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INCOME INEQUALITY, REGIONAL DISPARITIES, AND FISCAL DECENTRALIZATION IN INDUSTRIALIZED COUNTRIES

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Income inequality, regional disparities, and fiscal decentralization in industrialized countries(*)

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Abstract

In this paper we investigate the interactions among fiscal decentralization, income inequality and regional disparities, using a sample of 23 OECD countries over the period 1971-2000. We first explore the effects of fiscal decentralization on overall income inequality. We then test whether regional economic disparities influence the fiscal decentralization process. We use novel and robust measures of fiscal decentralization based on differences in the degree of both expenditure and tax autonomy. We also conduct several robustness checks to tackle the potential endogeneity and reverse causality issues. Our results highlight the importance both of the nature of fiscal decentralization - expenditure *versus* taxation - and of the extent to which responsibility and decision powers are really left to sub-central governments. While a higher degree of tax decentralization is associated with higher overall income inequality within a country, high regional disparities seem to be correlated with lower expenditure decentralization.

Keywords: *tax decentralization, expenditure decentralization, income inequality, regional economic disparities.*

JEL classification: *H700, H770, D310, R120*

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1. Introduction

Fiscal decentralization is the process through which powers over expenditures/revenues are delegated from the central government to the sub-central levels of government (both local and intermediate tiers). The extent of fiscal decentralization depends on the ability of lower tiers of government to make independent revenue and expenditure decisions within a geographic domain, without interference by the central government (Martinez-Vazquez and McNab 1997). In the last two decades many developed countries increased their degree of fiscal decentralization (Rodden 2003; Stegarescu 2005; OECD 2006, 2009a, 2009b; Bodman and Hodge 2010). Indeed, in Europe—on top of the already federalized Austria, Germany, and Switzerland—Belgium, Italy, and Spain have recently introduced widespread reforms in order to enhance regional autonomy (Ezcurra and Rodriguez-Pose 2010). France and Poland have taken more limited steps towards regionalization by creating regions and directly elected assemblies. The UK and Portugal opted for some forms of devolution and transferred a considerable amount of powers to their regions. Australia and Canada have also experienced modest increases to their already significant levels of decentralization.

The international debate on the advantages/disadvantages of promoting fiscal decentralization focused on efficiency issues. An important question which has received less attention is whether fiscal decentralization can affect the government redistributive function and the income distribution within a country. We believe this question to be particularly relevant. For example, in countries such as Spain and Italy that have high levels of income inequality and/or large regional economic and political disparities, increased fiscal decentralization could mitigate or exacerbate inequities. More generally, the policy question is if efficiency-improving reforms in the federal system may have undesirable equity consequences by inducing, for example, state and local governments to spend less for social services and to tax less from progressive bases.

The aim of this paper is to shed some light on the relationship between fiscal decentralization and inequality. The previous literature contains some attempts to capture the linkages between these two economic phenomena. However, no widespread consensus has emerged on the exact nature of the relationship, possibly because of some "confusion" around the inequality concept. Most previous studies have used this term without distinguishing between overall income inequality (usually measured with the Gini index calculated using household income - e.g. Akai and Sakata 2005), regional economic disparities (usually calculated with the Theil index calculated using economic indicators such as the Gross Value Added (GVA) or the unemployment rate - e.g. Beramendi 2003), and other types of within-country heterogeneity (e.g. of preferences among individuals across regions, Oates 1972). In this paper, we distinguish between overall income inequality and regional economic disparities and we use different models in order to grasp the relationships of these two variables with fiscal decentralization.

Income inequality and regional economic disparity have both undergone significant changes in recent years. In many OECD countries overall income inequality remained stable during the 1980s, but then steadily increased in the next two decades. After 2000, the picture is less clear (McCall and Percheski 2010). For instance, the United Kingdom and the United States show the highest increases, while in France and Belgium income inequality seems to have stabilized (Smeeding 2002; OECD 2008). As many countries are simultaneously embarked on active policies aimed at reducing income inequality and poverty (Galasso and Ravaillon 2000; Ravallion 1999, 2000; von Braun and Grote 2000; Rao 2002; Boex *et al.* 2005) as well as in fiscal decentralization reforms, it is important to clarify the extent to which these policy strategies interact with each other. On the other hand, there is no clear pattern in developed countries with regards to economic regional disparities. Indicators of dispersion of either GDP or GVA across regions show either upwards or downwards trends depending on the country under analysis.

Economic theory suggests many ways in which fiscal decentralization could be linked to inequality. The standard theoretical approach suggests that decentralization lowers the likelihood of redistribution amongst regions, increasing regional economic disparities (Stigler 1957; Musgrave 1959; Oates 1968, 1972; Brown and Oates 1987; Prud'homme 1995). Recent contributions argue instead that fiscal decentralization works as a commitment device, possibly exerting opposite effects (Weingast 1995; McKinnon 1995; 1997; Qian and Weingast 1997; Bahl *et al.* 2002; Gil Canaleta *et al*. 2004). Heterogeneous preferences across regions may lead individuals to favour decentralization (Oates 1972), while high territorial economic disparities may also increase the desire for greater regional autonomy and fiscal decentralization (Bolton and Roland 1997).

Fiscal decentralization, possibly introduced according to efficiency reasons, may affect overall income inequality through both direct and indirect channels. Direct effects may be triggered by changes in the progressivity of the tax system or in the composition of public expenditures. Indirect effects may be at work through a number of socio-economic factors (e.g. growth, stability, the degree of institutional development, the size of government intervention in the economy) that are likely to be affected by fiscal decentralization.

The interactions between fiscal decentralization and inequality have been widely investigated empirically. The dominant strategy is to assume that decentralization affects inequality, excluding the possibility of effects working in the opposite direction. In this vein, most authors studied regional disparities (e.g. Ezcurra and Pascual 2008), few others overall income inequality (e.g. Sepulveda and Martinez-Vasquez 2011). There are a few exceptions. Beramendi (2003, 2007) and Bodman and Hodge (2010) tested whether the degree of inequality in a country affects the incentives for fiscal decentralization. This empirical literature has reached mixed results with sometimes contradictory estimates of the sign of the decentralization-inequality relationship (see Section 2 for details), thus "our knowledge about the influence, if at all, of decentralization processes on interpersonal inequalities is extremely limited and patchy" (Tselios *et al.* 2011, p. 3).

This paper investigates how fiscal decentralization interacts with both overall income inequality and regional economic disparities using a sample of 23 OECD countries for the period 1971-2000. Our work is different from the previous literature in several respects. We first explore the effects of fiscal decentralization on overall income inequality in order to verify the normative prescriptions on the optimal level of government that should pursue redistributive objectives. Then, we look at the determinants of the decentralization process from a positive point of view, testing whether the level of regional disparities within a country actually determines the incentives for tax and expenditure decentralization.[1] This approach allows us to take into account the endogeneity problem according to which decentralization may affect inequality but may be affected by it as well. In both parts of the analysis we also use a number of methods that take into account the reverse causality which may bias the results.

We pay particular attention to the quality of fiscal decentralization, using several measures based on different degrees of both expenditure and tax autonomy. Most previous cross-country studies (e.g. Letelier 2005; Rodriguez-Pose and Ezcurra 2010; Sepulveda and Martinez-Vasquez 2011) have used the Government Finance Statistics (GFS) data published by the International Monetary Fund (IMF). These data permit us to build a measure of the degree of fiscal decentralization based on the share of sub-central expenditures (revenues) over consolidated public expenditures (revenues). However, the use of this measure presents relevant shortcomings. Although the GFS dataset has consistent definitions across countries over time, it ignores the effective degree of central government control and the real autonomy of sub-central governments over local tax rates, tax bases and local expenditures decisions. Indeed, no distinction between locally determined own taxes, piggybacked and shared taxes is made; likewise, local expenditures that are mandated or spent on behalf of central government wrongly appear as sub-national expenditures. The result is that the degree of fiscal decentralization tends to be overestimated (Ebel and Yilmaz 2003; Rodden 2003; Stegarescu 2005; Casette and Paty 2010). We follow the suggestion by Ezcurra and Pascual (2008, p. 1199), "in the future (...) it might be interesting to include different decentralization measures in the analysis in order to capture the various dimensions of the devolution processes". As argued by Rodden (2003), it is not fiscal decentralization *per se* that matters, but what form it takes. Thus, we use several measures of fiscal decentralization constructed by Stegarescu (2005) that allow for different degree of real autonomy of sub-national governments (see Section 3 for details). We adopt this approach because no single indicator is able to adequately capture the real level of fiscal decentralization of a country.

The inequality data also deserve some attention. For the overall income inequality variable, measurement problems and limited data availability are a well-known problem in the literature. In particular, it is hard to find series with consistent definitions across a significant number of countries.

[1] Using the words of Arzaghi and Henderson (2005, p. 1161): "There is an enormous normative literature on the role of regional governments (...). However, the positive issue of why and when decentralization occurs has received much less attention."

The regional disparities data also pose some problems of availability. In order to overcome these issues, in this study we take advantage of both the Texas Inequality Project data and of the Cambridge Econometrics European Regional Data. Thus, we are able to use panel data techniques (Wooldridge 2002) to offer evidence for a group of developed countries.

Our results are the following. Fiscal decentralization seems to positively affect overall income inequality. Therefore, a higher level of decentralization is associated with a more unequal distribution of income across individuals within a country. Although this result is fairly robust, the use of different indexes measuring the extent of fiscal decentralization confirms that the proper definition of the variables plays a crucial role in this kind of analysis. Indeed, it seems that the effects of fiscal decentralization on overall income inequality are mainly driven by the tax side. On the other hand, the effects triggered by expenditure decentralization are qualitatively similar, but are measured with a lower precision. Our findings appear to fit well with the traditional approach (Stigler 1957; Musgrave 1959; Oates 1972) concerning the minimum role to be played by local governments with regards to redistributive policies. The strong evidence towards the importance of tax decentralization seems to better qualify this normative prescription.

On the other hand, regional economic disparities (measured with the GVA and GDP disparities across regions within the country) are negatively associated with fiscal decentralization. In other words, a higher level of economic heterogeneity across regions within a country is associated with lower levels of decentralization. This is consistent across specifications using expenditure decentralization measures only, while the result does not hold looking at the tax side of decentralization. Reasoning from an equity-enhancing perspective, we hypothesize that rising economic heterogeneity across regions may require an intervention from the highest level of government in order to guarantee a higher level of equalization of resources across different regions, especially through expenditure tools. This seems close to the seminal prescription by Tiebout (1956), according to which higher income groups and regions can use fiscal decentralization to protect themselves against undesired redistributive policies. This is also consistent with the normative prescriptions: the negative effect of regional disparities on fiscal decentralization suggests that, for equity reasons, higher economic disparity across sub-national governments may work against decentralization processes within a country.

In general, a key point of our findings is that the nature of fiscal decentralization (i.e., tax *versus* expenditure) is crucial: considering different kinds of decentralization can lead to different results. Moreover, the degree of real autonomy and responsibility on tax and spending decisions assigned to local governments seems to matter. Finally, the results of both analyses seem to confirm the important link between fiscal decentralization and equality issues despite the scarce attention of the previous empirical literature that mainly focused on efficiency-related considerations on fiscal decentralization.

The remainder of the paper is organized as follows. Section 2 contains an extensive review of the empirical literature on the relationship between fiscal decentralization and inequality. Section 3

illustrates the variables and the empirical strategy used in our analysis. Section 4 presents and discusses the estimation results. Section 5 concludes.

2. Literature review

Two main issues are particularly important: the direction of causality between decentralization and inequality, and which kind of inequality - income or regional - should be referred to. There has been some "confusion" in the literature with regards to the term "inequality", in the sense that it has been used to label many different concepts and measures. In the following literature review we distinguish between overall income inequality and regional disparities, a distinction that constitutes the base of the subsequent empirical analysis.

As for the direction of causality between inequality and decentralization, some authors assume that fiscal decentralization affects inequality (e.g. Proud'homme 1995; Peterson 1995). Others consider inequality to be a determinant of fiscal decentralization (e.g. Panizza 1999; Letelier 2005; Bodman and Hodge 2010). As for the income/regional inequality issue, some works concentrate on the relationship between fiscal decentralization and regional disparities (e.g. Gil Canaleta *et al.* 2004; Kim *et al.* 2003), while other contributions look at the relationship between fiscal decentralization and income inequality (Beramendi 2003; Sepulveda and Martinez-Vazquez 2011).[2]

The rest of this section is devoted to a deeper analysis of the main findings of the previous literature. Subsection 2.1 reviews the studies where the direction of causality is assumed to run from fiscal decentralization to inequality. Subsection 2.2 looks at the results found when the direction of causality is reversed, i.e. inequality affecting the process of fiscal decentralization.

2.1. The impact of fiscal decentralization on inequality

Assuming that fiscal decentralization affects inequality does not help in forming expectations about the sign of this relationship. The potential channels relating fiscal decentralization to either income inequality or regional disparities are multiple and lead to complex interactions. Moreover, issues such as the nature (or quality) of fiscal decentralization (i.e. revenue *versus* expenditure decentralization: see Rodden 2003; Rodriguez-Pose *et al.* 2009), the relative importance of the government in the economy, and the degree of effective autonomy assigned to sub-central governments (determined by the legislative competencies and by the degree of power over spending, tax-raising, and debt-raising decisions - Stegarescu 2005) can play a crucial role.

[2] Some empirical studies (von Braun and Grote 2000; Sepulveda and Martinez-Vazquez 2010) find that decentralization may also affect poverty, both directly and indirectly. Direct effects relate, for instance, to regional targeting of transfers. Indirect effects may pass through the efficiency of local public services and their effects on growth. Zhang (2006) tests the implication of fiscal decentralization for economic growth and inequality in China.

For example, analyzing the relationship between fiscal decentralization and income inequality involves some considerations concerning the role of sub-national tiers of government in performing redistributive policies. The traditional theory of fiscal federalism (Stigler 1957; Musgrave 1959; Oates 1968, 1972, 1999) is sceptical about the assignment of redistribution functions to local governments due to both equity and efficiency problems. On the other hand, more recent theoretical and empirical contributions (Ashworth *et al.* 2002; Bahl *et al.* 2002; Tresch 2002; Barr 2004) recognize the important role of sub-central units in implementing redistributive policies. The actual degree of fiscal autonomy granted to sub-national governments remains a key point. Assuming the reduction of income inequality to be a policy objective, sub-central governments may not be able to achieve it through their tax policies - i.e. levying progressive taxation - as they generally do not have discretion over major tax bases. Yet, they may effectively influence the income distribution by acting on the expenditure side of the budget, over which they typically have a higher degree of autonomy (e.g., implementing pro-poor policies).

Table 1 summarizes the results of the studies investigating the effects of fiscal decentralization on inequality. For each contribution, we report the utilized measure of inequality (income/regional) the sample under analysis, and the estimated sign of the relationship between the two variables of interest.

Insert Table 1 about here

Most studies analyze the effects of fiscal decentralization on some measure of regional disparity. The empirical evidence seems to capture a negative relationship between fiscal decentralization and regional disparities in developed countries (see e.g. Gil Canaleta *et al.* 2004). The opposite result seems to hold for less developed countries (see e.g. Rodriguez-Pose and Ezcurra 2010). This second finding seems to find support in Prud'homme (1995), according to whom fiscal decentralization could have spatially regressive effects as a result of the weakening of the equalization role of central governments in economies characterized by great territorial inequality. On the other hand, the negative relationship found for the developed countries sample may be due to fiscal decentralization leading to a more balanced distribution of resources across space (as argued by Qian and Weingast 1997). This result highlights the practical relevance of the theoretical arguments of the "second generation" models of fiscal federalism (Weingast 1995; McKinnon 1997; Qian and Weingast 1997). According to these models, sub-national governments can play an important role in generating a more balanced distribution of income across regions. This is based on the incentives triggered by inter-regional competition after fiscal devolution and on the premise that the behaviour of local policymakers is conditioned by the need to represent citizens.

However, a closer look at the previous empirical evidence reveals that the picture is more complicated than what a first glance at Table 1 could suggest. For instance, one of the main results of

Akai and Sakata (2005) is that it is the achievement of autonomy by fiscal decentralization that negatively affects regional disparities, while the mere share of expenditure or revenue share in fiscal decentralization has no effects. As another example, the findings of Sepulveda and Martinez-Vazquez (2011) seem to hold only for the countries in which the share of the government sector in the economy is higher than 20%.

A common issue in the literature is how to precisely measure the level of fiscal decentralization. In particular, this variable is commonly approximated with the sub-national share in total government expenditure (see e.g. Ezcurra and Pascual 2008; Sepulveda and Martinez-Vazquez 2011), leaving out of the analysis the potential effects of any revenue decentralization process. Moreover, the common source for this data is the GFS database made by the IMF (e.g. Beramendi 2003; Ezcurra and Pascual 2008; Rodriguez-Pose and Ezcurra 2010). The use of such a measure presents relevant shortcomings, as argued above, and could affect the soundness of the studies that made use of it. Indeed, the share of local revenue (expenditure) over the same total (or general) revenue (expenditure) is not a sufficient condition to identify fiscal decentralization. Key elements such as real autonomy, responsibility, power and control over tax/expenditure decisions are wrongly kept outside from this simple definition.

Finally, the last rows of Table 1 show that mixed results arise from analyses of the relationship between fiscal decentralization and overall income inequality. The intuition for the positive relationship found by Beramendi (2003) could be that with a higher degree of decentralization, regions may take different decisions with regards to redistribution, leading to a more unequal income distribution across individuals within the country. On the other hand, Martinez-Vazquez and Sepulveda (2011) find that decentralization decreases income inequality. Therefore, inequality-reducing social welfare expenditures seem to be more effectively implementable at the local level in the presence of central redistribution programs financed by a large central public budget. Neyapti (2006) finds that revenue decentralization leads to increased inequality, but when coupled with good governance it can 'improve' the distribution of income. Tselios *et al.* (2011) claim that fiscal decentralization decreases interpersonal income inequality within regions (by using microeconomic data for more than 100,000 individuals in the EU), while Morelli and Seaman (2007) find the opposite considering intra-regional inequality within the United Kingdom and the devolution process here occurred.[3]

Additional interesting insights come from several existing single-country analyses that are more amenable to taking into account cultural, historical and institutional peculiarities than cross-sectional and panel analyses. On the other hand, their results are limited to the evidence of single national

[3] It should be noted that for the sake of clarity we grouped several studies under the two labels "regional disparities" and "overall income inequality" although the variables used in the studies are sometimes different. For instance, Tselios *et al.* (2011) start from micro-data to build within-region inequality indexes, while Neyapti (2006) uses the Gini index calculated on household incomes within-country, as we do.

experiences (e.g., see Kanbur and Zhang 2005). Bonet (2006), for example, finds that increased decentralization has been accompanied by an increase in territorial disparities in Colombia. The fact that decentralization favours current expenditure increases (e.g. public wages), rather than capital/infrastructure investments lies behind this result.

2.2. *Inequality and other determinants of fiscal decentralization*

An important strand of the literature is devoted to the investigation of the determinants of fiscal decentralization. Although far from having reached a widely agreed consensus, the theoretical literature has identified some key determinants of fiscal decentralization such as country size, income per capita, differences in preferences and the level of democracy (Panizza 1999). In particular, country size, income per capita, ethnic fractionalization, and the level of democracy appear to be positively correlated with the degree of fiscal decentralization. Theories attempting to explain secessions (as an extreme example of devolution/decentralization processes) and the optimal size of countries suggest that heterogeneous preferences for redistributive policies may also influence the decentralization decisions (Alesina and Spolaore 1997; Spolaore 2008). Demand for decentralization may also be driven by regional economic differences (Bolton and Roland 1997; Beramendi 2003). For instance, fiscal decentralization may be "used" by higher income groups and regions to protect themselves against undesired redistributive policies. Tiebout (1956) states that the "voting by feet" process diminishes incentives for net fiscal redistribution (through taxes and public goods and services provision) in communities where the level of income is high. Hence, a highly decentralized system is less likely to reach regional agreement to implement significant equalization policies (Martinez-Vazquez 1982).

To some extent, these ideas are in line with one of the corollaries of the "Decentralization theorem" (Oates 1972), according to which the benefits of decentralization are positively correlated with the inter-regional variance in demands for publicly provided goods. Decentralization-enhancing reforms are also determined by political motivations viewing fiscal decentralization as a remedy to central government failures and as an efficient tool to solve certain national problems such as ethnic conflicts and/or separatism issues (Sepulveda and Martinez-Vazquez 2011). Shah (2004) also sees fiscal decentralization as a way of strengthening democratic political institutions and basic civil rights.

With so many different avenues suggested by the theoretical literature, it is unsurprising that the empirical literature has used a wide range of different specifications to investigate the determinants of fiscal decentralization. However, the role of some kind of inequality (e.g., among individuals' income; between regions; within regions; and so on) in determining the decentralization process seems to be neglected by the existing empirical literature, with only few exceptions as shown in Table 2 which

summarizes the variables that have been found to significantly affect fiscal decentralization decisions. For each variable, we report the type of relationship that has been found, and the article of interest.[4]

Insert Table 2 about here

Table 2 shows that a number of different variables have been investigated as possible determinants of fiscal decentralization. Although mixed results seem to hold for most of them, there are several empirical regularities. For example, most studies find a positive relationship between fiscal decentralisation and per capita income, with only a couple of articles concluding in favour of an uncertain relationship (Pryor 1967; Beramendi 2003).

Nevertheless, there are some caveats that must be taken into account even in looking at this positive relationship. Letelier (2005) notes that, as income rises, societies tend to desire a greater degree of income redistribution and socially oriented policies. Combined with a growing demand for infrastructure to cope with higher standards of living, this may increase pressure for funds to be redistributed to higher levels of government. Hence, reforms leading to decentralization are less likely to occur. In short, the negative effect of income on decentralization comes from the change in the structure of demand for public goods as a country's income grows. Wallis and Oates (1988) state that the fiscal decentralization processes are subject to divergent forces, namely the pro-decentralization population growth versus the pro-centralization income growth. Finally, Bodman and Hodge (2010) find that the income effects on fiscal decentralization differ for OECD countries with respect to middle and low income nations. A positive relationship is estimated for the former group, but a negative one seems to be at work in the latter group of countries.

Besides income, many other explanatory variables have been tested as determinants of fiscal decentralization in the empirical literature: population, country size, ethnic fragmentation, urbanization, trade openness, unemployment, and intergovernmental grants. Robust evidence seems to exist for a few of those (e.g., the positive relationship between country size and fiscal decentralization), but for the majority of the variables mixed results arise from the literature. This may be due to the various specifications that have been used to investigate the causes of fiscal decentralization, different samples, different time spans under analysis.

Table 2 also shows that inequality has rarely been related to the evolution of fiscal decentralization. Beramendi (2003, 2007, 2008) highlights that the political process might make decentralization endogenous to inequality and its territorial structure: it may not be the case that it is "decentralization that causes inequality, but rather pre-existing economic inequalities that drive the decentralization of the welfare state, which in turn reproduces the pre-existing patterns of inequality" (Beramendi 2007, p. 786). In other words, it seems possible to identify some channels by which the

[4] We took advantage of the work of Letelier (2005): Table 2 extensively draws from Table 1 in that article (Letelier 2005, 162).

income distribution has shaped the process of fiscal decentralization. The rationale for this is that the choice among alternative institutional configurations (centralization *versus* decentralization) is not neutral with respect to the distribution of disposable income in society. Beramendi (2008) suggests that inequality is positively associated with decentralization when parties are very centralized at the national level and/or sub-national representatives at the national level are directly elected. Conversely, as the balance of power between local and national elites becomes more equal (e.g. federations with an integrated party system), inter-regional differences in the incidence of inequality are less and less reflected in the actual fiscal design of institutions.

Beramendi (2003, 2007) refers to the link between regional disparities and the preferences on decentralization of redistributive policies. According to this idea, differences in the demand for redistribution are associated with regional income disparities.[5] The main research question is the following: how does the structure of inequality determine the incentives for more/less decentralized welfare policies? Beramendi (2007) finds a positive relation between regional inequality and the degree of decentralization of redistribution in OECD countries. A similar mechanism has been suggested by Panizza (1999) from a theoretical point of view: different preferences across communities may help to determine the level of effective decentralization, assuming that a more heterogeneous population is more likely to prefer a higher level of expenditure decentralization. Underlying causes of this diversity may be traced back to factors such as differences in language and ethnicity (Bodman and Hodge 2010).

Whether or not fiscal decentralization is determined by regional disparities is an issue worth investigating. So far, the limited availability of disaggregated data capable of capturing the level of regional inequality within countries with different degrees of fiscal (and/or political) decentralization has restricted the possibility of accurate empirical tests. In the second part of the empirical analysis we offer a contribution in this direction.

3. The empirical strategy

To study the relationship between inequality and fiscal decentralization, we employ two different empirical models. First, we estimate the effects of fiscal decentralization on overall income inequality, controlling for the variables typically thought to influence the latter. We use data for 23 OECD countries for the period 1971-2000 (details in Section 3.1). Second, we use regional economic disparities data to investigate the determinants of fiscal decentralization in 17 OECD countries for the

[5] Regional disparities are measured by between-group share of the Theil index (Beramendi 2003) based on an income decomposition analysis in which the sub-national units are the partition criteria and by the ratio between the highest and the lowest regional Gini coefficient of household market equivalent income per adult (Beramendi 2007).

period 1981-2000 (details in Section 3.2). This allows us to test whether regional economic disparities affect the decisions of the government with regards to granting a lower/higher degree of revenue and/or expenditure autonomy to local governments. The choice of sample under investigation is dictated by data availability, particularly because of the lack of fiscal decentralization data after 2000. The sample used in the second part of this analysis is smaller due to the lack of regional-level data for non-European countries and for the years prior to 1980. The USA is included in the sample thanks to the utilization of a different source (see the Appendix for details).[6]

In both parts of the analysis, the use of a number of different indicators of fiscal decentralization (reflecting various degrees of autonomy given to sub-national governments) permits us to gain new insights into the issues at stake. The estimation of different specifications to take into account endogeneity problems also allows us to present new and robust evidence.

It is worth spending a few words on the two different inequality variables used in the analysis. The two series are not related with each other, in the sense that we are not able to construct a "broad" measure of overall income inequality divided into between-region income inequality (i.e. regional disparities) and within-region income inequality. Rather, the two variables differ considerably one from the other, but they share the property of having been referred to as "inequality" in the previous literature. Because of that, it emerges that inequality may affect decentralization, but in turn decentralization may affect inequality as well. Should this "inequality" be a unique variable, we would be facing the well-known bias due to simultaneous causality (i.e. the simultaneous equations bias, see Stock and Watson 2011). Basically, using a single inequality measure would make it impossible to test the fact that inequality affects fiscal decentralization but at the same time that fiscal decentralization is affected by it. However, we are able to overcome this issue by using two different inequality variables: the first related to overall income inequality (measured with the Gini index calculated on gross household income); the second builds from the GVA and GDP of the within-country regions (measured by a Theil index).

Fixed effect estimates are performed in both analyses to control for country-specific time-invariant factors that may affect the relationship between inequality and fiscal decentralization (e.g., institutional factors such as whether the country is federal). In addition, we test the robustness of the results estimating a number of alternative specifications to deal with the issues of endogeneity and reverse causality.

[6] We tried to extend the sample beyond 2000 but it proved impossible to do so. In particular, tax and expenditure decentralization data from the IMF/Eurostat datasets do not permit us to replicate the construction of the decentralization indexes built by Stegarescu (2005) and also adopted in our analysis. Crucial information that Stegarescu (2005) used to construct such indexes was contained in an OECD (1999) study that has not been updated since then.

3.1 Overall income inequality and fiscal decentralization

The effect of fiscal decentralization on overall income inequality is analyzed by estimating the following equation:

$$TOTINEQ_{i,t} = \alpha_{i,0} + \alpha_{i,1} FD_{i,t} + \beta_{i,j}^{'} \mathbf{Z}_{i,t} + u_{i,t}, \qquad (\mathbf{1})$$

where $TOTINEQ_{i,t}$ denotes overall income inequality (measured by the Gini index calculated using gross household income); $FD_{i,t}$ stands for one of the seven different indexes of fiscal decentralization, used one at a time, depending on the specification; $\mathbf{Z}$ is a set of controls for income inequality: a) *GDPPC* is per capita GDP (both in level and squared to check for the Kuznets hypothesis); b) *GOVSIZE* captures the importance of the public sector in the economy (measured by the ratio of total government expenditure over GDP); c) *OPEN* is trade openness (measured as the sum of imports and exports divided by GDP); d) *POPGR* stands for population growth; e) *EDUC* is education (measured as the average years of primary education in the population). Country-fixed effects ($a_{i,0}$) are included to control for country-specific patterns of the decentralization process, while $u_{i,t}$ is the disturbance term. Table 3 contains some descriptive statistics of the variables used in this part of the analysis. Details on the construction and the sources of the variables can be found in the Appendix.

Insert Table 3 about here

It is worth outlining the fiscal decentralization indexes built by Stegarescu (2005). The use of these indexes aims to solve the two main (and well-known) shortcomings of the IMF fiscal decentralization data, widely used in the previous empirical studies. First, these data do not permit us to distinguish between "the extent to which the degree of decentralisation reflects the assignment of functions and resources to different levels of government and the extent to which it merely reflects the relative size of sub-central government activities" (Stegarescu 2005, p. 305). Second, they are "imperfect indicators of the share of public goods supplied by sub-central governments and of the actual degree of decentralisation of the public sector" (Stegarescu 2005, p. 305).

In our analysis, we use three tax revenue decentralization indexes and four expenditure decentralization indexes. All indexes are built as ratios of local revenues/expenditures over total national revenues/expenditures. On the tax revenue side, the narrowest measure is *TD1*: this is the share of sub-central governments' own tax revenue over the total (national) tax revenue. This measure only takes into account the revenues over which local governments have complete autonomy. *TD2* is a broader measure. It differs from *TD1* because it also includes shared tax revenues. Finally, the broadest measure (*TD3*) is the "conventional" ratio between sub-central governments' total tax

revenues and national total tax revenues. This means that this index can capture the revenues that are collected at the local level but decided entirely by the central government.

On the expenditure side, we use four different indexes. *ED1* is the broadest measure. It is calculated as the ratio of the sub-central governments' expenditure (minus the transfers to other levels of government) over the general government total expenditure (minus the intergovernmental transfers). Hence, *ED1* reports only amounts spent directly by sub-national governments ("direct expenditure" according to Stegarescu 2005, p. 304) but not necessarily financed with own local resources as, in this case, intergovernmental transfers are allocated to the recipient level. *ED1S* adds social security transfers to *ED1*. A narrower measure of expenditure decentralization is *ED2*, that is *ED1* "adjusted for grants received from central government, thus taking into account all public expenses financed from formally own resources (self-financed expenditure", Stegarescu 2005, p. 304). In other words, *ED2* does not include intergovernmental transfers received from other tiers of governments (mainly from the centre) as they are allocated to the grantor level. Again, *ED2S* includes social security transfers.

One shortcoming of these indexes is the fact that there is no distinction between regional and local governments: all tiers of sub-national governments (i.e., regions, states, provinces, counties, territories or districts municipalities, communes or local councils) are aggregate into a single group. This horizontal aggregation does not take into account the number of participating sub-central governments and the differences in competencies among them. A more correct measure of fiscal decentralization might consider the horizontal disaggregation of fiscal data by jurisdictions. Yet, the main difficulty with this involves finding such indicators that are comparable across countries.

Another shortcoming is the following: these indexes do not tell us anything about the types of expenditure taken into account and, as a consequence, anything about the expenditure composition. For instance, it could be worth exploring the different effects of education expenditure decentralization *versus* health expenditure decentralization. Unfortunately, the lack of data with such a high level of details for a panel of countries poses some limitations to our present analysis.

Equation (1) is estimated for 23 OECD countries over 5-year, non-overlapping periods: 1971-1975, 1976-1980, 1981-1985, 1986-1990, 1991-1995, and 1996-2000. There are three main reasons for adopting this procedure. First, we neutralize the effects of cyclical fluctuations. Second, the period averages should allow us to improve the quality of the inequality variable, which is potentially subject to measurement errors (Martinez-Vasquez and Sepulveda 2011). Third, our yearly dataset contains missing values, a problem which is reduced by computing 5-year averages (Easterly 1999; Higgins and Williamson 1999; Li and Reuveny 2003).

3.2 Fiscal decentralization and regional economic disparities

We investigate the effect of regional economic disparities on fiscal decentralization by estimating the following equation:

$$FD_{i,t} = \alpha_{i,0} + \alpha_{i,1} REGDISP_{i,t} + \beta_{i,j}^{'} \mathbf{X}_{i,t} + v_{i,t}, \qquad (2)$$

where $FD_{i,t}$ denotes one of the seven different indexes of fiscal decentralization constructed by Stegarescu (2005), used one at a time, depending on the specification; $REGDISP_{i,t}$ stands for the level of regional economic disparities within a country (measured by the Theil index calculated using the GDP and GVA of the regions/states within each country) ; **X** is a set of fiscal decentralization determinants such as: a) *GOVSIZE* is government size; b) *GDPPC* is per capita GDP; c) *OPEN* is trade openness; d) *POPGR* stands for population growth; e) *EDUC* is education; f) *LEFT* and *RIGHT* are two dummies that represent the ruling political party (they are equal to 1 in each period when there has been a majority of either left or right orientation in the cabinet; the reference category being a balanced cabinet).[7]

Country-fixed effects ($\alpha_{i,0}$) are included to control for country-specific patterns and time-invariant determinants of the decentralization process, such as country size, and the level of democracy (since the sample is made by Western European countries and the US). $v_{i,t}$ is the disturbance term. Table 4 contains some descriptive statistics of the variables used in this part of the analysis.

Insert Table 4 about here

Equation (2) is estimated for 17 OECD countries over 5-year non-overlapping periods: 1981-1985, 1986-1990, 1991-1995, and 1996-2000.

4. Empirical results

4.1 Overall income inequality and fiscal decentralization

Table 5 reports the estimates of seven different specifications of the model in equation (1), one for each of the fiscal decentralization indexes used in the analysis.

[7] In principle, a variable capturing the quality of the governance could have entered the equation as a control. However, governance quality data going back to 1980 are hard to find (e.g. the governance indicators by Kauffmann *et al.* (2004) start in 1996. However, we believe that controlling for the balance of power in the country can be an effective control for the political side of the determinants of fiscal decentralization.

Insert Table 5 about here

The results suggest that fiscal decentralization directly affects overall income inequality, as the estimated coefficients of the seven different measures of decentralization are positive in all specifications. This finding seems to fit well with the traditional normative approach (Stigler 1957; Musgrave 1959; Oates 1972) according to which income redistribution and related policies should not be left to sub-central governments - as decentralization increases inequality of income distribution. According to this reasoning, the pursuit of an overall horizontal equity principle calls for the withdrawal of decentralization, since local governments are likely to follow their own equity targets independently from each other (see also Tresch 2002) with unfavourable effects on the overall income distribution within the country leading to some kind of "different treatment of equals". Given a higher degree of decentralization, regions may pursue different redistribution strategies - possibly undermining the redistributive power of a nation - which may increase overall income inequality. This does not imply that decentralization cannot have any redistributive effects at the local level in the presence of a high degree of decentralization.

However, in aggregate, a higher decentralization is associated with a less equal income distribution as social and redistributive policies implemented within regional boundaries can flatten differences across individuals within them, but - especially with strong inter-jurisdictional disparities - they are likely to worsen the overall income distribution and increase differences across individuals within the national territory. The total impact of fiscal decentralization on overall income inequality may therefore depend on the relative importance of its components (intra- and inter-jurisdictional inequality). Such a hypothesis is certainly appealing, but cannot be directly assessed here, basically due to wide data limitations. However, the reverse condition can be verified by investigating the impact of interregional income inequality on the decentralization process, as we present in the next section.

Table 5 also shows that using different measures of decentralization may lead to different findings, highlighting the importance of the quality of fiscal decentralization. Indeed, the tax decentralization coefficients (*TD1, TD2,* and *TD3*) are all positive and statistically significant; in all cases, the estimates range between 0.10 and 0.14. More precisely, it emerges that the narrowest revenue measure (*TD1*), which best represents the real and effective degree of autonomy of local governments, has the largest effect (0.144) on (increasing) overall income inequality. The broadest index (*TD3*) shows the smallest - again positive - coefficient (0.097). This suggests than the worsening of the overall income distribution at the national level is likely to be more pronounced when the tax decentralization process involves "real" increases in local governments' autonomy, i.e. when sub-national tiers of government can independently decide and set their taxation policy.

Consequences on income disparity due to expenditure decentralization seem qualitatively similar, but the coefficients associated to the expenditure decentralization indexes (*ED1, ED1S, ED2*, and *ED2S*), although all positive, are measured with a lower precision and are not statistically significant at standard levels. Different findings on the expenditure side could be obtained with a more detailed disaggregation of local expenditures considering the expenditure composition and which type of expenditure is decentralized (e.g., health, welfare, education...) as it is likely that the relationship between inequality and decentralization may be affected by how much of total spending on education, for example, is decentralized and managed locally rather than centrally, given the known important role of education in reducing income disparities across individuals. Controlling for the national level of education (as we do by including the *EDUC* variable) permits us to take into account this important variable in a way that overcomes the limitations of the data.

To sum up, results of Table 5 suggest that tax decentralization is the main contributor to rising income inequality attributable to decentralization. This increasing-inequality effect, driven by the revenue side, is likely to depend on the fact that the importance of local taxes approximates the degree of responsibility of local governments in defining public policies better than the expenditure indicators can do. Moreover, this result is stronger when real autonomy and decision power are left to sub-central governments

Some of the previous literature is consistent with this finding. Sepulveda and Martinez-Vazquez (2011) claim that decentralized tax policies are likely to directly affect disposable income distribution among individuals within a country. Fiscal decentralization promoted through the revenue side can reduce the progressivity of the tax system altering the distribution of disposable income at the national level. This is due to the fact that sub-national governments are mainly financed by indirect taxes (which tend to be more regressive) and property taxes (which are generally less progressive than the tax mix used by the central government). Both kinds of taxes mitigate the progressivity of the national tax system according to the conventional wisdom about the incidence of local taxes (see, e.g., Boex *et al.* 2005). Hence, revenue decentralization can exert a regressive effect on the overall income distribution.

The rest of the explanatory variables carry interesting information which is robust across the seven different specifications. GDP significantly affects income inequality in a non-linear way, with positive coefficients associated with the level and negative coefficients associated with the squared term. This provides support for the Kuznets hypothesis, with a U-shaped relationship between inequality and GDP. The other controls (education, openness, population growth and government size) all show non-significant coefficients, although the sign of the estimates is consistent across the various specifications. Keeping in mind the low precision of the estimated coefficients, higher values of openness and population growth seem to increase inequality. On the other hand, a higher educational level seems to be associated with a lower level of income inequality (the estimated coefficients range between -2.14 and -3.00).

Likewise, government size is negatively related to inequality. This result calls for a check of possible interactions between the level of fiscal decentralization (positively associated with inequality) and the importance of the public sector in the economy. The estimation of an alternative specification including an interaction term between fiscal decentralization and government size (not reported) suggests that only in two specifications out of seven (using the two broader measures of expenditure decentralization *ED1* and *ED1S*) are the interaction effects on inequality significant. However, for average values of government size, the evidence still points towards a negative influence of decentralization on inequality. Results for the control variables are not affected.

4.1.1 Robustness checks

To control for possible cross-sectional correlation, we re-estimate equation (1) using Feasible Generalised Least Squares (FGLS) techniques with fixed effects. The FGLS estimation allows us to introduce time invariant variables that may reflect important economic and institutional aspects of the model.

Insert Table 6 about here

Table 6 confirms the previous results on the positive relationship between fiscal decentralization - mainly based on taxes - and overall income inequality. Actually, positive and significant coefficients also emerge considering the two broader measures of expenditure decentralization (*ED2* and *ED2S*).

Moreover, for robustness purposes we re-estimated the impact of fiscal decentralization using different specifications to deal with the issues of endogeneity and reverse causality. Tables 7 and 8 report the estimates of a specification where the lagged dependent variable is added to the model described by equation (1).

Insert Tables 7 and 8 about here

The results confirm the positive relationship between fiscal decentralization and income inequality, and the measure of goodness of fit of the model is now notably higher. In particular, the decentralization coefficients are significant and positive (Table 7, fixed effects estimation) in the cases of the two broader measures of both tax and expenditure decentralization (*TD2-3* and *ED2-2S*, respectively), even though the coefficients are of smaller magnitude with respect to the benchmark specification. As for the system-GMM results (Table 8 - necessary due to the inconsistency of the fixed effects estimates that include the lagged dependent variable), the decentralization coefficients are positive in all cases, but never significant. We believe this to be due to the small time dimension of the panel (see Everaert and Pozzi 2007). In fact, Cameron and Trivedi (2005) warn that this kind of estimators applied to panels with a small number of units (countries in our case) leads to a large loss

of efficiency. The coefficient of the lagged dependent variable is in all specifications close to 1 and statistically highly significant, showing the high inertia characterizing overall income inequality.

Table 9 reports the result of a model estimated with the purpose of dealing with the reverse causality issue. In this case, the 5-year average measures of fiscal decentralization are replaced by the values of the indexes at the beginning of every period (Furceri and Zdzienicka 2011). The results confirm the findings of the benchmark estimation. There is a small difference in the estimated coefficients of *ED2* and *ED2S*, which are now significant at the 10% level.

Insert Table 9 about here

To sum up, it seems that even controlling for endogeneity and reverse causality (and even allowing for a non-linear relationship), there is a strong evidence in favour of a positive relationship between fiscal decentralization and overall income inequality.[8] Although results may vary depending on the fiscal decentralization measure used in the analysis, the evidence suggests that higher degrees of tax decentralization are indeed associated with higher levels of income inequality measured by the Gini index.

4.2 Fiscal decentralization and regional economic disparities

Table 10 reports the estimates of seven different specification of the model of equation (2), one for each of the fiscal decentralization indexes used in the analysis.

Insert Table 10 about here

The above results suggest that regional economic disparities directly affect fiscal decentralization, as the estimated coefficients associated with the former are negative in all specifications but two. Hence, from a positive viewpoint, decentralization does not seem to be the right reply to high regional disparities as, when they increase, they call for lower fiscal decentralization. To some extent, this result seems to be complementary to that found in the first part of the analysis. Indeed, as decentralization can worsen income distribution across individuals nationwide, at the same time high economic regional disparities (i.e., GVA inequality across regions) does not seem to justify fiscal decentralization reforms, based on equity considerations.

In detail, the coefficients are statistically significant at standard levels (and quantitatively larger as well) when the four expenditure decentralization indexes (*ED1*, *ED1S*, *ED2*, and *ED2S*) are used as dependent variables. This indicates that a negative relationship is at work between regional disparities

[8] An additional robustness check in which we add period dummies to the benchmark specification (not reported) confirms the signs of the coefficients, but not their levels of statistical significance.

and expenditure decentralization. In detail, when the wider measures of expenditure decentralization (*ED1, ED1S*) are considered, the independent variable shows higher coefficients (respectively, -0.389 and -0.229) rather than when the narrower indexes (*ED2, ED2S*) are employed (-0.212 and -0.176, respectively). This suggests that higher regional disparities are associated with a lower proclivity towards "direct expenditure" instead of "self-financed expenditure" decentralization. To some extent, we may affirm that central government grants to lower levels of government (included in *ED1* and excluded in *ED2*) tend to be hardly substituted by own financial resources when there are high regional economic disparities.

On the other hand, the relationship between tax decentralization and regional disparities is measured with a lower precision (the *TD1*, *TD2*, and *TD3* coefficients are not statistically significant at standard levels). This once again confirms the importance of the nature of fiscal decentralization, since looking at the different sources of decentralization leads to different findings.

As for the rest of the explanatory variables, the importance of education is consistent across all specifications, with positive and highly statistically significant coefficients. Results are less clear for government size, GDP, openness and population growth, with high standard errors that do not permit us to draw a coherent picture of their effects on fiscal decentralization.

Our finding of a negative relationship between expenditure decentralization and regional economic disparities may seem surprising and needs an explanation. In fact, it is divergent from the traditional theory according to which some kind of heterogeneity - e.g. of preferences (Oates 1972) - calls for different provisions of public policies across regions (i.e., greater decentralization) leading to regional disparities according to efficiency reasons. Indeed, we may expect that as preferences heterogeneity may favour decentralization attitudes (according to the first generation theory of fiscal federalism), high territorial income disparities may increase the desire for fiscal decentralization based on efficiency considerations. Interregional differences - also increasing as a consequence of economic integration and regional specialization (Stegarescu 2009) - can enhance the benefits of decentralization.

However, considering the trade-off between equity and efficiency, the following intuition can be provided. Reasoning on equity grounds, higher income heterogeneity across regions may require an intervention of the highest level of government in order to guarantee an equal redistribution - possibly through expenditure tools. In other words, within the same country rich regions could support greater fiscal decentralization characterized by more autonomy and power to spend in their own territory, while poor regions would need a more coordinated and cooperative (i.e. centralized) institutional system in order to satisfy their demand for income redistribution, social policies, infrastructures, and analogous public expenditures. The final effect on fiscal decentralization depends on which of the two groups will prevail.

As pointed out by Bolton and Roland (1997), whereas well endowed regions benefit from extended fiscal autonomy and competition that permits to escape from interregional redistribution through national taxes, poor unproductive regions would call for central government support and

income redistribution. Therefore, a key point remains the following: fiscal decentralization may be "used" by higher income groups and regions to protect themselves against undesired redistributive policies. Hence, a highly decentralized system is less likely to reach regional agreement to implement significant equalization policies (Martinez-Vazquez 1982; Martinez-Vazquez and Sepulveda 2011). On the other hand, high levels of central government expenditure are likely to be associated with the presence of strong and generous redistributive regimes. The importance of centralized income redistribution policies in more developed countries has been recognized also by Arzaghi and Henderson (2005).

Moreover, the experience of many industrial countries shows that successful fiscal decentralization reforms cannot be achieved without a well-designed fiscal transfers program (Shah 1997, 2004). When sub-national governments are unlikely to have enough own revenues to finance their expenditures, transfers from the central government are necessary. Thus, it makes sense that higher regional income disparities call for some kind of intergovernmental transfers (or equalization systems) which can be facilitated by greater centralization. Accordingly, expenditure coefficients play a crucial role more than tax indexes actually do also in our estimations (see Table 10).

To some extent, our findings are also in line with those of Stegarescu (2009) and Letelier (2005). Indeed, the former shows the centralizing effect of growing regional income disparity as regional disparity of per capita GVA has a highly significant negative coefficient on the decentralization measures. In turn, according to Letelier (2005), improving standards of living and rising income (such as those recorded in the countries of our sample) may lead to changes in the demand for public goods with increasing emphasis on income redistribution and socially oriented policies. These kinds of expenditures are likely to be better implemented by the central government, leading to lower degrees of decentralization.

Hence, the results of both parts of our empirical analysis highlight the important role of equity considerations in shaping both the causes and the consequences of the adoption of fiscal decentralization. Equality and decentralization appear to be two clashing issues, at least to some extent. Indeed, decentralization can exert adverse effects on the equality, while inequality seems to call for less decentralization.

4.2.1 Robustness checks

Given the small number of observations used in this part of the analysis - due to the lack of regional disparities data before 1980 and Stegarescu's fiscal decentralization indexes after 2000 - we provide some robustness checks in order to confirm the general goodness of the benchmark results.[9] The first

[9] Actually, we also tried to extend the time span considering data from 1981 to 2008 obtained by expanding the seven decentralization indexes by assuming their growth rates to be equal to those of the share of taxes/expenditures of state and local governments over total taxes/expenditures of consolidated general governments using the IMF-Eurostat database. The results of the benchmark specification - equation (2) - are

check we provide aims at re-estimating equation (2) with FGSL technique, also including country fixed effects and taking into account heteroskedasticity.

Insert Table 11 about here

The negative relationship between expenditure decentralization and regional economic disparities holds with the FGLS estimator for all four expenditure measures. The coefficient of *REGDISP* preserves a negative - and highly significant - sign in all expenditure decentralization specifications. On the other hand, the effect of regional income disparities on tax decentralization does not seem to be significant as in the benchmark specification. As for the other covariates, the importance of education is consistent across all specifications, with positive and highly statistically significant coefficients.

Among other robustness checks, we re-estimated the impact of fiscal decentralization using different specifications to deal with the issues of endogeneity and reverse causality without any time span extension (i.e. 1981-2000). Tables 12 and 13 report the OLS and the GMM estimates of a specification where the lagged dependent variable is added to the model described by equation (2).

Insert Tables 12 and 13 about here

Two things are worth noticing. First, adding the lagged dependent variable increases the goodness of fit of the model in all cases. Second, the results confirm the negative relationship between fiscal decentralization and regional disparities, although the coefficients are measured with higher standard errors than those of the benchmark specification. As for the system-GMM (Table 13), results do not always confirm the findings of the benchmark estimates. However, in this case the time dimension is very small, thus the problems highlighted by Everaert and Pozzi (2007) and Cameron and Trivedi (2005) are even more binding than in the previous section. The lack of statistical significance seems to undermine any reasonable inference in this case.

Finally, table 14 shows the estimates of a model whose purpose is dealing with the reverse causality issue where the 5-year average measures of regional inequality are replaced by their values at the beginning of every period (Furceri and Zdzienicka 2011).

Insert Table 14 about here

The results confirm the findings of the benchmark estimation, although there are some minor differences in the estimated coefficients and, particularly, in their significance.

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confirmed. However, we realize that this assumption may be quite restrictive as based on some kind of statistical extrapolation. Hence, we do not include it into this version of the paper.

To sum up, it seems that even controlling for endogeneity and reverse causality, there is strong evidence in favour of a negative relationship between regional income disparities and expenditure decentralization. This suggests that higher levels of disparities across regions within the countries are indeed associated with less expenditure decentralization. On the other hand, nothing can be said on the revenue side, since the specifications with the tax decentralization measures are not able to yield unambiguous evidence on this subject.

5. Conclusions

Many countries recently and simultaneously embarked in active policies aimed at reducing poverty and income inequality as well as in fiscal decentralization reforms. Therefore, it seems important to clarify the extent to which these policy strategies interact with each other. At the same time, existing regional disparities within a country may require different degrees of fiscal decentralization.

The linkages between fiscal decentralization and inequality represent an area of theoretical debate open to empirical investigation. Indeed, a wide empirical literature has tried to shed some light on these complex interactions. However, clear evidence has not emerged as mixed results are obtained, with contradictory estimates of the sign of the decentralization-inequality relationship, and some "confusion" seems to emerge concerning the proper inequality concept as different definitions have been employed in order to describe the same phenomenon. Measurement issues (also for the fiscal decentralization variable), potential endogeneity and reverse causality are possible explanations for this lack of undisputed results.

Our paper is devoted to the study of the linkages between fiscal decentralization, overall income inequality, and regional economic disparities. Using a sample of 23 OECD countries for the period 1971-2000, we firstly investigate the effects of fiscal decentralization on overall income inequality to empirically investigate some of the traditional normative prescriptions. Then, we look at the determinants of the fiscal decentralization process testing whether regional economic disparities within the countries actually affect the incentives for tax and expenditure decentralization. Particular attention has been paid to the nature of fiscal decentralization. Indeed, we used several measures better able to account for the various degrees of both expenditure and tax autonomy.

Results of both analyses suggest that how fiscal decentralization is implemented and promoted - expenditure *versus* tax side - is relevant. The extent to which sub-central governments have real autonomy to determine the allocation of their expenditure or to raise their own revenue also appears to matter. Moreover, the fiscal decentralization process and the equality principle seem difficult to combine together, notwithstanding the "well-known" potential efficiency gains of decentralization.

Tax decentralization positively affects overall income inequality. Therefore, a higher degree of power and responsibility on taxes assigned to sub-central governments is associated with a more unequal distribution of income across households within a country. On the other hand, expenditure decentralization is not associated with significant effects on income inequality. This implies that, in order to improve income redistribution policies, lowering the degree of tax decentralization seems to be the best strategy to pursue, while expenditure decentralization does not seem to be an effective tool. Therefore, local governments following their own equity targets through different tax instruments can unfavourably affect the distribution of household income nationally. This finding seems to fit well with the traditional theory of fiscal federalism (Stigler 1957; Musgrave 1959; Oates 1972) according to which sub-national governments should play a minimum role in redistributive polices, which are in fact better accomplished by the central governments for equity (and efficiency) reasons.

Another result of the analysis is that regional economic disparities are negatively associated with expenditure decentralization. In other words, a higher level of GVA/GDP heterogeneity across regions contributes to a lower degree of expenditure decentralization. The same regional economic heterogeneity does not seem to affect tax decentralization. While this result once again confirms the importance of the nature of fiscal decentralization, this negative relationship may seem surprising at first glance. However, some possible explanations based on equity considerations, can be advanced: rising income inequalities across regions may require an intervention of the highest level of government in order to pursue redistributive objectives, possibly through expenditures tools (i.e. equalization transfer mechanisms as argued by Shah 1997, 2004). A highly decentralized system is less likely to reach regional agreement to implement such policies (Martinez-Vazquez 1982; Stegarescu 2009; Sepulveda and Martinez-Vazquez 2011).

To sum up, tax decentralization directly affects overall income inequality, denying the role of fiscal decentralization as a commitment device which supports the standard normative approach. From a positive viewpoint, regional economic disparities do not seem a sufficient condition to justify expenditure decentralization, highlighting the importance of equity motives over efficiency issues.

To conclude, the paper has some limitations which can be the object of further research should superior data become available. For example, extending the time span of the sample beyond 2000 could give us intereting hints related to the more recent developments in the fiscal decentralization processes. Moreover, while the classification of tax measures is quite detailed in representing the real level of tax autonomy of each typology, further efforts and improvements could be made in reference to the local expenditure side. This would imply breaking down sub-central expenditure by function and classification according to the degree of local discretion in legislation and execution, as highlighted also by Stegarescu (2005). Finally, studying less developed countries could also prove interesting.

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Tables and Figures

Table 1 - *Literature review: the impact of fiscal decentralization on inequality*

Reference	Type of inequality	Estimated sign	Sample
Akai & Sakata 2005	Regional disparities	Negative	USA
Calamai 2009	Regional disparities	Negative	Italy
Ezcurra & Pascual 2008	Regional disparities	Negative	EU countries
Gil Canaleta *et al.* 2004	Regional disparities	Negative	17 OECD
Rodriguez-Pose & Ezcurra 2010	Regional disparities	Negative	19 countries
	Regional disparities	Positive	7 countries
Bonet 2006	Regional disparities	Positive	Colombia
Kim *et al*. 2003	Regional disparities	Positive	Korea
Kanbur & Zhang 2005	Regional disparities	Positive	China
Qiao *et al.* 2008	Regional disparities	Positive	China
Tsui 1996	Regional disparities	Positive	China
Rodriguez-Pose & Gill 2004	Regional disparities	Positive	11 countries
Tselios *et al.* 2011	Overall income	Negative	West Europe
Sepulveda & Martinez-Vasquez 2011	Overall income	Negative	65 countries
Neyapti 2006	Overall income	Positive	54 countries
Morelli & Seaman 2007	Overall income	Positive	UK
Beramendi 2003	Overall income	Positive	15 OECD

Table 2 - *Literature review: the determinants of fiscal decentralization*

Variable	**Estimated sign**	**References**
Income per capita	Positive	Oates 1972; Kee 1977; Pommerehne 1977; Bahl & Nath 1986; Panizza 1999; Stegarescu 2009; Arzaghi & Henderson 2005; Letelier 2005
	Mixed	Pryor 1967; Wallis & Oates 1988; Beramendi 2003; Bodman and Hodge 2010
Population	Positive	Pryor 1967; Oates 1972; Pommerehne 1977; Panizza 1999; Arzaghi & Henderson 2005; Letelier 2005
	Negative	Bodman and Hodge 2010
	Mixed	Patsouratis 1990; Stegarescu 2009
Urbanization	Positive	Pommerehne 1977; Bahl & Nath 1986
	Negative	Stegarescu 2009; Letelier 2005; Bodman and Hodge 2010
	Mixed	Arzaghi & Henderson 2005
Openness	Positive	Beramendi 2003, 2007
	Negative	Kee 1977
	Mixed	Stegarescu 2009; Bodman and Hodge 2010
Country size	Positive	Panizza 1999; Arzaghi & Henderson 2005; Beramendi 2007
Ethnic heterogeneity	Negative	Arzaghi & Henderson 2005
	Positive	Beramendi 2003, 2007
Unemployment	Negative	Stegarescu 2009
	Mixed	Oates 1972; Pommerehne 1977; Panizza 1999
Grants to local gov.ts	Positive	Kee 1977; Letelier 2005
	Mixed	Bahl & Nath 1986; Bodman and Hodge 2010
Overall income ineq.	Negative	Pommerehne 1977
Regional disparities	Positive	Beramendi 2003, 2007, 2008
	Negative	Stegarescu 2009

Table 3 - *Descriptive statistics, overall income inequality analysis*

		N	Mean	Std. dev.	Min.	Max
TOTINEQ		129	35.04	3.68	27.17	45.22
FD:	*TD1*	138	18.62	16.49	0.00	59.06
	TD2	138	22.20	17.57	0.00	62.58
	TD3	138	23.26	17.09	0.31	62.58
	ED1	130	41.42	17.66	5.04	78.21
	ED1S	130	31.89	14.94	3.88	61.28
	ED2	130	27.35	16.10	1.31	64.53
	ED2S	130	21.59	13.03	0.94	53.04
GOVSIZE		138	9.44	2.40	3.72	16.87
GDPPC		138	23.02	6.74	9.82	54.04
OPEN		138	66.75	40.19	13.98	242.90
POPGR		138	0.59	0.68	0.00	5.00
EDUC		138	5.43	1.00	3.37	7.75

Note: T = 6 5-year averages periods (1971-2000); N = 23 countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, USA).
Source: Authors' elaborations

Table 4 - *Descriptive statistics, fiscal decentralization analysis*

		N	Mean	Std. dev.	Min.	Max
FD:	*TD1*	68	17.39	16.38	0.20	57.83
	TD2	68	22.59	18.10	0.20	61.21
	TD3	68	23.74	17.44	1.64	61.21
	ED1	63	42.47	16.11	5.65	78.21
	ED1S	63	31.40	12.27	4.24	55.66
	ED2	63	27.60	16.48	3.54	64.53
	ED2S	63	20.61	12.00	2.64	47.11
REGDISP		67	17.69	12.99	3.97	52.10
GOVSIZE		68	9.67	2.68	4.74	16.87
GDPPC		68	24.54	5.85	11.79	41.71
OPEN		68	67.94	30.53	18.16	159.25
POPGR		68	0.43	0.74	0.00	5.00
EDUC		68	5.29	0.98	3.45	7.48
LEFT		68	0.28	0.45	0	1
RIGHT		68	0.47	0.50	0	1

Note: T = 4 5-year averages periods (1981-2000); N = 17 countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, USA).
Source: Authors' elaborations

Table 5 - *Dependent variable: overall income inequality (TOTINEQ) - Fixed effects estimation*

	TD1	*TD2*	*TD3*	*ED1*	*ED1S*	*ED2*	*ED2S*
FD	0.144**	0.105***	0.097***	0.272	0.012	0.082	0.098
	(2.18)	(4.36)	(3.16)	(0.47)	(0.15)	(1.39)	(1.44)
GOVSIZE	-0.324	-0.261	-0.243	-0.299	-0.315	-0.217	-0.280
	(-1.30)	(-1.04)	(-0.96)	(-1.32)	(-1.43)	(-0.79)	(-1.15)
GDPPC	0.775***	0.764***	0.770***	0.805***	0.799***	0.831***	0.809***
	(4.06)	(4.03)	(4.00)	(3.93)	(3.86)	(4.28)	(4.40)
GDPPC^2	-0.009***	-0.009***	-0.009***	-0.010***	-0.010***	-0.010	-0.010***
	(-3.15)	(-3.12)	(-3.09)	(-3.02)	(-2.97)	(-3.38)	(-3.48)
OPEN	0.019	0.017	0.016	0.018	0.019	0.013	0.016
	(0.96)	(0.64)	(0.60)	(0.56)	(0.60)	(0.43)	(0.57)
POPGR	0.100	0.123	0.149	0.155	0.141	0.201	0.150
	(0.36)	(0.72)	(0.85)	(0.69)	(0.66)	(0.92)	(0.74)
EDUC	-2.994	-2.865	-2.788	-2.560	-2.136	-2.883	-2.502
	(-1.56)	(-1.59)	(-1.55)	(-1.08)	(-1.05)	(-1.54)	(-1.47)
Obs.	129	129	129	122	122	122	122
R^2	0.017	0.015	0.012	0.001	0.000	0.007	0.008

Note: t-statistics in parenthesis based on robust standard errors. ***, **, * denote significance at 1%, 5% and 10%, respectively. Country dummies included but not reported.

Table 6 - *Dependent variable: overall income inequality (TOTINEQ) - FGLS estimation*

	TD1	*TD2*	*TD3*	*ED1*	*ED1S*	*ED2*	*ED2S*
FD	0.094***	0.089***	0.089***	-0.011	-0.0174	0.049*	0.073***
	(2.67)	(3.71)	(3.28)	(-0.52)	(-0.58)	(1.89)	(2.62)
GOVSIZE	-0.279**	-0.274**	-0.255**	-0.306**	-0.311***	-0.191	-0.216*
	(-2.14)	(-2.14)	(-1.98)	(-2.51)	(-2.62)	(-1.52)	(-1.89)
GDPPC	0.710***	0.695***	0.701***	0.695***	0.699***	0.750***	0.693***
	(9.56)	(9.37)	(9.35)	(8.98)	(9.19)	(10.12)	(8.71)
GDPPC^2	-0.009***	-0.008 ***	-0.008***	-0.008***	-0.008***	-0.009***	-0.008***
	(-7.20)	(-7.06)	(-7.05)	(-6.89)	(-7.01)	(-7.93)	(-6.29)
OPEN	0.018	0.016	0.0152	0.0144	0.013	0.008	0.015
	(1.54)	(1.44)	(1.33)	(1.20)	(1.10)	(0.72)	(1.28)
POPGR	2.176	3.204	4.253	-2.623	-2.717	3.291	1.422
	(0.22)	(0.32)	(0.43)	(-0.23)	(-0.23)	(0.30)	(0.15)
EDUC	-2.395***	-2.298***	-2.107***	-1.158	-1.142*	-1.828***	-1.628***
	(-3.58)	(-3.67)	(-3.39)	(-1.54)	(-1.75)	(-2.71)	(-2.75)
Obs.	128	128	128	121	121	121	121
Wald chi²	1159.96***	1217.10***	1151.88***	1590.67***	1720.44***	1663.56***	1780.74***

Note: z-statistics in parenthesis based on robust standard errors. ***, **, * denote significance at 1%, 5% and 10%, respectively. Country dummies included but not reported.

Table 7 - *Dependent variable: overall income inequality (TOTINEQ) - Fixed effects estimation*

	TD1	*TD2*	*TD3*	*ED1*	*ED1S*	*ED2*	*ED2S*
TOTINEQ	0.886***	0.873***	0.878***	1.007***	1.008***	0.973***	0.983***
(lagged)	(6.02)	(5.68)	(5.77)	(6.45)	(6.19)	(6.26)	(5.91)
FD	0.070	0.054***	0.054***	0.044	0.044	0.094***	0.089**
	(1.53)	(3.13)	(2.97)	(1.14)	(0.78)	(3.84)	(2.38)
GOVSIZE	0.125	0.164	0.170	0.249	0.222	0.404**	0.265
	(0.52)	(0.67)	(0.69)	(1.02)	(0.88)	(2.07)	(1.16)
GDPPC	0.609***	0.611***	0.608***	0.560***	0.562***	0.611***	0.549***
	(4.08)	(4.25)	(4.27)	(3.87)	(3.90)	(5.20)	(4.63)
GDPPC^2	-0.009***	-0.009***	-0.009***	-0.008***	-0.009***	-0.009***	-0.008***
	(-3.98)	(-4.08)	(-4.08)	(-3.86)	(-3.92)	(-5.12)	(-4.57)
OPEN	0.015	0.015	0.014	0.019	0.020	0.013	0.019
	(0.62)	(0.62)	(0.58)	(0.76)	(0.79)	(0.55)	(0.87)
POPGR	-0.022	-0.005	-0.001	-0.040	-0.063	0.042	-0.059
	(-0.14)	(-0.03)	(-0.01)	(-0.24)	(-0.41)	(0.25)	(-0.37)
EDUC	-1.054	-1.079	-0.950	-1.608	-1.071	-1.692	-1.122
	(-0.68)	(-0.22)	(-0.64)	(-0.81)	(-0.61)	(-1.17)	(-0.83)
Obs.	106	106	106	100	100	100	100
R^2	0.542	0.482	0.504	0.467	0.600	0.302	0.508

Note: t-statistics in parenthesis based on robust standard errors. ***, **, * denote significance at 1%, 5% and 10%, respectively. Country dummies included but not reported.

Table 8 - *Dependent variable: overall income inequality (TOTINEQ) - System GMM estimation*

	TD1	*TD2*	*TD3*	*ED1*	*ED1S*	*ED2*	*ED2S*
TOTINEQ	1.359***	1.345***	1.357***	1.346***	1.421***	1.423***	1.417***
(lagged)	(12.36)	(15.08)	(15.45)	(6.27)	(5.99)	(9.63)	(8.97)
FD	0.022	0.016	0.022	0.005	0.041	0.039	0.055
	(0.31)	(0.38)	(0.55)	(0.12)	(0.45)	(1.17)	(1.08)
GOVSIZE	0.159	0.253	0.255	0.261	0.269	0.317	0.286
	(1.26)	(1.15)	(1.19)	(1.09)	(1.37)	(1.43)	(1.39)
GDPPC	0.425**	0.426**	0.404**	0.454***	0.361*	0.323*	0.317**
	(2.27)	(2.19)	(2.14)	(2.85)	(1.67)	(1.89)	(2.02)
GDPPC^2	-0.007***	-0.007***	-0.007***	-0.008***	-0.007**	-0.006**	-0.006**
	(-2.84)	(-2.65)	(-2.60)	(-3.75)	(-2.31)	(-2.38)	(-2.59)
OPEN	0.011	0.010	0.011	0.010	0.015	0.014	0.014
	(0.96)	(1.34)	(1.40)	(1.11)	(1.12)	(1.82)*	(1.76)*
POPGR	0.015	0.029	0.023	-0.246	-0.263	-0.176	-0.232
	(0.09)	(0.17)	(0.14)	(-1.01)	(-1.30)	(-0.94)	(-1.21)
EDUC	0.207	0.311**	0.325**	0.325**	0.192	0.404**	0.267*
	(0.41)	(2.18)	(2.33)	(2.33)	(0.61)	(2.43)	(1.97)
Obs.	106	106	106	100	100	100	100
Hansen test~	0.495	0.469	0.489	0.331	0.491	0.492	0.562

Note: z-statistics in parenthesis based on robust standard errors. ***, **, * denote significance at 1%, 5% and 10%, respectively. Country dummies included but not reported. ~: p-value reported.

Table 9 - *Dependent variable: overall income inequality (TOTINEQ)*

	TD1	*TD2*	*TD3*	*ED1*	*ED1S*	*ED2*	*ED2S*
FD (initial	0.210***	0.125***	0.122***	0.035	0.007	0.107*	0.136*
per. value)	(3.39)	(6.09)	(5.48)	(0.54)	(0.08)	(1.97)	(1.76)
GOVSIZE	-0.270	-0.235	-0.220	-0.308	-0.317	-0.254	-0.297
	(-1.01)	(-0.92)	(-0.85)	(-1.41)	(-1.40)	(-0.98)	(-1.22)
GDPPC	0.808***	0.774***	0.785***	0.811***	0.798***	0.851***	0.853***
	(4.51)	(4.29)	(4.34)	(3.91)	(3.81)	(4.38)	(4.37)
GDPPC^2	-0.010***	-0.009***	-0.009***	-0.010***	-0.010***	-0.010***	-0.010***
	(-3.68)	(-3.41)	(-3.45)	(-3.02)	(-2.95)	(-3.49)	(-3.53)
OPEN	0.016	0.015	0.014	0.017	0.019	0.010	0.016
	(0.69)	(0.63)	(0.58)	(0.52)	(0.60)	(0.36)	(0.54)
POPGR	0.133	0.105	0.147	0.169	0.141	0.262	0.210
	(0.77)	(0.66)	(0.90)	(0.74)	(0.65)	(1.19)	(1.00)
EDUC	-2.962	-3.057	-2.949	-2.708	-2.098	-3.014	-2.673
	(-1.64)	(-1.71)*	(-1.69)*	(-1.09)	(-0.99)	(-1.64)	(-1.52)
Obs.	129	129	129	122	122	122	122
R^2	0.033	0.018	0.016	0.002	0.000	0.009	0.013

Note: t-statistics in parenthesis based on robust standard errors. ***, **, * denote significance at 1%, 5% and 10%, respectively. Country dummies included but not reported.

Table 10 - *Dependent variable: fiscal decentralization (FD)*

	TD1	*TD2*	*TD3*	*ED1*	*ED1S*	*ED2*	*ED2S*
REGDISP	-0.058	0.034	0.041	-0.389**	-0.229**	-0.212*	-0.176**
	(-0.75)	(0.24)	(0.27)	(-2.56)	(-2.71)	(-1.83)	(-2.45)
GOVSIZE	-0.068	-0.957	-1.197	-1.270	0.019	-2.420	-0.972
	(-0.06)	(-0.52)	(-0.64)	(-0.89)	(0.02)	(-1.54)	(-0.89)
GDPPC	0.131	0.226	0.173	0.032	0.170	-0.140	0.082
	(1.41)	(1.46)	(1.17)	(0.12)	(1.11)	(-0.79)	(0.87)
OPEN	0.036	-0.027	0.000	0.089	0.031	0.023	-0.038
	(1.01)	(-0.46)	(0.00)	(1.64)	(0.72)	(0.42)	(-1.22)
POPGR	0.046	-0.568	-0.599	0.465	0.600	-0.541	0.014
	(0.12)	(-0.81)	(-0.86)	(0.87)	(1.51)	(-1.05)	(0.04)
EDUC	6.916***	7.236***	5.441**	21.362***	9.407**	9.936***	4.510**
	(4.85)	(3.29)	(2.82)	(3.61)	(2.46)	(3.46)	(2.32)
LEFT	-2.193	-3.664	-3.850	-1.194	-0.564	-2.518	-1.483
	(-1.05)	(-1.05)	(-1.07)	(-0.49)	(-0.30)	(-0.88)	(-0.69)
RIGHT	-1.212	-3.224	-3.371	-1.682	-1.649	-3.260	-2.463
	(-0.61)	(-0.87)	(-0.93)	(-0.71)	(-0.89)	(-1.29)	(-1.29)
Obs.	67	67	67	62	62	62	62
R^2	0.07	0.000	0.000	0.022	0.028	0.085	0.001

Note: t-statistics in parenthesis based on robust standard errors. ***, **, * denote significance at 1%, 5% and 10%, respectively. Country dummies included but not reported.

Table 11 - *Dependent variable: fiscal decentralization (FD) - FGLS estimation*

	TD1	*TD2*	*TD3*	*ED1*	*ED1S*	*ED2*	*ED2S*
REGDISP	-0.062	-0.039	-0.081	-0.420***	-0.229***	-0.311***	-0.209***
	(-1.30)	(-0.43)	(-0.85)	(-3.53)	(-3.72)	(-4.09)	(-4.03)
GOVSIZE	-0.124	0.118	-0.196	-1.479***	0.087	-2.135***	-0.823***
	(-0-40)	(0.22)	(-0.35)	(-2.64)	(0.27)	(-4.87)	(-3.51)
GDPPC	0.118	0.184*	0.099	-0.022	0.143**	-0.175**	0.141***
	(1.34)	(1.65)	(0.89)	(-0.18)	(2.41)	(-1.98)	(3.67)
OPEN	0.017	0.020	0.057	0.127***	0.053*	0.022	-0.069***
	(0.61)	(0.48)	(1.36)	(2.82)	(1.84)	(0.71)	(-2.61)
POPGR	-8.450	-15.515	-3.872	25.503	72.242***	-12.874	-0.419
	(-0.55)	(-0.42)	(-0.10)	(0.60)	(2.88)	(-0.41)	(-0.02)
EDUC	4.960***	6.802***	5.585***	20.393***	7.819***	11.619***	5.367***
	(4.17)	(4.74)	(4.44)	(7.85)	(4.85)	(9.96)	(7.95)
LEFT	-0.791	-0.762	-0.081	0.437	0.809	-2.147***	-0.265
	(-1.26)	(-0.66)	(-0.07)	(0.53)	(1.52)	(-2.88)	(-0.42)
RIGHT	-0.823*	-0.442	0.007	0.165	-0.558	-3.661***	-1.193*
	(-1.76)	(-0.42)	(0.01)	(0.19)	(-1.12)	(-5.46)	(-1.88)
Obs.	67	67	67	61	61	61	61
Wald chi²	14524.86***	15982.09***	11450.00***	9065.07***	7275.94***	9424.55***	19163.73***

Note: z-statistics in parenthesis based on robust standard errors. ***, **, * denote significance at 1%, 5% and 10%, respectively. Country dummies included but not reported.

Table 12 - *Dependent variable: fiscal decentralization (FD)*

	TD1	*TD2*	*TD3*	*ED1*	*ED1S*	*ED2*	*ED2S*
FD	0.390*	0.533***	0.515***	0.650***	0.663***	0.511***	0.478***
(lagged)	(1.82)	(5.75)	(6.38)	(7.61)	(8.83)	(5.15)	(4.17)
REGDISP	-0.201	-0.100	-0.115	-0.117	-0.125	0.003	-0.057
	(-1.57)	(-0.60)	(-0.82)	(-1.21)	(-2.22)**	(0.03)	(-0.58)
GOVSIZE	0.899	1.157	-0.447	-4.559*	-1.526	-4.538**	-2.201**
	(0.75)	(0.10)	(-0.26)	(-2.08)	(-1.53)	(-2.49)	(-2.02)
GDPPC	-0.136	-0.070	-0.116	-0.132	-0.006	-0.199	0.029
	(-0.58)	(-0.20)	(-0.36)	(-0.51)	(-0.04)	(-0.90)	(0.20)
OPEN	0.101	0.001	0.053	-0.012	-0.009	0.012	-0.022
	(1.44)	(0.00)	(0.45)	(-0.14)	(-0.14)	(0.15)	(-0.42)
POPGR	0.710	0.050	0.117	-0.407	0.249	-1.139	-0.244
	(1.16)	(0.07)	(0.16)	(-1.65)	(1.06)	(-3.95)	(-1.12)
EDUC	7.747***	2.505	4.211*	3.346	-0.237	5.733*	2.254
	(3.66)	(1.17)	(1.81)	(0.85)	(-0.13)	(1.88)	(1.15)
LEFT	-2.117	-2.193	-2.559	0.594	0.330	-0.069	-0.072
	(-1.20)	(-1.03)	(-1.19)	(-0.39)	(0.23)	(-0.04)	(-0.04)
RIGHT	-0.727	-0.960	-1.006	0.611	-0.677	0.198	-0.201
	(-0.57)	(-0.64)	(-0.66)	(0.47)	(-0.69)	(0.15)	(-0.16)
Obs.	51	51	51	45	45	45	45
R^2	0.320	0.867	0.657	0.181	0.734	0.114	0.386

Note: t-statistics in parenthesis based on robust standard errors. ***, **, * denote significance at 1%, 5% and 10%, respectively. Country dummies included but not reported.

Table 13 - *Dependent variable: fiscal decentralization (FD) - System GMM estimation*

	TD1	*TD2*	*TD3*	*ED1*	*ED1S*	*ED2*	*ED2S*
FD	0.801***	0.519	0.292	1.238***	0.472	0.482	-0.118
(lagged)	(4.25)	(1.44)	(0.51)	(3.72)	(0.23)	(0.78)	(-0.09)
REGDISP	-1.101	-1.277	-1.734	0.132	-0.416	-0.177	-0.488
	(-1.18)	(-1.11)	(-1.05)	(0.17)	(-0.41)	(-0.32)	(-0.80)
GOVSIZE	-0.214	-0.533	-0.972	-0.738	0.130	-0.511	-0.234
	(-0.52)	(-0.41)	(-0.47)	(-0.91)	(0.09)	(-0.61)	(-0.25)
GDPPC	0.305	0.709	0.978	-0.343	0.446	0.747	1.000
	(0.74)	(0.61)	(0.58)	(-0.78)	(0.21)	(0.67)	(0.81)
OPEN	-0.166	-0.229	-0.302	0.129	-0.049	-0.209	-0.232
	(-1.18)	(-0.92)	(-0.85)	(0.85)	(-0.12)	(-0.96)	(-1.55)
POPGR	3.779	5.145	7.214	-1.447	1.669	1.204	2.347
	(1.23)	(1.24)	(1.34)	(-0.42)	(0.36)	(0.44)	(1.00)
EDUC	2.192	1.425	1.392	-4.437*	0.525	1.458	2.278
	(0.60)	(0.14)	(0.10)	(-1.65)	(0.05)	(0.34)	(0.52)
LEFT	-5.838	-14.275	-15.983	17.467	12.184	-28.228	-8.841
	(-0.61)	(-0.61)	(-0.38)	(1.52)	(0.74)	(-1.49)	(-0.33)
RIGHT	-13.774**	-28.987	-41.368	11.101	8.612	-24.354**	-8.937
	(-2.18)	(-1.30)	(-1.33)	(0.51)	(0.73)	(-1.98)	(-0.40)
Obs.	51	51	51	45	45	45	45
Hansen test~	0.072	0.976	0.980	0.350	0.623	0.165	0.200

Note: z-statistics in parenthesis based on robust standard errors. ***, **, * denote significance at 1%, 5% and 10%, respectively. Country dummies included but not reported. ~: p-value reported.

Table 14 - *Dependent variable: fiscal decentralization (FD)*

	TD1	*TD2*	*TD3*	*ED1*	*ED1S*	*ED2*	*ED2S*
REGDISP	-0.015	0.089	0.106	-0.310**	-0.167*	-0.189	-0.147*
(init. value)	(-0.15)	(0.50)	(0.56)	(-2.51)	(-1.64)	(-1.58)	(-1.66)
GOVSIZE	-0.015	-0.875	-1.101	-1.223	0.071	-2.427	-0.961
	(-0.01)	(-0.49)	(-0.61)	(-0.85)	(0.08)	(-1.57)	(-0.89)
GDPPC	0.132	0.239	0.189	0.002	0.155	-0.160	0.067
	(1.38)	(1.45)	(1.21)	(0.01)	(1.01)	(-0.88)	(0.71)
OPEN	0.032	-0.033	-0.007	0.084	0.027	0.022	-0.040
	(0.86)	(-0.52)	(-0.11)	(1.43)	(0.59)	(0.40)	(-1.23)
POPGR	-0.020	-0.687	-0.738	0.424	0.545	-0.522	0.009
	(-0.05)	(-0.86)	(-0.93)	(0.76)	(1.16)	(-0.95)	(0.02)
EDUC	6.803***	7.009***	5.172**	21.255***	9.289**	9.952***	4.484**
	(4.64)	(3.11)	(2.63)	(3.55)	(2.40)	(3.44)	(2.28)
LEFT	-2.220	-3.839	-3.852	-1.355	-0.660	-2.605	-1.556
	(-1.07)	(-1.06)	(-1.07)	(-0.55)	(-0.35)	(-0.92)	(-0.73)
RIGHT	-1.233	-3.224	-3.384	-1.750	-1.696	-3.286	-2.490
	(-0.63)	(-0.88)	(-0.94)	(-0.73)	(-0.91)	(-1.29)	(-1.29)
Obs.	67	67	67	62	62	62	62
R^2	0.072	0.001	0.002	0.020	0.035	0.084	0.000

Note: t-statistics in parenthesis based on robust standard errors. ***, **, * denote significance at 1%, 5% and 10%, respectively. Country dummies included but not reported.

Appendix: variables, description and sources

Overall income inequality (*TOTINEQ*). Gini index: estimates of gross household income inequality. *Source*: University of Texas Inequality Project EHII2008.

Regional income disparities (*REGDISP*). Theil index calculated according to the following formula:

$$100 * \sum \left(\frac{GVA_j}{GVA_i} \right) * \ln \left(GVA_j / \frac{GVA_i}{J_i} \right) \qquad (3)$$

where GVA_j j=1,...J_i is the GVA of region j in country i, and GVA_i is the GVA of the whole country. NUTS2 regions are used for all countries of the sample but the USA, for which states represent the sub-national units of the country. *Source*: Cambridge Econometrics European Regional Data, and US Bureau of Economic Analysis.

Fiscal decentralization (*FD*). Three tax revenue decentralization indexes (from the broader to the narrower measures: *TD1*, *TD2*, *TD3*), and four expenditure decentralization indexes (the broader measure: *ED1* - *ED1S* including social security transfers; the narrower measure *ED2* - *ED2S* including social security transfers). *Source*: Stegarescu, D. (2005), "Public sector decentralization: Measurement concepts and recent international trends", Fiscal Studies 26, 301-333.

Government size (*GOVSIZE*). Government share of real Gross Domestic Product per capita. *Source*: Penn World Tables.

Education (*EDUC*). Average years of primary education. *Source*: Barro, R. and Lee, J.W. 2.0 07/2010.

Population (*POPGR*). Growth rates calculated from total population figures. *Source*: Penn World Tables.

GDP (*GDPPC*). Per capita GDP calculated from Purchasing Power Parity GDP (GDP growth - GROWTH - has been calculated from that variable). *Source*: OECD Economic Outlook no. 87.

Openness (*OPEN*). Openness of the economy in current prices, measured as total trade (sum of import and export) as a percentage of GDP. Source: Penn World Tables.

Government party (*LEFT/RIGHT*). Dummies that take the value 1 in each 5-years period when for most of it there has been dominance/hegemony of either left or right in the cabinet (the reference category being a balanced cabinet). *Source:* Comparative political dataset, Armingeon *et al.* (2008).