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Varieties of decentralization, institutional complementarities, and economic growth: evidence in OECD countries(*)

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Abstract

The functioning of fiscal decentralization within the real institutional setting is the key message of recent fiscal federalism theory. However, most of the empirical analysis explores the relationship between fiscal decentralization and economic growth within a constitutional void. This paper investigates the connection between fiscal decentralization and economic growth across different institutional settings in 20 OECD countries in 1973-2007. We find that the pro-growth effects of tax decentralization depend critically on the nature of the administrative institutions and political system in place. This provides new insights on how local tax structures should be designed and also combined with administrative and political institutions to support economic growth in the long run.

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1. Introduction

The new federal constitutions of Iraq in 2005 and Nepal in 2007 represent only the most recent cases of a long-standing "federal tendency". Over the last decades, most countries have reformed their institutional settings shifting political power and fiscal autonomy towards sub-national governments, backed by the idea that decentralization would increase efficiency, and ultimately economic growth. The relationship between decentralization and economic growth, however, is rather complex, and scholars have attempted to disentangle it both theoretically and empirically. On the theoretical ground, the connections between fiscal federalism and economic growth is based on a number of direct and indirect mechanisms including allocative efficiency, productive efficiency, incentives to save (for a review see Martinez-Vazquez and McNab, 2003). On the empirical ground, an increasing number of studies have explored this issue with mixed evidence (e.g. Baskaran and Feld, 2013; Bodman, 2011; Davoodi and Zou, 1998; Iimi, 2005; Thieben, 2003).

A common weakness in the previous studies is that of disregarding the role of the institutional context: most empirical contributions examine the relationship between fiscal decentralization and economic growth in a constitutional void. By contrast, recent normative studies in fiscal federalism has largely adopted a political economy approach that emphasizes the importance of institutional arrangements, including the political and administrative aspects, to ensure that the appropriate incentive structure is in place to make fiscal federalism working properly (see Ahmad and Brosio, 2008 for a review). This has given rise to the so-called Second Generation Theory (SGT hereafter) of fiscal federalism – or political economy of fiscal federalism – which studies how politicians' behaviour interacts with a decentralized system within real political institutions (Lockwood, 2006; Oates, 2005; Weingast, 2013).

This paper aims to fill this gap by investigating the connection between fiscal decentralization and economic growth across different institutional settings in 20 OECD countries over the period 1973-2007. Our central concern is that of exploring to what extent the effect of fiscal federalism on economic growth is contingent on the institutional setting. In order to define the institutional structure, we focus on both administrative and political decentralization as they considerably affect the incentive structure of sub-central governments and local politicians. Indeed, administrative and political decentralization, together with the fiscal dimension, define the country's functioning in terms of distribution of power, responsibility, and resources among different tiers of government as well as their legitimacy degree.

Decentralization is a multi-dimensional phenomenon encompassing several aspects connected to each other and, as a matter of fact, it has been articulated in different ways across countries. Even though the importance of taking into account the several dimensions of decentralization and their interrelations has been recognized in principle, such approach has been rarely adopted in the theory as

well as in the empirical research (O'Dwyer and Ziblatt, 2006; Rodden, 2004; Schneider, 2003).[1] This has serious implications both conceptually and for the empirical analysis since, as Libman (2010) points out, "it is possible that the country which seems "decentralized" according to one dimension is in fact "highly centralized" according to the other one" (p.412).

In order to study the role of the institutional setting on the relationship between fiscal decentralization and economic growth, we rely on the concept of institutional complementarities. This has been developed in comparative studies to explain differences in economic and political institutions across countries, as well as their effects on aggregate economic performance (Hall and Gingerich, 2004; Hall and Soskice, 2001). In our case, the role of institutional complementarities for decentralization concerns the several dimensions of the latter as highlighted by the literature: decentralization of resources (fiscal federalism), of authority (administrative decentralization), and political decentralization (local governments' legitimacy). Our aim is that of highlighting the presence of institutional complementarities at work among these dimensions.

The institutional setting defining the distribution of power among different levels of government is a key characteristic of the institutional structure of a country. The emergence of an institutional setting is a path-dependence process that does not assure its inherent efficiency, as it is argued to occur for the market (Hayek, 1973; North, 2005). Therefore, since different institutional systems can have different degree of efficiency and lead to different economic performance, a methodological premise of this research has been that of a comparative approach (Eggertsson, 2013).

In this paper we explore to what extent different institutional structures in terms of formal arrangement in a multi-layered system lead to better/worse economic performance, holding a comparative perspective. The evolution of the decentralization process as a whole and along specific dimensions is mostly the result of historical and political events (OECD, 2012a). This has brought about a variety of decentralized systems. In some cases, they have a long tradition and were born as a confederation of states, like in the United States and Canada. In more recent cases, (e.g., France, Spain, and Italy) decentralization occurred in a top-down fashion aimed at increasing governmental efficiency in satisfying local different needs and preferences. Claims about a superiority of decentralization might hide profound differences about the way how decentralization is actually implemented, and lead to policy recommendation of dubious effectiveness. To this regard, our approach is rather positive than normative.

The empirical results provide strong support for our main argument: the connection between fiscal decentralization and economic growth is contingent upon different institutional settings. More precisely, complementarities among the different dimensions of decentralization emerge and favour economic growth. While fiscal decentralization is associated with negative income growth when it is

[1] By contrast, the study of differences and similarities across federal systems, known as comparative federalism, has a long tradition in comparative politics (Burgess, 2006).

considered alone, it positively affects GDP growth when it is coupled with other institutional dimensions, namely political and administrative decentralization. That is, the beneficial effects of fiscal decentralization - mainly through the tax side - depend critically on the nature of the administrative institutions and political system in place. All in all, it seems that decentralization reforms may be effective for economic growth provided that they are implemented along all dimensions of the process.

The plan of the paper is as follows. In the next Section we discuss the relevance of institutional complementarities for decentralization and review some previous studies on the decentralization-growth relationship. Section 3 describes decentralization variables and data, while Section 4 explains the empirical models used. Section 5 shows and discusses the results. Finally, Section 6 concludes and provides some policy implications.

2. Fiscal decentralization, economic growth, and institutional interaction

2.1 The relationship between fiscal decentralization and economic growth

One of the traditional theoretical argument in favor of fiscal decentralization is that it provides greater economic efficiency in the allocation of resources in the public sector (e.g., Oates, 1972). Starting from this point, different direct and indirect linkages between decentralization and economic growth have been identified via greater efficiency (Martinez-Vazquez and McNab, 2003). Results from the recent empirical literature provide a mixed picture, and a clear-cut effect of fiscal decentralization on income growth does not always emerge.

In what follows, we concentrate on those contributions mainly interested in the revenue side of the process, i.e. between tax decentralization and GDP growth, as they are more consistent with our approach when measuring fiscal decentralization. The analysis on 19 OECD countries performed by Thornton (2007) over the period 1980-2000 highlights that, when the measure of fiscal decentralization is limited to the revenues over which sub-national governments have full autonomy, its impact on economic growth is not statistically significant. On the other hand, Gemmell et al. (2013) find evidence of positive revenue decentralization effects on growth in OECD countries during 1972-2005. According to them, the positive sign could simply reflect the fact that local governments collect less from growth-distorting taxes than central governments (such as charges, user fees and property taxes).

More generally, OECD (2012a) has recently found decentralization to be positively related to GDP per capita levels but negatively related to GDP per capita growth. The relationship seems to be stronger for revenue rather than for spending decentralization, suggesting that the revenue side of intergovernmental frameworks – tax and revenue assignment across government levels and tax

autonomy – has a stronger impact on economic activity and might also provide a more accurate picture of the true fiscal power of sub-central governments.

Following this reasoning, we focus on the revenue side and provide our disaggregation in order to capture valuable information on the type of tax assignment (i.e. tax-sharing *versus* tax-separation) and of specific tax assigned (i.e. income *versus* property) at the local level. Indeed, the conclusion that each type of taxes at the local level has the same growth-promoting effect cannot be *a priori* drawn.

Beyond works addressing whether decentralization affects economic growth typically resorting to fiscal decentralization, there are a few that do not disregard political decentralization. The political component is, indeed, positioned as one of the advantages of the decentralization process and it should be considered in relation to economic performance. Some evidence on this issue is provided by recent works (Ezcurra and Rodríguez-Pose, 2012; Zhang, 2006) even though they are mostly concerned with regional inequality rather than income growth. Ezcurra and Rodríguez-Pose (2012) investigate the association between different political decentralization indicators with changes in GDP per capita, finding evidence of a lack of statistical relationship between the two variables of interest, regardless of how political decentralization is measured. In a study on the Russian Federation, Libman (2010) finds that different dimensions of decentralization - i.e. fiscal, regulatory and constitutional decentralization - provide different correlations with economic performance. In his works on comparative federalism, looking at the effect of fiscal and political institutions on fiscal performance, Rodden (2002) observes that such effects are contingent on other institutional factors.[2]

So far, when analyzing the connection between economic growth and fiscal decentralization, the research has mostly focused on different indices of fiscal decentralization and local autonomy, and in some cases has included the role of political decentralization and other institutional factors. However, the importance of the institutional setting in which fiscal decentralization takes place has not been analyzed in a systematic fashion.

2.2 Fiscal decentralization and the institutional setting

The role of the institutional setting for fiscal decentralization has been addressed by the Second Generation Theory (hereafter SGT) of fiscal federalism (Lockwood, 2006; Oates, 2005; Weingast, 2009). This research analyses the functioning of fiscal federalism within real political institutions (Weingast, 2013). More specifically, it investigates how political processes and the behavior of political agents are shaped by the incentive structure embodied in political institutions, and how the latter interacts with fiscal decentralization.

The role institutional interdependence has been also explored in the comparative political economy research that has developed the concept of institutional complementarities: *'two institutions*

[2] He finds that large and persistent deficits occur when sub-national governments are simultaneously dependent on intergovernmental transfer and free to borrow.

can be said to be complementary if the presence (or efficiency) of one increases the returns (or efficiency of) the other' (Hall and Soskice, 2001, p. 35).[3]

We apply these concepts to the relationship between fiscal federalism and economic growth. We firstly discuss the multi-faceted nature of decentralization processes. Then we discuss the interaction between the different dimensions of the decentralization process, and provide some predictions about their effect on the relationship between fiscal decentralization and economic growth.

The multi-faceted nature of decentralization has been described by Donahue (1997) in terms of the legitimacy of the process, the allocation of resources linked thereto, and the degree of authority included. Along these lines, Rodden (2004) identifies four dimension of decentralization. The first, i.e. *fiscal decentralization*, has attracted most of the attention in empirical studies, also thanks to the availability of data on sub-national revenues and expenditures for many countries. The second, i.e. *policy decentralization*, reflects the extent to which central governments have the authority of overriding decisions and policies of lower tiers of government. The third dimension, i.e. *political decentralization*, addresses the issue of sub-central elections, in which the distinction is between popularly elected local officials *versus* appointed officials. Finally, the fourth definition concerns *federalism*. Federalism is not a particular distribution of authority among governments, but rather a process entailing a set of institutions through which authority is distributed. However, also within federalism there exist differences in the role of local governments in affecting the central government's policy-making process.[4]

Following this reasoning, we consider three dimensions of decentralization: fiscal decentralization (*FD*), administrative decentralization (*AD*), and political decentralization (*PD*). *FD* regards the typical issue addressed in previous studies, i.e. spending-taxation competences and responsibilities assigned to sub-national governments. *AD* concerns the degree of authority and captures the autonomy in decision-making process of sub-national government. Finally, *PD* refers to political functions measured both in terms of local representation – i.e. for the presence of sub-national election - and of the institutional setting as a whole – i.e. federal *versus* unitary systems. These three dimensions would give rise to different institutional settings as a whole depending on their dosage.

Our central argument is that the positive effect of fiscal decentralization on economic growth might be contingent to the type of institutional context - and to the associated incentive structure - because of the presence of institutional complementarities. Specifically, the returns generated by *FD* are likely to depend on the simultaneous presence of the other two institutional dimensions, i.e. *AD*

[3] A strand of this literature has pointed to explain greater economic growth in terms of institutional complementarities in the labor market, corporate finance, and industrial relations.

[4] This distinction has been adopted in similar forms in several other studies. Schneider (2006) has condensed these dimensions in fiscal decentralization, administrative decentralization, and political decentralization. O'Dwyer and Ziblatt (2006) employ this framework to compare the effect of decentralization on the quality of government. They find that the different dimensions have different effects on the quality of government. However, interactions among the three dimensions are not explored.

and *PD*. We are therefore concerned in exploring the proposition that higher degrees of *FD* would lead to higher economic growth when coupled with high *AD* and high *PD*.[5]

The traditional argument in favor of fiscal decentralization is that it provides greater economic efficiency of the public sector regardless of the nature of politicians, i.e. assuming benevolent governments (Oates, 1972). However, this virtuous mechanism can be offset by a number of issues arising with fiscal decentralization, such as moral hazard, soft budget constraints, the common-pool problem, overlapping fiscal competences making, sometimes, less transparent central and sub-central policies. In short, when analyzed in the real institutional context, the positive impact of fiscal decentralization on efficiency – and ultimately on growth – can be impeded by opportunistic behaviors of local governments. To this regard, the presence of a stronger administrative and political decentralization can solve some of these problems leaving only the virtuous and incentive mechanisms at work.

As an example, the soft budget constraint problem, potentially arising at a local level with more *FD*, can be solved by reforming political and administrative institutions, establishing a link between fiscal decentralization and local governments' responsibility (Oates, 2005; Rodden, 2005). In this perspective, a good system of local taxation should make costs more visible to the corresponding electorate and provide the adequate source of funds.

More generally, experiences of moral hazard behaviors by local policy-makers might arise when fiscal decentralization is coupled by a lack of political accountability. Political decentralization and legitimacy shape the incentive structure by increasing sub-central governments' accountability. This would mitigate inefficiencies stemming from cases in which power is too much dispersed, fragmented, and shared among different levels of jurisdiction, and therefore citizens are not aware of who is responsible for what.

Federalist systems imply imposing some limits for the national/federal government in favor of more autonomy of sub-national/sub-federal governments. There is little doubt that in federal states such autonomy, which is both political and fiscal, is much clearer and protected by the constitutions and in the upper chamber. This should reinforce accountability and control of sub-federal and local policy-makers. The importance of constitutional arrangements in federal countries has been also stressed in Weingast's studies (1995) on market-preserving federalism. All in all, in federal countries the protection of local governments' autonomy stated in the constitutions reinforces their political accountability and the long-term commitment.

[5] It should be noted that our theoretical approach does not lead to a necessary supremacy of decentralization for economic growth. Since we are interested in the relationship between decentralization and economic growth, we take into account the role of the institutional setting which makes decentralization more effective. Our approach, however, does not logically imply that a less decentralized system in a unitary state would be less conducive to economic growth. The focus on decentralization stems from the fact that this kind of reform has been pursued by and large over the last decades.

3. Measuring the three dimensions of decentralization

In this section we present the variables employed in the empirical analysis to capture our three dimensions of decentralization: *FD, AD*, and *PD*. Overall, each variable is considered over the period 1973-2007 for the sample of 20 OECD countries (Table 1).[6]

3.1 Measuring fiscal decentralization (FD).

The degree of fiscal decentralization varies widely across countries but has changed little over the past 15 years. OECD-wide, the sub-central spending share averaged around 31% in 2010, while the tax revenue share was at around 15% (OECD, 2012a). Spending is clearly more decentralized than revenues. However, revenue shares appear to better reflect fiscal and regulatory power than spending shares, because sub-central spending is often financed by large transfers with many regulatory strings attached. A choice between these two measures is likely to significantly affect the empirical analysis of fiscal decentralization.

Tax autonomy, i.e. the share of taxes over which sub-central governments have some power to set the tax base or the tax rate, is even lower at around 11% of all tax revenue and several countries provide none at all. As a matter of fact, it is well-known that high sub-national government revenue (and expenditure) shares do not necessarily indicate high local autonomy (Stegarescu, 2005; Yilmaz and Ebel, 2002). It mostly depends on what taxation (spending) item is considered and how it is administered and organized by the sub-central authorities.[7] Moreover, when the relationship between fiscal decentralization and outcomes is tested empirically, revenue-based indicators tend to provide more statistically significant results.

We represent the degree of *FD* by using several measures to make our study consistent with the conventional approach (e.g., expenditure and revenue shares) and add new evidence to it adopting novel disaggregated tax decentralization indices (e.g., local own taxes by type). We built the following variables combining different sources (mainly IMF's *Government Finance Statistics Yearbook* and OECD):

- Expenditure decentralization (*ED*): measured by the share of local government expenditures on total general government expenditures.

[6] We refer to the terms local, sub-national, sub-central, regional, jurisdictional as synonymous to indicate lower tiers of government basically differing from the national/central/federal government in the countries of our sample. The main reason is that decentralization data do not allow any distinction among regional, local, and other lower tiers of governments: all sub-national units are aggregated into a single group. However, a further horizontal disaggregation would pose cross-country comparability issues that we want to avoid at this stage of the analysis.

[7] The SGT suggests that the best way to enforce the effectiveness of the decentralization process is to assign significant tax autonomy to local governments that are likely to be more accountable in such a way. The First Generation Theory (FGT hereafter) of fiscal federalism also devotes attention to the "tax assignment problem" (McLure, 1998; Musgrave, 1983) in a multi-layered government affirming that taxation executed by the local governments should focus on property taxes and user fees. Other types of taxes executed by local governments would introduce distortions in the location and levels of economic activity since tax bases can be highly mobile and residents can easily relocate to those areas with relatively low taxes.

- Tax decentralization (*TD*): measured by the share of own local tax revenues[8] on total general government tax revenues.
- Property tax decentralization (*TDP*): measured by the share of property taxes collected at the local level on total general government tax revenues;
- Income tax decentralization (*TDI*): measured by the share of income taxes collected at the local level on total general government tax revenues.

The first two indices are the most common in previous studies even though a wider definition for revenue decentralization is usually adopted (i.e. with the numerator capturing not only local own tax revenues but all local revenues); even it is the easiest to be built, it normally overestimates the degree of local governments' tax autonomy. The last two indicators represent the main novelty of our contribution with respect to the earlier empirical literature. The choice of these two taxes - property and income - is due to their importance for the local budget with respect to other forms of revenue. Overall, these taxes account, on average, for about 70% of sub-central tax revenues over the period 1995-2005 (see section 3.4 for further details on our sample).[9]

Moreover, such disaggregation is proposed basically for three reasons. The first is strictly empirical, as available data do not allow making recourse to a finer partition of local tax revenues. Yet – and this is the second reason – no previous studies have ever used so detailed and refined measures to represent tax decentralization in cross-country analyses (Baskaran and Feld, 2013; Gemmell et al., 2013; Thieben, 2003; Thornton, 2007).[10] Finally, while income taxes are usually decentralized on a tax-sharing method, property taxes are mostly based on a tax-separation scheme. The virtues of the property tax are ascribed to its relatively low efficiency costs, benign impact on growth, and high score on fairness (see International Monetary Fund, 2013). A further investigation is then required in order to verify whether the aspects related to the "quality" of tax decentralization can differently affect GDP growth in a country.

3.2 Measuring administrative decentralization (AD).

Our measure of *AD* reflects the degree of authority of sub-national government. We employ the "Regional Authority Index" (*RAI*) developed by Hooghe et al. (2008). The authors disaggregate regional authority into two components, which capture respectively the degree of authority exerted by

[8] Local non-tax revenues and capital revenues are excluded as they are recorded irregularly.

[9] In particular, local taxes on income, profits and capital gains (i.e. the numerator of *TDI*) have increased over time from about 38% to 42% of total sub-central revenues; while taxes on property (i.e. the numerator of *TDP*) seem to have experienced a gradual decline in many countries, from 34% to 31% (OECD, 2009). The share of consumption-type taxes has also increased, although a large part of this effect is due to new tax-sharing arrangements where sub-central governments have very little taxing power. On average, they account for a smaller share of local tax revenues – about 19% – with a large variability in their use, with the peak achieved in large countries, like the United States and Canada. In short, this form of revenue-sharing does little to enhance revenue autonomy or accountability among sub-central governments. For all these reasons, we do not consider local taxes on goods and services in our analysis.

[10] To our knowledge, a similar approach is adopted only in Liberati and Sacchi (2013), even though they investigate the relationship between tax decentralization and local government size.

a regional government over its territory (*self-rule*) and over the whole country (*shared-rule*). The sum of the two yields the *RAI*.

In detail, *self-rule* regards the degree of independence of the regional government from the influence of central authorities and the scope of regional decision-making, and it is obtained as the sum of four indicators: institutional depth, policy scope, fiscal autonomy and representation.[11] In turn, s*hared-rule* measures the capacity of the regional government to determine central decision-making and comes from the sum of four indicators: law-making, executive control, fiscal control and constitutional reform.[12]

The *RAI* has a number of strengths. First, it is a composite indicator that takes into account several aspects of authority. This makes it suitable to capture the continuum along which administrative autonomy is implemented (Rondinelli, 2008). Second, by exploring how governments are structured it allows us to consider the massive variation over countries in the shape of government. Thus, for instance, fiscal autonomy measures the extent to which a regional government can independently tax its population, regardless the level of local revenue, as well as the extent to which regional representatives co-determine the distribution of national tax revenues.

3.3 Measuring political decentralization (PD).

Our third dimension of decentralization is *PD*. Political decentralization is usually measured by whether the constitution classifies a country as a federation or as a unitary state, and by whether subnational officials are elected (Treisman, 2002).

As for the latter, we employ a variable *Local election* that gives information whether state/provincial governments are locally and directly elected.[13] It takes value equal to 0 if neither the local executive nor the local legislature are directly elected by the local population that they govern; 1 if either is directly elected and the other is indirectly elected (e.g., by councils at subsidiary levels of government) or appointed; and 2 if they are both directly and locally elected. This measure is recent and has not yet been much used in the empirical literature of fiscal federalism. In addition, it is the only measure of political decentralization available for such a large sample.

[11] Institutional depth measures the extent to which a regional government is autonomous rather than de-concentrated. Policy scope depends on the range of policies for which a regional government is responsible in areas related to economic, cultural–educational and welfare policies, as well as over aspects of constitutive or coercive authority and over membership of the community. Fiscal autonomy captures the extent to which a regional government has authority on fiscal matters, independently of its expenditures or revenues. Representation concerns the existence of an independent legislature and executive at the regional level.

[12] Law-making assesses the role played by regional representatives when establishing national legislation. Executive control measures the extent to which a regional government can co-determine national policy in intergovernmental meetings. Fiscal control reflects whether the regional governments can influence the distribution of national tax revenues, including intergovernmental grants. Constitutional reform covers the relevance of national government to co-determine constitutional changes.

[13] Both states and provinces are considered as sub-national forms of government as data are recorded without including any distinction. If there are multiple levels of sub-national government, we consider the highest level as the "state/province" level.

Our second measure is a standard index describing the federalist/unitary nature of the country. We call *FED* the customary binary variable that distinguishes federalist types of countries' constitutions from the others. Actually, binary measures of federalism have been criticized on the ground of two arguments. Firstly, constitutional provisions explain only a part of the differences in sub-central autonomy as various federal countries appear more centralized than some unitary ones (OECD, 2012b). Yet, in our case, we use *FED* as a variable measuring its nature, which is a particular institutional setting defining specifically intergovernmental relationship. The second shortcoming concerns that decentralization cannot be addressed as a dummy-variable since there is a continuum that reflects the role of sub-national governments in the central government's policy-making process (Rodden, 2004). However, here and once more, we are interested in the minimum common denominator of federalist countries that is the specific guarantee of local governments' authority described above, i.e. their legitimacy.

3.4 Decentralization dimensions in our sample.

Table 1 summarizes the variables discussed above. The first two indices (i.e. *ED* and *TD*) have been largely adopted in previous studies. They reveal the customary pattern in which federal States, such as Australia, Canada, Germany, Switzerland and the United States, along with Denmark and Sweden, show the higher figures. *ED* is always more pronounced than *TD* as also pointed out by OECD (2012a).

Our novel decomposition of tax decentralization makes it possible to look at the local revenue composition, by grouping them by property taxes (*TDP*) and income taxes (*TDI*). One can observe a high correlation between *TDI* and *TD*. The distribution of *TDI* appears to be quite uniform between unitary and federal countries, with the exceptions of Germany, Canada and Switzerland. Actually, these taxes are also the predominant sub-central tax source in Scandinavian unitary countries (e.g., Denmark and Sweden), a feature that marks a difference with most English-speaking countries, where property taxes account, instead, for the overwhelming part of local tax revenues. The predominant role of income taxes at the sub-central level in many countries is likely due to the fact that central governments usually cede a part of income taxation to local governments either through a pure tax-sharing formula or through the introduction of a proportional surcharge on national figures (tax base or tax liability) with discretion on rates and reliefs (Martinez-Vazquez and Timofeev, 2010).[14]

Some differences appear by looking at *TDP*. It is particularly high in some federal countries (e.g., Australia, Canada, Switzerland, and the United States) and also some unitary countries actually rely on property taxes (e.g., Iceland, Denmark, UK, France, and Spain). Finally, property tax is absent in Finland and Sweden. In general, the weight of property tax is lower than that of income tax at the sub-

[14] This can give also rise to some form of vertical and horizontal tax (base) competition and, more importantly for us, may have a depressive effect on individuals' income and consumption due to the higher tax burden linked thereto.

central level and it is more visible when they are both calculated over general government revenue as in our case. However, it is known that property taxes represent the main source of the overall sub-central government financing in some countries (e.g. Australia and United Kingdom) and the main source of financing for most of smaller government levels (basically at the lower tier as municipalities). Beyond this, *TDP* better captures the degree of tax autonomy of sub-central governments as such taxes are usually assigned exclusively to them, so without ambiguity about which authority is entitled to tax, and being based on a tax-separation scheme.

The *AD* dimension is captured by *RAI*, while *PD* is approximated alternatively by *FED* and *Local election*. The *RAI* is positively correlated with tax decentralization, i.e. *TD*, (0.34) as reported in last columns of Table 1. As for political decentralization, *FED* correlates 0.49 with *TD*, while *Local election* is also positively associated with *TD* but with a lower magnitude (0.39).

All in all, these figures show that there are relevant differences across the three dimensions of decentralization. This also proves the presence of various forms of such process in our sample, and militates for including measures other than fiscal autonomy to account for all of them properly. Each indicator of decentralization shows substantial variation across countries.

[TABLE 1 ABOUT HERE]

4. The empirical strategy

4.1 The baseline model

In order to make our study consistent with the previous literature, we start the empirical analysis testing whether fiscal decentralization affects economic growth. As discussed above, we mainly focus on the revenue side of the decentralization process in relation to GDP growth, and then we estimate the following for country *i* (from 1 to 20) and period *t* (five-year non-overlapping periods either from 1973 to 2007):[15]

$$GDPgrowth_{it} = \alpha + \beta_1 TD_{it} + \sum_{j=1}^{s} \gamma_j Cont_{it} + \tau_i + \mu_{it} \qquad (1)$$

The dependent variable is annual real per capita GDP growth for each country calculated over five-years; TD_{it} (in log) is our measure of fiscal decentralization, as described in Section 3.1. Two sets of control variables ($Cont_{it}$) are included. The former includes variables potentially affecting economic

[15] Actually, we also perform regressions considering the expenditure side (*ED*), instead of *TD*, to measure fiscal decentralization. We report the estimation results in the next section.

growth - i.e. initial real per capita GDP (in log) as a proxy for the initial level of development, population growth rate, urbanization rate, unemployment rate, tertiary school enrolment growth rate as a proxy for human capital, openness, gross fixed capital formation growth as a proxy for investment growth. The second set includes variables capturing some institutional aspects at both national and sub-national level - i.e. national political party; the type of local governments' election; the public sector's fragmentation to control for the number of participating sub-national governments; the degree of regional authority. The choice of controls is consistent with previous studies (for a recent review see Gemmell et al., 2013) and it reflects factors normally affecting economic growth. Finally, τ_i captures specific country-fixed effects; μ_{it} is the error term. All variables are expressed in five-year averages. Detailed information on variables source and their construction are reported in the Appendix.

A further specification of equation (1) is introduced, to distinguish between property tax and income tax:

$$GDPgrowth_{it} = \alpha + \beta_2 TDI_{it} + \beta_3 TDP_{it} + \sum_{j=1}^{s} \gamma_j Cont_{it} + \tau_i + \mu_{it} \quad (2)$$

TDI and *TDP* are expressed in log forms, while the set of controls in the same as equation (1).[16] Descriptive statistics of all the dependent and explanatory variables are reported in Table 2.

[TABLE 2 ABOUT HERE]

4.2 The interaction model

We are interested in investigating whether political and administrative forms of decentralization reinforce (or not) the impact of a more fiscally decentralized government structure on GDP growth.

Hence, we introduce in the baseline model the interaction terms between *FD* measures and, respectively, *AD* (*RAI)* and *PD* measures (*Local election* and *FED*, one at a time). For the sake of brevity, we report only interaction models for the *RAI* case. The others (i.e. with *Local election* and *FED*) follow the same logic:

$$GDPgrowth_{it} = \alpha + \beta_1 TD_{it} + \theta_1 RAI_{it} + \lambda_1 (TD_{it} * RAI_{it}) + \sum_{j=1}^{s} \gamma_j Cont_{it} + \tau_i + \mu_{it} \quad (3)$$

[16] Before equation (2), we also estimate equation (1) considering *TDI* and *TDP*, one at a time, in place of *TD*. All the results are reported in the next section.

$$GDPgrowth_{it} = \alpha + \beta_2 TDI_{it} + \beta_3 TDP_{it} + \theta_1 RAI_{it} + \lambda_2 (TDI_{it} * RAI_{it}) + \lambda_3 (TDP_{it} * RAI_{it}) + \sum_{j=1}^{s} \gamma_j Cont_{it} + \tau_i + \mu_{it} \quad (4)$$

Equation (4) allows income and property tax decentralization measures - with their interaction terms - to be used simultaneously as in the baseline model. In this case, we are interested in the λ's coefficients. Positive coefficient would suggest the presence of institutional complementarities for economic growth.

4.3 The estimation methodology

Following other works in comparative politics and decentralization analysis (e.g Enikolopov and Zhuravskaya, 2007) as well as in growth and fiscal decentralization (e.g., Jin and Zou, 2002), we use fixed effect (FE) panel estimator, taking into account the panel characteristics of our dataset. Indeed, panel data has the advantage of allowing one to control for omitted variables that are persistent over time. Including country specific effects allows one to better control for individual heterogeneity. The inclusion of country specific effects may also be necessary to inhibit correlation between the regressors due to contemporaneous country shocks (see also Bodman, 2011).[17]

All regressions are carried out on five-year averages (for a recent review see Gemmell et al., 2012). Indeed, output is a highly persistent series and to avoid modelling cyclical dynamics, most growth applications consider only a small number of time periods, based on (say) five-year averages (e.g. Bond et al., 2001). This also allows us to focus on long-run growth.

In order to make the results from FE models robust as well as to overcome some methodological problems normally occurring with growth models (e.g. endogeneity and persistency), we estimate the same models using a dynamic panel approach – i.e. the system-GMM estimator (Arellano and Bover, 1995). The main advantages are that the GMM framework is flexible enough to accommodate our unbalanced panel and it also allows us to deal with country fixed effects. Other papers using system GMM estimators in growth regressions include Levine et al. (2000), Rodrik (2008) and Acosta-Ormaechea and Morozumi (2013).

[17] We also estimate the baseline and the interaction models using Feasible Generalised Least Squares (FGLS) with fixed effects and controlling for heteroskedasticity in order to take into account possible cross-sectional correlation (results are not reported for the sake of brevity, but are available upon request). Moreover, we include period dummies to control for common long-run trend in different countries when using both FE and FGLS estimations. In these cases, results are confirmed (available upon request).

5. Results and discussion

5.1 Panel estimators

Our results for the baseline model are shown in Table 3 (pairwise correlations among the variables are available in Table A1 of the Appendix).

[TABLE 3 ABOUT HERE]

The first two columns are referred to aggregate fiscal decentralization indices (i.e. *TD*, *ED*) separately considered; the third contains estimation when both expenditure and tax decentralization enter equation (1) in order to take into account the different "nature" of the fiscal decentralization. The last three columns provide regressions based on equation (2), which includes disaggregated measures of tax decentralization (i.e. *TDI*, *TDP*).

The *nature* of fiscal decentralization seems to matter for economic growth as while tax decentralization (*TD*) has a negative and significant impact on real per capita GDP growth, expenditure decentralization (*ED*) does not (it shows a negative but not statistically significant coefficient). This result also holds when *TD* and *ED* are considered jointly in the regression (third column). This suggests an asymmetric effect regarding the fiscal decentralization-growth relationship.

The negative association between tax decentralization and economic performance may be the consequence of differences in revenue policy decided by sub-national governments when they can exert more taxing power and autonomy, which may undermine overall growth potential. Indeed, in more decentralized government structures an overexploitation of their 'discretion', without strong accountability mechanisms, may lead policy-makers to misapply local taxation to increase, for example, their political consensus disregarding efficiency issues. Our findings are consistent with previous results obtained by Rodriguez-Pose and Ezcurra (2011) and OECD (2012a). On the contrary, the fact that *ED* seems to do not affect economic growth may depend on the fact that such pro-growth effects are mostly related to government spending composition and public policy mix than to expenditure decentralization *per se*. Unfortunately, we are not able to capture spending decentralization by function neither to test this hypothesis.

Second, the *quality* of tax decentralization seems to matter for economic growth. Indeed, passing from aggregate indicator to single tax categories, income tax decentralization (*TDI*) has a negative and significant impact on real per capita GDP growth (fourth column), while property tax decentralization (*TDP*) does not affect economic growth (fifth column), even though it shows a negative but not statistically significant coefficient. This result helps us to explain the previous negative association between tax decentralization as a whole and GDP growth and confirms that not all local taxes have the

same strength in depressing economic performance. This finding also holds when considering together *TDI* and *TDP* (sixth column).

The fact that local income and property taxation exert a different impact on GDP growth denotes the relevance of the taxation principle on which they are based. Income tax basically reflects the *ability-to-pay* criterion and it is a piggybacked (or shared) tax at the local level; property tax basically reflects, instead, the *taxation benefit* principle and it is an exclusive sub-central tax. The implication arising from this result seems to be that in order not to harm economic growth at the national level, it would be better to assign to sub-central governments taxes following a tax-separation scheme instead of a tax-sharing formula as suggested by both the traditional literature of fiscal federalism (e.g., Musgrave, 1983) and studies on the local tax assignment (Liberati, 2011 for a review; e.g. McLure, 1998). This also sounds quite familiar to recent OECD (2012a) and International Monetary Fund (2013) prescriptions according to which taxes on immovable property are less likely to affect people's behavior than income or employment taxes making the former the most growth-friendly of all major taxes. As a matter of fact, Arnold et al. (2011) prove the existence of a 'tax and growth ranking' with recurrent taxes on immovable property being the preferred tax instrument in terms of long-run GDP per capita, without considering decentralization features in their case.

It is worth emphasizing that neither administrative decentralization (represented by *RAI*) nor political decentralization (represented by *Local election*) are statistically significant in this specification. As for the controls, as expected positive and significant effects are exerted by the openness degree and the growth of gross fixed capital, while the negative initial level of GDP signals a classic process of economic convergence.

Results from the interaction models are reported in Tables 4, 5, 6 and they are referred to equations (3) and (4). Table 4 reports the interactions between fiscal and administrative decentralization (i.e. with the *RAI* variable), while Tables 5 and 6 show the interactions between fiscal and political decentralization (respectively, with *Local election* in Table 5, and with *FED* in Table 6). Starting with Table 4, no growth-effects emerge when aggregate fiscal decentralization variables (i.e. *TD*, *ED*, and both) are coupled with the regional authority index (see columns 1, 2, and 3). Positive coefficients appear for the interaction terms (i.e. *TD*RAI* and *ED*RAI*) even if they are not statistically significant at the conventional level (10%).

[TABLE 4 ABOUT HERE]

Insightful results arise looking at the last three columns of Table 4, where disaggregated tax decentralization indices are employed. When coupled with the *RAI*, the effect of both decentralized income and property taxes on GDP growth become statistically significant and positive. The magnitude of the interaction effect is higher for *TDP* (see columns 4 and 5) and it is highly significant

(at 1%) when *TDP* and *TDI* enter together the model (column 6). As a matter of fact, more (tax) resources assigned to sub-central governments combined with more authority are associated with income growth. This seems to depend on the extent to which local governments have real decision-power and authority over its territory as well as over the whole country. Our findings contribute to better qualify the evidence of positive revenue decentralization on growth in OECD countries by Gemmell et al. (2013), adding the beneficial effect of administrative decentralization beyond the simple devolution of resources to local authorities.

The interaction effects between fiscal and political decentralization are reported in Table 5 using the proxy of *Local election* and in Table 6 using the proxy of *FED*. By looking at Table 5, no relevant effects emerge when each fiscal decentralization index is coupled with the *Local election* variable as the interaction terms are never significant. Having local governments more or less directly elected by their population does not seem an enhancing-growth condition even with high level of fiscal decentralization.

[TABLE 5 ABOUT HERE]

Table 6 proves the positive interaction effect on GDP growth between fiscal and political decentralization in the case of property tax only (column 5 and 6). With respect to the baseline model, where the property tax coefficient is not significant, this suggests that that the beneficial impact on economic growth is likely to be obtained by using a tax satisfying the benefit principle of taxation when coupled with strong political legitimacy of local or state governments as that in federal countries.

[TABLE 6 ABOUT HERE]

Overall, the results from the interaction models suggest that even if local tax revenues are assigned on a tax-separation scheme they do not necessarily favor economic growth as some integration with authority (i.e. *RAI*) and legitimacy (i.e. *FED*) dimensions of the decentralization process would be, in fact, required. Put differently, only when intergovernmental relationships are well-established within the institutional system and local governments are also entitled to some authority, tax decentralization is able to lead pro-growth effects.

To sum up, two main lessons can be taken from the evidence above. Different formal arrangements in a multi-layered system can boost economic performance only if all specific dimensions of the decentralization process are developed and properly combined. We need, indeed, taxing power as well as a certain degree of authority granted to sub-national governments and, at the same time, specifically defined relationships among the levels of government. Secondly, as for the

taxing power, tax instruments available at a local level should be based on a tax-separation scheme or referred to tax bases exclusively assigned to lower tiers in order to enhance pro-growth effects. The analysis confirms, once more, the tax and economic growth ranking according to which recurrent taxes on immovable property being the least harmful tax (Acosta Ormaechea and Yoo, 2012; Arnold et al., 2011), only when they are properly coupled with other decentralization dimensions in our case.

5.2 Dynamic panels and GMM estimators

The use of static panel may pose several problems that are particularly attached to models estimating economic growth, such as a lack of dynamics, persistency and endogeneity of the dependent variables. Additionally, some regressors may be endogenous. For all these reasons, the panel method which has been increasingly used is that of generalized methods of moments (GMM). In particular, Bond et al. (2001) recommend the use of system-GMM estimator (developed by Arellano and Bover, 1995; Blundell and Bond, 1998) when the per capita GDP is observed in 3 or 5 years averages and T is necessarily small. Indeed, when the number of time periods available is small, the first-differenced GMM estimator may be subject to a large downward finite-sample bias.

Following Bond et al. (2001) and Barro (2004), we treat investment and population growth as endogenous (including also education among the endogenous variables would leave the results unchanged), while tax decentralization and all other covariates are assumed to be exogenous.[18] We could have included also our decentralization variables among the endogenous variables. However, this choice would have considerably increased the number of instruments far above the number of countries (for some reasons not to do that see Roodman, 2009a, 2009b). Secondly, the degree of decentralization is usually assumed to vary according to the *levels* (and not to the *changes*) of GDP – i.e. richer countries tend to be more decentralized – and over long spans of time (OECD 2012a). More generally, while regressions considering aggregate income levels are likely to suffer from endogeneity problems, it appears to be less of a concern in regressions considering growth rates of GDP per capita.[19]

[18] For all the models reported in this section, we impose a second lag of the endogenous variables as it is difficult to obtain suitable "external" instruments for the variables that are included in the benchmark specification and consistently with the fact that the Sargan test maybe weaken with larger number of instruments when the number of countries is small. Results also hold using collapsed instruments. Furthermore, the lag structure is consistent with the tests for autocorrelation of first and second order (Arellano and Bond, 1991), giving the right outcomes throughout all the models. AR(1) and AR(2) tests are reported at the bottom of each table. We also include the Sargan test that does not reject the validity of instruments. Finally, as suggested by Roodman (2009a, 2009b) the validity of the additional instruments in system-GMM (i.e. the possibility of instrumenting levels with differences) depends on the assumption that changes in the instrumenting variables are uncorrelated with the current errors in levels, which include fixed effects. As explained by Bond et al. (2001), investment and population growth may hardly be assumed to be uncorrelated with country fixed effects in the growth context. For this reason we choose to instrument only the difference equation.

[19] As Slemrod (1995) and others have stressed, in the presence of endogenous relationships between fiscal variables and GDP, such "levels regressions" are likely to suffer especially from statistical endogeneity problems. By first differencing the data, it is possible to remove the country specific factors that affect the level of spending and taxation.

We prefer to report the results for the one-step GMM estimators, with standard errors that are not only asymptotically robust to heteroskedasticity but have also been found to be more reliable for finite sample inference (see Blundell and Bond, 1998).[20]

Table 7 reports the results of the system-GMM. The results are consistent with those in Table 3, showing negative coefficients associated with *TD* and *TDI*. As expected, investment growth rate is positive as well as openness, even though the latter is significant only in two specifications.

[TABLE 7 ABOUT HERE]

Results from the interaction models of fiscal decentralization variables with administrative and political decentralization are reported in Tables 8, 9, and 10. Table 8 results confirm the positive effect of the interaction of both income tax and property tax with administrative decentralization (*RAI*). Concerning political decentralization, the estimates confirm the positive effect of the interaction between *TDP* and *Local Election* (Table 9) and *TDP* and *FED* (Table 10).

[TABLE 8 ABOUT HERE]
[TABLE 9 ABOUT HERE]
[TABLE 10 ABOUT HERE]

6. Concluding remarks

The importance of studying the functioning of fiscal decentralization within the real institutional setting is the key message of recent developing in fiscal federalism theory (e.g., the SGT). However, this has been disregarded in the empirical analysis that has explored the relationship between fiscal decentralization and economic growth within a constitutional void. The mixed evidence reached is likely to reflect some missing link in such analysis.

This paper shows that the impact of fiscal decentralization on economic growth is contingent on the institutional setting, precisely on the degree of both administrative and political decentralization. This supports our theoretical prediction that the different dimensions of decentralization work in a complementary fashion. More generally, our evidence supports the political economy approach in fiscal decentralization.

To better represent fiscal decentralization in relation to income growth, we focused on the tax side and introduced a novel distinction among sub-central taxes (basically, income and property) to deal

[20] In finite samples, the asymptotic standard errors associated with the two-step GMM estimators can be seriously biased downwards, and thus form an unreliable guide for inference (see Bond et al., 2001).

with the local tax composition and the tax assignment problem. This provides new insights on how local tax systems should be designed and combined with other institutions to support economic growth in the long run. Our results point towards a better performance of tax decentralization when it is measured – and implemented – with property tax. In this perspective, we confirm both conventional and recent wisdoms: the former recommends assigning this revenue to local governments as it would not introduce distortions in the location and levels of economic activity since tax bases are not mobile and residents can hardly relocate to those areas with relatively low taxes. The latter emphasizes the economic efficiency of property taxation due to low administrative costs; benign impact on growth; stable and predictable revenue source (see International Monetary Fund, 2013).

On the ground of our evidence policy implications can be drawn. The "federalist" tendency, in particular that concerning the devolution of resources and competences to lower governments, has been generated by a general consensus about the positive effect of fiscal decentralization in terms of both efficiency and economic growth. The good performance of more decentralized or federal countries has played a role in encouraging policy-makers in this direction. However, fiscal decentralization in federal countries also concerns political legitimacy of sub-national and sub-federal governments (indeed recognized at the constitutional level) as well as decentralization of authority.

Political reforms towards decentralization should therefore take into account the importance of a number of factors other than simply locally assigning expenditure and revenues. They include the tax assignment problem at the sub-central level (as proved by the importance of the property tax in our results), the type and the extent of authority granted to local governments, as well as their degree of political legitimacy.

Keeping this in mind, some reflections on the recent 'recentralization' trend in relation to the financial crisis and economic stagnation in the euro area may arise (for a detailed review see Institute d'Economia de Barcelona, 2013). Indeed, our results seem to call for a reversing need, meaning that the most important action may not be a strengthened centralization, but rather a promotion of all aspects of decentralization as the best answer to stimulate income growth.

Finally, it is important to note that our evidence holds for a sample composed by industrialized countries. In developing countries, instead, different findings could emerge, since those countries are usually characterized by a weaker institutional and political system that can undermine the effectiveness of institutional complementarities linked to the decentralization process. An interesting research venture would certainly be to cover this gap by investigating whether fiscal decentralization has to wait for a mature institutional and political system in order to be effective, or alternatively whether it can actually spur a process of institutional building itself. Given the increased number of emerging countries embarking in decentralization reforms, this is a topic issue to look at.

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Tables and figures

Table 1
Measures of the three dimensions of decentralization, (average over 1973-2007 years)

Countries	*Fiscal decentralization (FD)*				*Administrative decentralization (AD)*	*Political decentralization (PD)*		Correlations between TD and:		
	ED	TD	TD grouped for:		RAI	FED	Local election			
			TDI	TDP				RAI	FED	Local election
Australia	41.39	15.77	absent	6.52	18.27	1	2.00	0.34	0.49	0.39
Austria	31.03	17.09	7.71	0.77	17.69	1	2.00			
Belgium	24.11	5.13	1.68	2.12	27.90	1*	1.47			
Canada	58.12	35.84	12.76	7.69	22.64	1	2.00			
Denmarl	46.23	24.16	22.06	1.99	10.17	0	2.00			
Finland	36.75	19.81	19.13	absent	3.66	0	0.20			
France	33.06	17.64	6.74	1.80	17.70	0	2.00			
Germany	41.20	24.13	15.25	1.52	29.38	1	2.00			
Greece	5.98	0.64	0.19	0.12	4.74	0	0.69			
Iceland	24.51	18.12	11.78	2.95	0.00	0	1.00			
Italy	23.27	7.00	2.49	0.85	17.11	0	2.00			
Luxemburg	15.05	5.24	4.79	0.33	0.00	0	0.00			
The Netherlands	26.39	2.17	0.76	0.90	13.90	0	1.00			
Norway	33.34	14.26	13.18	0.90	9.66	0	1.00			
Portugal	20.54	3.41	1.26	0.61	3.35	0	0.57			
Spain	26.04	11.29	3.22	1.80	18.84	1	2.00			
Sweden	40.81	29.94	25.87	absent	10.00	0	1.00			
Switzerland	54.61	28.51	22.81	4.38	19.50	1	2.00			
United Kingdom	24.89	6.07	3.44	2.57	8.83	0	2.00			
Unites States	45.45	25.35	6.22	7.64	23.18	1	2.00			

Notes: Belgium becomes a federal state in 1993.

Sources: Authors' calculations

Table 2
Descriptive statistics of all variables at annual frequency, (average over 1973-2007 years)

Variable	Mean	Std. Dev.	Min	Max
GDP growth	2.11	2.71	-12.15	12.75
Initial GDP (in PPP 2005 constant prices)	25,548	8,355	9,034	67,517
TD (in %)	15.85	10.12	0.52	43.31
ED (in %)	32.08	14.18	4.88	100.00
TDI (in %)	9.89	8.12	0.00	29.24
TDP (in %)	2.46	2.46	0.00	8.58
RAI	13.27	8.77	0.00	32.07
FED	0.36	0.48	0.00	1.00
Population growth	0.56	0.45	-1.24	2.18
Urbanization	74.25	11.84	39.60	97.32
Education growth	0.05	0.09	-0.32	0.87
Unemployment rate	6.37	4.04	0.00	24.17
Openness	71.28	43.98	11.83	308.93
Gross fixed capital growth	2.90	7.04	-33.51	37.14
Political party	0.38	0.49	0.00	1.00
Government fragmentation	3.37	6.42	0.03	25.94

Sources: Authors' calculations

Table 3
The baseline model (FE panel estimator)

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	GDPgrowth	GDPgrowth	GDPgrowth	GDPgrowth	GDPgrowth	GDPgrowth
Initial GDP	-2.32***	-1.77**	-2.34***	-1.94**	-2.00**	-2.06**
	(0.61)	(0.65)	(0.62)	(0.73)	(0.83)	(0.78)
TD	-1.38***		-1.48***			
	(0.40)		(0.51)			
ED		-0.39	0.22			
		(0.43)	(0.41)			
TDI				-1.73**		-1.65**
				(0.62)		(0.62)
TDP					-0.49	-0.18
					(0.33)	(0.27)
RAI	-0.032	-0.40	0.031	0.30	0.20	0.39
	(0.49)	(0.69)	(0.58)	(0.47)	(0.60)	(0.47)
Local election	0.55	0.98*	0.29	-0.51	0.11	-0.51
	(0.59)	(0.54)	(0.70)	(0.57)	(0.65)	(0.58)
Government fragmentation	5.04	4.38	5.16	7.76	3.84	7.49
	(5.88)	(5.93)	(6.06)	(5.48)	(7.05)	(5.53)
Population growth	-0.20	-0.27	-0.22	-0.24	-0.26	-0.24
	(0.28)	(0.36)	(0.28)	(0.26)	(0.38)	(0.28)
Urbanization	1.25	0.92	1.30	0.65	1.18	0.96
	(2.38)	(2.15)	(2.45)	(2.23)	(2.39)	(2.47)
Education growth	-0.93	0.70	-1.00	-1.29	0.48	-1.41
	(2.12)	(2.25)	(2.11)	(1.91)	(2.36)	(1.95)
Unemployment rate	-0.28	-0.18	-0.29	-0.27	-0.087	-0.28
	(0.38)	(0.35)	(0.39)	(0.39)	(0.41)	(0.42)
Openness	4.22***	3.69**	4.19***	3.86***	3.42**	3.80***
	(1.30)	(1.32)	(1.30)	(1.19)	(1.40)	(1.20)
Gross fixed capital growth	0.23***	0.23***	0.23***	0.25***	0.23***	0.25***
	(0.027)	(0.029)	(0.027)	(0.028)	(0.029)	(0.029)
Political party	0.19	0.14	0.17	0.028	0.11	0.0088
	(0.24)	(0.23)	(0.25)	(0.22)	(0.24)	(0.25)
R-squared	0.545	0.509	0.546	0.619	0.529	0.616
Observations	124	128	124	113	116	110
Number of countries	20	20	20	20	20	20

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4
The interaction model with *RAI* (FE panel estimator)

Variables	(1) GDPgrowth	(2) GDPgrowth	(3) GDPgrowth	(4) GDPgrowth	(5) GDPgrowth	(6) GDPgrowth
Initial GDP	-2.48***	-1.78**	-2.54***	-1.89**	-3.07***	-2.80***
	(0.61)	(0.67)	(0.65)	(0.66)	(0.93)	(0.68)
TD	-3.29**		-3.48**			
	(1.55)		(1.53)			
*TD*RAI*	0.79		0.81			
	(0.62)		(0.58)			
ED		-0.81	-0.30			
		(1.28)	(1.05)			
*ED*RAI*		0.21	0.29			
		(0.49)	(0.40)			
TDI				-3.94***		-4.47***
				(1.07)		(1.41)
*TDI*RAI*				1.08**		1.34**
				(0.48)		(0.58)
TDP					-4.96**	-3.78***
					(1.76)	(0.74)
*TDP*RAI*					1.71**	1.46***
					(0.62)	(0.27)
RAI	-2.37	-1.17	-3.44	-2.79	-0.14	-3.98*
	(2.06)	(2.05)	(2.96)	(1.63)	(0.72)	(2.01)
Local election	0.36	1.00*	0.11	-0.87	0.92	-0.12
	(0.62)	(0.58)	(0.77)	(0.51)	(0.92)	(0.57)
Government fragmentation	4.28	4.19	4.13	5.75	-0.56	1.03
	(5.98)	(6.00)	(6.19)	(5.23)	(5.01)	(3.71)
Population growth	-0.31	-0.26	-0.33	-0.46	-0.18	-0.50*
	(0.31)	(0.36)	(0.30)	(0.30)	(0.25)	(0.26)
Urbanization	2.19	0.84	2.16	1.06	3.84	3.37
	(2.35)	(2.14)	(2.55)	(1.76)	(2.66)	(2.25)
Education growth	-0.92	0.72	-1.06	-1.06	0.69	-1.07
	(2.19)	(2.24)	(2.17)	(1.84)	(2.37)	(1.97)
Unemployment rate	-0.31	-0.16	-0.28	-0.17	-0.13	-0.18
	(0.37)	(0.35)	(0.40)	(0.35)	(0.39)	(0.35)
Openness	4.14***	3.60**	3.98***	3.75***	3.38***	3.73***
	(1.32)	(1.36)	(1.34)	(1.09)	(1.16)	(0.78)
Gross fixed capital growth	0.23***	0.23***	0.23***	0.26***	0.23***	0.26***
	(0.027)	(0.028)	(0.026)	(0.029)	(0.019)	(0.028)
Political party	0.22	0.12	0.18	0.11	0.10	0.12
	(0.25)	(0.24)	(0.25)	(0.24)	(0.24)	(0.25)
R-squared	0.551	0.510	0.554	0.640	0.589	0.684
Observations	124	128	124	113	116	110
Number of countries	20	20	20	20	20	20

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 5
The interaction model with *Local election* (FE panel estimator)

Variables	(1) GDPgrowth	(2) GDPgrowth	(3) GDPgrowth	(4) GDPgrowth	(5) GDPgrowth	(6) GDPgrowth
Initial GDP	-2.27***	-1.85***	-2.29***	-1.90**	-1.99**	-2.06**
	(0.59)	(0.63)	(0.59)	(0.71)	(0.73)	(0.74)
TD	-1.06*		-1.29			
	(0.57)		(1.14)			
*TD*Local election*	-0.35		-0.16			
	(0.50)		(1.01)			
ED		-0.23	0.32			
		(0.56)	(1.68)			
*ED*Local election*		-0.14	-0.21			
		(0.75)	(1.91)			
TDI				-1.77**		-2.42**
				(0.70)		(1.06)
*TDI*Local election*				0.10		0.89
				(0.44)		(0.79)
TDP					-1.66*	-1.67
					(0.87)	(1.14)
*TDP*Local election*					1.19	1.50
					(0.79)	(1.13)
Local election	1.24	1.22	1.39	-0.46	-0.13	-2.83
	(1.11)	(2.33)	(5.01)	(1.02)	(0.87)	(2.37)
Government fragmentation	5.18	4.18	5.22	7.82	3.55	7.12
	(5.96)	(6.03)	(6.11)	(5.55)	(6.93)	(5.20)
Population growth	-0.23	-0.22	-0.25	-0.27	-0.29	-0.31
	(0.28)	(0.35)	(0.27)	(0.27)	(0.34)	(0.26)
Urbanization	1.09	0.90	1.20	0.58	2.22	2.79
	(2.45)	(2.24)	(2.50)	(2.20)	(2.29)	(3.40)
Education growth	-0.86	0.71	-0.95	-1.36	0.34	-1.41
	(2.14)	(2.26)	(2.23)	(1.85)	(2.33)	(1.96)
Unemployment rate	-0.28	-0.23	-0.28	-0.23	-0.10	-0.35
	(0.35)	(0.33)	(0.35)	(0.34)	(0.36)	(0.42)
Openness	4.28***	3.57**	4.26***	3.93***	3.33**	3.68***
	(1.34)	(1.35)	(1.38)	(1.20)	(1.39)	(1.16)
Gross fixed capital growth	0.23***	0.23***	0.23***	0.25***	0.23***	0.25***
	(0.027)	(0.029)	(0.027)	(0.028)	(0.027)	(0.028)
Political party	0.17	0.10	0.17	0.045	0.12	0.081
	(0.24)	(0.24)	(0.25)	(0.23)	(0.23)	(0.23)
R-squared	0.546	0.507	0.546	0.618	0.536	0.623
Observations	124	128	124	113	116	110
Number of countries	20	20	20	20	20	20

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 6
The interaction model with *FED* (FE panel estimator)

Variables	(1) GDPgrowth	(2) GDPgrowth	(3) GDPgrowth	(4) GDPgrowth	(5) GDPgrowth	(6) GDPgrowth
Initial GDP	-2.34***	-1.95***	-2.29***	-1.98**	-2.45***	-2.52***
	(0.57)	(0.59)	(0.60)	(0.73)	(0.73)	(0.74)
TD	-1.20***		-1.29***			
	(0.35)		(0.35)			
*TD*FED*	-0.16		-0.23			
	(0.60)		(0.98)			
ED		0.27	0.50			
		(0.31)	(0.30)			
*ED*FED*		-1.09*	-0.22			
		(0.59)	(0.89)			
TDI				-1.62*		-1.45*
				(0.91)		(0.80)
*TDI*FED*				0.28		-0.091
				(1.22)		(0.99)
TDP					-0.75**	-0.51**
					(0.32)	(0.19)
*TDP*FED*					1.37**	1.45**
					(0.61)	(0.54)
FED	0.30	3.51*	0.98	-0.28	-1.60*	-1.51
	(0.94)	(1.79)	(1.88)	(1.06)	(0.83)	(1.30)
Government fragmentation	4.29	3.66	4.79	5.91	2.76	5.27
	(5.16)	(5.73)	(5.57)	(5.28)	(6.07)	(4.98)
Population growth	-0.11	-0.16	-0.25	-0.29	-0.086	-0.086
	(0.26)	(0.28)	(0.26)	(0.26)	(0.31)	(0.25)
Urbanization	1.19	0.96	1.76	1.07	2.43	1.65
	(2.16)	(1.68)	(2.27)	(2.38)	(2.04)	(2.35)
Education growth	0.56	1.73	0.65	-0.19	2.31	-0.10
	(1.92)	(1.91)	(1.94)	(2.89)	(2.04)	(3.02)
Unemployment rate	-0.24	-0.14	-0.25	-0.22	-0.018	-0.20
	(0.34)	(0.31)	(0.35)	(0.35)	(0.36)	(0.38)
Openness	4.03***	3.54***	4.02***	3.75***	4.01**	4.44***
	(1.10)	(1.18)	(1.13)	(1.03)	(1.43)	(1.01)
Gross fixed capital growth	0.26***	0.27***	0.26***	0.28***	0.25***	0.27***
	(0.035)	(0.036)	(0.035)	(0.043)	(0.032)	(0.042)
Political party	0.19	0.084	0.14	-0.032	0.081	-0.062
	(0.25)	(0.26)	(0.27)	(0.24)	(0.24)	(0.23)
R-squared	0.570	0.544	0.574	0.642	0.587	0.659
Observations	120	123	120	109	112	106
Number of countries	20	20	20	20	20	20

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 7
The baseline model (system-GMM estimator)

	(1)	(2)	(3)	(4)
Variables	$GDPgrowth_t$	$GDPgrowth_t$	$GDPgrowth_t$	$GDPgrowth_t$
$logGDP_{t-1}$	-0.02***	-0.04***	-0.02***	-0.04***
	(0.042)	(0.041)	(0.044)	(0.043)
Gross fixed capital growth$_t$	0.014***	0.014***	0.014***	0.014***
	(0.0027)	(0.0024)	(0.0028)	(0.0025)
Population growth$_t$	-0.11***	-0.10***	-0.12***	-0.11***
	(0.040)	(0.036)	(0.042)	(0.037)
TD_t	-0.016*			
	(0.0093)			
TDI_t		-0.014**		-0.014**
		(0.0067)		(0.0067)
TDP_t			-0.0073	-0.012
			(0.010)	(0.0091)
RAI_t	-0.0037	-0.0043	-0.00076	0.00072
	(0.0095)	(0.0088)	(0.011)	(0.0097)
FED	0.036*	0.020	0.032*	0.022
	(0.020)	(0.016)	(0.018)	(0.016)
Local election$_t$	-0.055*	-0.034	-0.067**	-0.043
	(0.030)	(0.026)	(0.033)	(0.028)
Government fragmentation$_t$	0.025**	0.027***	0.024**	0.030***
	(0.011)	(0.0096)	(0.0098)	(0.0099)
Urbanization$_t$	0.087	0.047	0.11*	0.080
	(0.058)	(0.052)	(0.064)	(0.059)
Education growth$_t$	-0.24	-0.27*	-0.25	-0.28*
	(0.15)	(0.14)	(0.16)	(0.15)
Unemployment$_t$	0.0059	0.0028	0.0068	-0.0015
	(0.013)	(0.012)	(0.013)	(0.013)
Openness$_t$	0.014	0.037**	0.013	0.031*
	(0.020)	(0.018)	(0.019)	(0.018)
Observations	101	97	98	94
Number of countries	20	20	20	20
Wald chi2	2702***	3026***	2570***	2948***
Sargant test	12.1	9.05	11.6	9.29
H0: no autocorrelation of order 1	-2.39**	-2.08**	-2.33**	-2.01**
H0: no autocorrelation of order 2	0.11	-0.17	0.045	-0.20

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 8
The interaction model with RAI (system-GMM estimator)

	(1)	(2)	(3)	(4)
Variables	$GDPgrowth_t$	$GDPgrowth_t$	$GDPgrowth_t$	$GDPgrowth_t$
$logGDP_{t-1}$	-0.02***	-0.04***	-0.02***	-0.04***
	(0.043)	(0.041)	(0.043)	(0.042)
Gross fixed capital $growth_t$	0.015***	0.014***	0.014***	0.014***
	(0.0027)	(0.0024)	(0.0028)	(0.0025)
Population $growth_t$	-0.11***	-0.11***	-0.12***	-0.10***
	(0.041)	(0.037)	(0.042)	(0.037)
TD_t	-0.077***			
	(0.030)			
TD_t*RAI_t	0.025**			
	(0.010)			
TDI_t		-0.061***		-0.055**
		(0.023)		(0.023)
TDI_t*RAI_t		0.019**		0.016**
		(0.0080)		(0.0082)
TDP_t			-0.074**	-0.080***
			(0.030)	(0.029)
TDP_t*RAI_t			0.025**	0.025**
			(0.011)	(0.010)
RAI_t	-0.068**	-0.045**	-0.025	-0.059***
	(0.028)	(0.019)	(0.016)	(0.022)
FED	0.024	0.019	0.016	0.0050
	(0.019)	(0.016)	(0.018)	(0.016)
Local $election_t$	-0.044	-0.036	-0.026	-0.0040
	(0.029)	(0.026)	(0.036)	(0.032)
Government $fragmentation_t$	0.028**	0.029***	0.027***	0.034***
	(0.011)	(0.0099)	(0.010)	(0.010)
$Urbanization_t$	0.11*	0.084	0.086	0.088
	(0.063)	(0.057)	(0.061)	(0.064)
Education $growth_t$	-0.26*	-0.27*	-0.22	-0.26*
	(0.15)	(0.14)	(0.16)	(0.15)
$Unemployment_t$	0.0067	0.0052	0.0083	0.0014
	(0.013)	(0.012)	(0.013)	(0.013)
$Openness_t$	0.011	0.031*	0.018	0.031*
	(0.020)	(0.018)	(0.019)	(0.018)
Observations	101	97	98	94
Number of countries	20	20	20	20
Wald chi2	2845***	3100***	2650***	3141***
Sargant test	12.2	9.52	11.1	9.57
H0: no autocorrelation of order 1	-2.43**	-2.12**	-2.40**	-2.13**
H0: no autocorrelation of order 2	0.12	-0.20	-0.15	-0.41

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 9
The interaction model with Local election (system-GMM estimator)

	(1)	(2)	(3)	(4)
Variables	$GDPgrowth_t$	$GDPgrowth_t$	$GDPgrowth_t$	$GDPgrowth_t$
$logGDP_{t-1}$	-0.02***	-0.04***	-0.01***	-0.04***
	(0.043)	(0.041)	(0.044)	(0.043)
Gross fixed capital growth$_t$	0.014***	0.014***	0.014***	0.014***
	(0.0028)	(0.0024)	(0.0029)	(0.0025)
Population growth$_t$	-0.12***	-0.10***	-0.12***	-0.10***
	(0.042)	(0.035)	(0.042)	(0.036)
TD_t	-0.022			
	(0.024)			
*TDt*Local electiont*	0.014			
	(0.026)			
TDIt		0.0071		-0.010
		(0.012)		(0.017)
TDI_t**Local election*$_t$		-0.028**		-0.010
		(0.013)		(0.017)
TDP_t			-0.064**	-0.074**
			(0.027)	(0.033)
TDP_t**Local election*$_t$			0.064**	0.069**
			(0.028)	(0.032)
Local election$_t$	-0.067	0.039	-0.071***	-0.031
	(0.074)	(0.035)	(0.027)	(0.049)
Government fragmentation$_t$	0.030***	0.031***	0.026***	0.030***
	(0.011)	(0.011)	(0.0099)	(0.0100)
Urbanization$_t$	0.068	-0.00028	0.090*	0.054
	(0.057)	(0.043)	(0.051)	(0.052)
Education growth$_t$	-0.23	-0.26*	-0.24	-0.29**
	(0.15)	(0.13)	(0.15)	(0.14)
Unemployment$_t$	0.0066	-0.00067	0.0070	-0.0034
	(0.011)	(0.011)	(0.011)	(0.012)
Openness$_t$	0.019	0.049***	0.017	0.037**
	(0.020)	(0.018)	(0.019)	(0.019)
Observations	101	97	98	94
Number of countries	20	20	20	20
Wald chi2	2626***	3092***	2547***	3015***
Sargant test	11.2	9.09	10.4	9.10
H0: no autocorrelation of order 1	-2.41**	-2.01**	-2.22**	-1.81*
H0: no autocorrelation of order 2	0.12	-0.22	-0.089	-0.37

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 10
The interaction model with FED (system-GMM estimator)

	(1)	(2)	(3)	(4)
Variables	$GDPgrowth_t$	$GDPgrowth_t$	$GDPgrowth_t$	$GDPgrowth_t$
$logGDP_{t-1}$	-0.03***	-0.05***	-0.03***	-0.05***
	(0.040)	(0.039)	(0.042)	(0.041)
Gross fixed capital growth$_t$	0.014***	0.014***	0.014***	0.014***
	(0.0028)	(0.0024)	(0.0028)	(0.0025)
Population growth$_t$	-0.11***	-0.097***	-0.12***	-0.097***
	(0.038)	(0.034)	(0.039)	(0.034)
TD_t	-0.018*			
	(0.011)			
TD_t*FED	0.0076			
	(0.024)			
TDI_t		-0.0084		-0.0080
		(0.0072)		(0.0075)
TDI_t*FED		-0.022*		-0.020
		(0.012)		(0.013)
TDP_t			-0.027**	-0.023**
			(0.012)	(0.012)
TDP_t*FED			0.042**	0.033**
			(0.019)	(0.017)
FED	-0.0090	0.044*	-0.035*	0.0089
	(0.065)	(0.025)	(0.021)	(0.032)
Government fragmentation$_t$	0.033***	0.032***	0.028***	0.030***
	(0.011)	(0.010)	(0.0095)	(0.0096)
Urbanization$_t$	0.031	-0.022	0.053	0.013
	(0.050)	(0.043)	(0.047)	(0.052)
Education growth$_t$	-0.17	-0.26*	-0.21	-0.31**
	(0.14)	(0.13)	(0.15)	(0.14)
Unemployment$_t$	0.0033	-0.0020	0.0059	-0.0026
	(0.011)	(0.011)	(0.011)	(0.012)
Openness$_t$	0.039**	0.057***	0.040***	0.052***
	(0.015)	(0.015)	(0.015)	(0.014)
Observations	101	97	98	94
Number of countries	20	20	20	20
Wald chi2	2817***	3184***	2652***	3153***
Sargant test	12.1	9.39	10.9	9.39
H0: no autocorrelation of order 1	-2.41**	-2.06**	-2.35**	-1.99**
H0: no autocorrelation of order 2	0.081	-0.19	-0.017	-0.29

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Appendix

Description of the variables

- *GDP growth*: Real GDP per capita (constant prices) growth rate. PPP-converted GDP per capita (Laspeyres), derived from growth rates of c, g, i, at 2005 constant prices. *Source*: PWT 7.1
- *Initial GDP*: Initial real GDP per capita (in log). PPP-converted GDP per capita (Laspeyres), derived from growth rates of c, g, i, at 2005 constant prices. *Source*: PWT 7.1
- *ED*: Expenditure decentralization. Sub-central expenditure over total general government expenditure (in log). *Source*: Authors' calculations on IMF and OECD.
- *TD*: Tax decentralization. Sub-central own tax revenue over total general government tax revenue (in log). *Source*: Authors' calculations on IMF and OECD.
- *TDI*: Income tax decentralization. Sub-central income tax over total general government tax revenue (in log). *Source*: Authors' calculations on IMF and OECD.
- *TDP*: Property tax decentralization. Sub-central property tax over total general government tax revenues (in log). *Source*: Authors' calculations on IMF and OECD.
- *RAI*: Regional Authority Index. Sum of self-rule and shared-rule. Variable expressed in log. *Source*: Hooghe, L., Marks, M., and Schakel, A.H. (2008) Regional Authority in 42 Democracies, 1950–2006. A Measure and Five Hypotheses, *Regional and Federal Studies* 18(2-3), 111-302.
- *Local election*: direct election of state/province government. Ordinal-scaled variable coded 0 if neither the local (state/province) executive nor the local legislature are directly elected by the local population that they govern; 1 if either is directly elected and the other is not; 2 if they are both directly and locally elected. Variable expressed in log. *Source*: Teorell, J., Samanni, M., Holmberg, S. and Rothstein, B. (2012). The Quality of Government Basic Dataset made from The QoG Standard Dataset (version April 2011), University of Gothenburg.
- *FED*: Dummy variable for federal country. *Source*: Authors' calculations.
- *Government fragmentation*: Number of sub-central governments over population density (total population per sq. km of land area). Variable expressed in log. *Source*: Authors' calculations on WDI.
- *Population growth*: Growth rate of total population. *Source*: Authors' calculations on WDI.
- *Urbanization:* Urban population % of total (in log). *Source*: WDI.
- *Education growth:* Growth rate of tertiary school enrolment (% gross - secondary school enrolment for Canada and Germany for missing values). *Source*: WDI.
- *Unemployment rate:* rate of unemployment. *Source*: WDI.
- *Openness:* Trade openness (sum of import and export) of the economy in current prices % GDP (in log). *Source*: PWT 7.1
- *Gross fixed capital growth:* Growth rate of gross fixed capital formation. *Source*: PWT 7.1
- *Political party:* Dummy variable for left governments (national level). *Source*: Authors' calculations Comparative Political Dataset I.

Table A1
Pairwise correlations among the variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	*GDP growth*	1.00																
2	*Initial GDP*	0.00	1.00															
3	*ED*	-0.21	0.23	1.00														
4	*TD*	-0.22	0.19	0.78	1.00													
5	*TDI*	-0.21	0.10	0.65	0.76	1.00												
6	*TDP*	-0.22	0.07	0.48	0.47	0.02	1.00											
7	*RAI*	-0.17	-0.04	0.38	0.18	-0.03	0.33	1.00										
8	*FED*	-0.16	0.09	0.46	0.46	0.06	0.50	0.57	1.00									
9	*Government fragmentation*	-0.06	0.19	0.32	0.49	0.11	0.62	-0.05	0.29	1.00								
10	*Local election*	-0.16	0.03	0.48	0.33	0.07	0.46	0.72	0.58	0.16	1.00							
11	*Population growth*	-0.01	0.23	0.09	0.08	-0.17	0.46	-0.24	0.18	0.52	-0.02	1.00						
12	*Urbanization*	0.02	0.53	0.20	0.20	-0.02	0.30	0.09	0.08	0.23	0.29	0.12	1.00					
13	*Education growth*	0.01	-0.23	-0.17	-0.26	0.00	-0.23	-0.20	-0.13	-0.16	-0.20	-0.05	-0.21	1.00				
14	*Unemployment*	0.00	-0.24	-0.09	-0.21	-0.35	0.08	0.48	0.07	-0.03	0.25	-0.12	0.01	-0.12	1.00			
15	*Openness*	0.18	0.40	-0.21	-0.29	0.01	-0.46	-0.36	-0.32	-0.45	-0.42	-0.15	0.19	0.05	-0.29	1.00		
16	*Gross fixed capital growth*	0.58	0.25	-0.04	-0.03	-0.11	0.08	-0.09	0.01	0.17	0.02	0.22	0.19	-0.04	0.07	0.09	1.00	
17	*Political party*	0.04	-0.17	0.03	0.00	0.00	-0.22	0.15	0.03	-0.21	0.12	-0.20	-0.02	0.13	0.15	-0.04	-0.08	1.00