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Leviathan and Legislative Monopoly Power: Empirical Evidence from OECD Countries

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Abstract: In this paper we test the Leviathan hypothesis, focusing on the joint impact of fiscal decentralization and legislative monopoly power in the growth of the public sector. Two proxies of legislative monopoly power are considered: the control of all relevant houses by the executive party and the margin of majority. Using a dynamic panel-based error correction model on OECD member countries, we find that for strong legislative (party) control, fiscal decentralization constrains government selfishness when the threshold level of sub-national tax autonomy is quite low. By contrast, for smaller regimes of legislative control, fiscal decentralization constrains the public sector size when it is funded by high levels of sub-national autonomous taxation.

Key words: fiscal decentralization • government size • legislative monopoly power

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1. Introduction

A long debate on the Leviathan hypothesis started after the seminal work of Brennan and Buchanan (1977, 1980). Leviathan is defined as a revenue-maximizing government whose fiscal appetites are tamed by decentralization of the authority to taxing power in the presence of inter-jurisdictional mobility of persons and firms. In the literature, several empirical studies have been conducted to test this hypothesis, estimating the presence of an inverse relationship between fiscal decentralization and government size measured as the share of total government expenditure/revenue on gross domestic product. Mixed results have appeared since Oates's (1985) seminal empirical analysis. Therefore, the Leviathan issue does not seem to be closed. On the contrary, it has attracted new research interest.

The empirical literature has paid little attention to the nexus between legislative monopoly power and the growth of the public sector according to the Leviathan idea. Brennan and Buchanan (1980) argue that voting majority rule could be inadequate to constrain selfish behaviour of government. In this regard, lower intensity of political competition increases with the growth of the public sector. Similarly, the competing theory based on "entry barriers in politics" (Tullock, 1965) concludes in favour of a restriction of monopolist government activities. Empirical evidence on US states (Anderson & Tollison, 1988) shows the opposite result: legislative monopoly power of government is a powerful constraint to tame Leviathan fiscal appetites. Their result is interesting because it brings federalism into question as a constraint of central government actions.

In this paper, we "search for Leviathan" (Oates, 1985), testing both fiscal decentralization and legislative monopoly power hypotheses. Using a dynamic panel-based error correction model on 16 OECD member countries, we show that fiscal decentralization tends to constrain fiscal appetites of government. However, this result becomes significant only in the short run. On the side of legislative monopoly power, two proxies were considered: the margin of majority and the control of all relevant Houses by the executive party. We find that the latter proxy is an effective constraint to government size. In our study, the "mythical beast" (Oates, 1985) revives when we consider the joint effect on government size of fiscal decentralization and legislative monopoly according to different degrees of legislative control and tax autonomy, respectively. Estimation results show that when the executive party controls all relevant houses, fiscal decentralization constrains government selfishness when the degree of sub-national power to tax is over 33%. In other words, Leviathan revives when a strong legislative (party) control is accompanied by a small threshold level of sub-national tax authority.

On the other hand, joint analysis of margin of majority and fiscal decentralization shows that the public sector growth size is restricted by fiscal decentralization when governments hold a fraction of seats higher than 1/3 and the degree of sub-national tax autonomy is over 50%. Similar results are found when we control for governments with a share of seats over 1/2. Empirical evidence suggests that governments with smaller regimes of legislative monopoly power tend to restrict government size when fiscal decentralization is accompanied by a higher degree of local autonomous taxation. However, this result is not particularly robust in the dynamic panel regression analysis.

Overall, estimation results raise Leviathan when we control for the joint impact of legislative monopoly power and fiscal decentralization on government size. They point out that for strong legislative (party) control, we observe that fiscal decentralization restrains government size when it is accompanied by a smaller degree of sub-national tax authority (over 33%). On the other hand, for smaller regimes of legislative control, fiscal decentralization could be an effective constraint to government selfishness when it is funded by a high level of sub-national tax authority (over 50%). Summarizing, we found that in developing countries two alternative solutions are suggested to reduce the growth of public sector size: *i)* strong legislative control; *ii)* weak legislative control accompanied by fiscal decentralization funded by high levels of sub-national autonomous taxation.

The rest of the paper is organized as follows. Section 2 introduces an overview of the literature. In section 3, a summary of Public Choice theory on legislative monopoly power is presented. Section 4 presents data and variables. Section 5 illustrates the unit root and cointegration analysis. Empirical specifications and estimation techniques are described in section 6. Our estimation results are commented upon in section 7, and conclusions are drawn in section 8.

2. Overview of the empirical literature

Brennan and Buchanan's (1977, 1978, 1980) idea of the public sector consists in a monolithic government which maximizes revenues by exploiting its own tax-payers. They refer to this type of government as Leviathan. The fiscal exploitation of Leviathan is tamed by "a dispersal of fiscal authority among differing levels of government" (Brennan & Buchanan, 1980, p. 181). Decentralization of taxing power across levels of government tends to trigger tax competition among jurisdictions with a reduction in public sector size (see figure 1). Following their reasoning, tax competition produces an increase in the welfare of society because it reduces the size of the public sector. A different starting point is offered by the literature on benevolent government which focuses on welfare-maximizing solutions. This literature shows that horizontal tax competition among local governments leads to an inefficient level of taxation and spending, causing a welfare reduction for society.[1]

The Leviathan idea works when citizens mobilize strongly across jurisdictions and there are many sub-national governmental units with a strong power to tax and spending. These conditions are necessary to trigger tax competition across neighbouring jurisdictions and, consequently, to restrain the overall government outcome. Few studies test the presence of an inverse relationship between the number of competing local governmental units and the growth of the public sector. In the literature, this relationship is well known as the *fragmentation hypothesis* (see figure 1).[2] Mixed results emerge: Forbes and Zampelli (1989) find a positive correlation between the county (tax) own-revenue size and the number of counties in the SMSA. By contrast, Jouflain and Marlow (1991) conclude in favour of the fragmentation hypothesis.

The most popular Leviathan hypothesis concerns the decentralization of taxing and spending decision-making at local government levels. This hypothesis is summarized in the famous sentence: "Total government intrusion into the economy should be smaller, *ceteris paribus*, the greater the extent to which taxes and expenditures are decentralized, the more homogeneous are the separate units, the smaller the jurisdictions, …" (Brennan & Buchanan, 1980:185). Accordingly, an inverse relationship between fiscal decentralization and the growth of the public sector is expected in empirical analysis. Oates's (1972, 1985) seminal studies show a negative and significant correlation between fiscal centralization and the size of public sector. This evidence supports Oates's (1985) conclusions that Leviathan is a "mythical beast". On the

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[1] See Wilson (1999) for a review on tax competition.

[2] "the potential for fiscal exploitation varies inversely with the number of competing governmental units in the inclusive territory", (Brennan & Buchanan, 1980, p. 185).

contrary, many other works carried out on US states[3] support the *fiscal decentralization hypothesis*. This may well occur because US states have a high degree of inter-state mobility and decentralization of taxing power authority. Moreover, they are a federation of states[4]; therefore, they are more decentralized in terms of decision-making, political participation and accountability than a unitary one. This should stimulate competitive pressure at the sub-national government levels according to the Leviathan design. The fiscal decentralization hypothesis has been tested on other federal countries: Australia (Grossman, 1992), Canada (Grossman & West, 1994), India (Lalvani, 2002) and Switzerland (Feld et al., 2003).[5] Only for Australia is the empirical evidence not significant. Grossman (1992) argues that this may well be due to “the relatively small number of lower-level governments; the economic insignificance of local governments; and the relative immobility of citizens” (p. 240).

Although some empirical evidence is consistent with the Leviathan hypothesis, mixed results emerge.[6] Some studies make a thorough investigation, considering the way in which fiscal decentralization is funded. Stein (1999) finds that fiscal decentralization tends to increase government size when “vertical imbalance is high, transfers are discretional and the degree of borrowing autonomous of sub-national governments is large” (p. 357). He asserts that the impact of fiscal decentralization on government size mainly depends on the large difference between expenditure and revenue decentralization. Sub-national governments tend to spend much more on the production of local public goods and services when they are funded by transfers from the upper-tier level of governments rather than with their “own

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[3] For example, Marlow (1988), Grossman (1989), Zax (1989), Raimondo (1989), Joulfain & Marlow (1990, 1991), Shadbegian (1999). Some exceptions refer to Oates (1985) and Nelson (1986).

[4] “federalization of the political structure as an indirect means of imposing constraints on the potential fiscal exploitation of Leviathan. It may be possible that an explicit constitutional decision to decentralize and hence to disperse political authority may effectively substitute for overt fiscal limits” (Brennan & Buchanan, 1980, p. 174).

[5] Alternatively, we find studies that only introduce a federal dummy in the regression analysis to control for this effect (Solano, 1983; Saudners, 1988; Heil, 1991; Jin & Zou, 2002; Fiva, 2006).

[6] Jin and Zou (2002) find different impacts of fiscal decentralization according to government size i.e., aggregate, national and sub-national, and show that a higher level of spending and revenue decentralization reduces only national government size. An increase in revenue decentralization is also associated to decreases in aggregate government size.

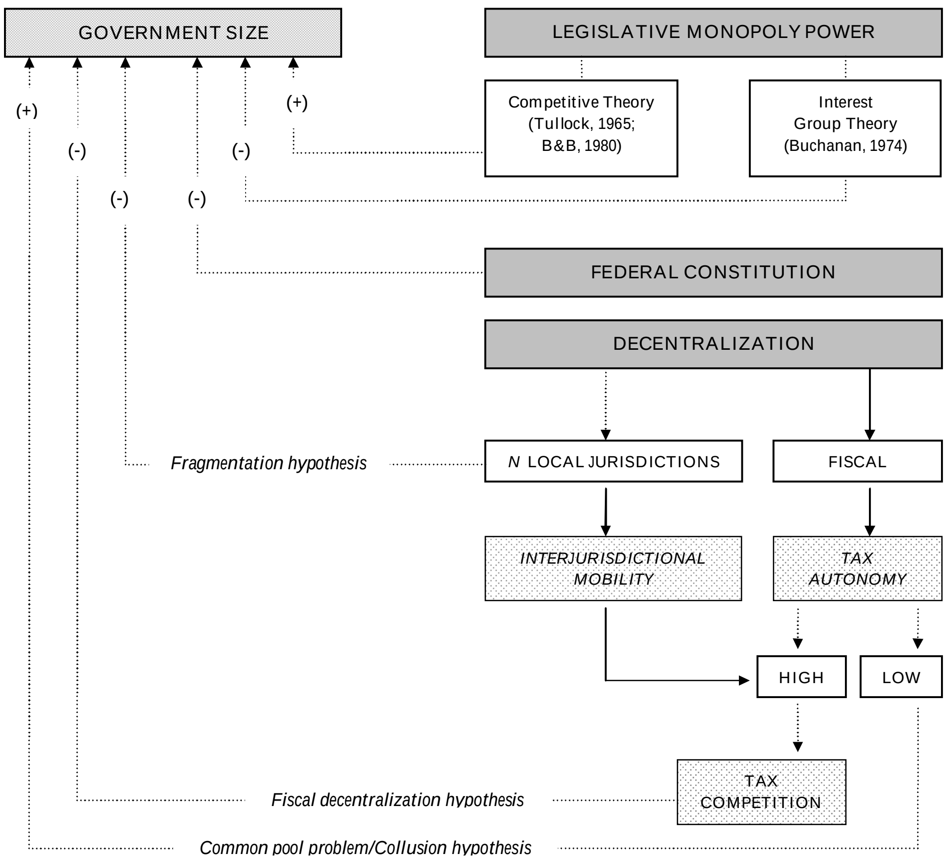
tax resource". Mosen and Van Cauwenberge (2000) show that government size can be restrained only when fiscal federalism is accompanied by a decentralization of taxing power. To show this, they use a more accurate measure of fiscal decentralization which consists in the ratio of sub-national expenditures, diminished by intergovernmental transfers and local borrowing, to total government expenditures. Another major contribution is provided by Rodden (2003), who shows that fiscal decentralization affects the size of the public sector according to the type of financial resource i.e., local or common pool (grants and revenue-sharing). He finds that the public sector tends to grow later when it is mainly funded by autonomous local taxation while it grows faster when it is funded by common pool resources. Finally, Fiva (2006) finds an asymmetric result on the growth of the public sector according to the type of fiscal decentralization. He shows an inverse relationship between government size and tax revenue decentralization and a non-negative relationship between public sector size and spending decentralization. Fiva (2006) argued that these results depend on how sub-national expenditures are funded in accordance with past empirical evidence on vertical imbalance (Stein, 1999; Jin & Zou, 2002).

Empirical evidence shows that sub-national governments tend to spend much more when their expenditure is mainly funded by intergovernmental transfers rather than own tax resources. This behaviour is known as the *common pool resources problem*[7] or, similarly, as a vertical fiscal imbalance. Local politicians are less stimulated to compete to attract the tax base (people, firms, etc.) from neighbouring jurisdictions when their expenditure is mainly funded by intergovernmental transfers. As a consequence, expenditure decentralization can be positively correlated with government size and the Leviathan decentralization theorem fails. Brennan and Buchanan (1980) examine this possible occurrence in the Leviathan model, considering *collusion effects* (figure 1).[8] Collusion consists in agreement between state and local governments to establish a uniform tax system across all jurisdictions in order to reduce

[7] Rodden (2003).

[8] "The Leviathan model does, however, readily enough generate a theory of "government grants" … Within a constitutionally designed federal structure, we would predict that there would be constant pressures by competitive lower-level governments to secure institutional rearrangements that would moderate competitive pressures. One obvious such arrangement would be one that established a uniform tax system across all jurisdictions: this would remove one major element of the competitive government process. … In return for an appropriate share

Fig. 1 The Leviathan scheme



competitive pressure amongst each other for hoarding revenues. Therefore, intergovernmental transfers reinforce the monopoly power of central government by revenue-sharing programmes. Their idea is well founded for federal states where collusive effects are more likely to appear because competitive pressures among lower government levels are strong. Studies conducted on several federal countries (Australia, Canada, USA) (Grossman, 1989, 1992; Grossman & West, 1994; Shadbegian, 1999) find evidence in favour of collusive behaviour across local governments, confirming Brennan and Buchanan's (1980) "architecture" of the public sector.

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of the additional revenue, the central government would act as an enforcer of the agreement between lower-level government, doling out financial penalties to those jurisdictions which attempted to breach the agreement", (Brennan & Buchanan, 1980, p. 182).

Basically, the empirical literature shows that Leviathan is “alive and kicking”. The Leviathan hypothesis fails when the common pool problem arises, i.e., when intergovernmental transfers represent the main resource for financing sub-national expenditure. In federal governments, this could be a further signal of a collusive agreement between state and local governments to reduce competitive pressure on revenue resources by a uniform taxation system.

3. Legislative monopoly power theory

Basically, Brennan and Buchanan (1980) assume that electoral competition accompanied by voting majority rules is inadequate to constrain government behaviour. They support a drastic weakening in terms of electoral constraint when the voting rule moves from unanimity to majority.[9] By contrast, they argue that the primary means of constraining the selfishness of a monolithic government should be imposed on the fiscal decision-making process.[10]

Following the reasoning made for the monopoly market structure, the dominant position of a monopolistic firm entails higher market prices and a lower level of outcome in equilibrium. Similarly, government which concentrates legislative power in its own hands can extract a rent from tax payers by imposing high tax rate levels and reducing the quantity of public goods provided. Government with legislative monopoly power redistributes resources to the interest group exploiting tax payers. The government behaviour described comes close to Buchanan’s (1974) predictions based on organized crime and the well-being of society (Anderson & Tollison, 1988). Buchanan’s (1974) starting point is that it is socially preferable that criminal activities are organized in a monopoly since this restricts the whole “bad” outcome to sharing profits among the members of the criminal organization. In fact, when two or more criminal firms share the same market (for example, drug traffic, arms smuggling, bootlegging, etc.), this leads to a downturn of prices with an increase in the quantity of criminal activities produced.

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[9] “There is a set of purely analytic questions about majoritarian political processes which raise doubts as to whether such processes can be predicted to constrain governments effectively, in all or most cases” (Brennan & Buchanan, 1980, p. 17).

[10] “The line of reasoning makes a persuasive case, we think, for a general model of the political mechanism in which majoritarian electoral processes are not effective in constraining the power of government” (Brennan & Buchanan, 1980, p. 26)

From a different starting point, Tullock (1965) argues that the legislative dominant position of the governing party (or coalition) reflects the degree of entry barriers for a potential political competitor.[11] Political entry barriers can be placed both on the voting majority rule, which provides scale advantages for the present government incumbent, and on higher organizational costs supported by an opposition group to entry into the legislature. He asserts that when potential entry barriers are lower in politics, political competition between the present occupant and potential entrant could produce a restriction of monopolist government activities. However, he noted that potential political competition could be negligible in several contexts, for instance, at the local government level where political opposition groups are generally formed by a small number of candidates who are not well organized to engage in electoral campaigning. Moreover, since the organizational costs of politics exceed electoral success returns, potential political entry barriers are generally high. To sum up, a positive link between monopoly and public sector size could well occur.

The impact of legislative monopoly upon government size is empirically tested by Anderson and Tollison (1988). Their evidence focuses on US states and uses, as a proxy of legislative monopoly power, the percentage of seats held by the majority party in the Senate and in the House of Representatives. They show a negative and significant impact of the legislative control on government size. Hence concentrations of legislative monopoly power in the government's own hands are consistent with a reduction in public sector size according to Buchanan's (1974) theory. High legislative power at the central government level leads politicians to behave as rent-seekers for the interest group, exploiting tax-payers.

4. Data

For our empirical analysis, we used balanced cross-sectional time series data on 16 OECD member countries[12] from 1978 to 1997. Fiscal budget data were collected from *Fiscal Decentralization Indicators* of the International Monetary

[11] In Tullock's opinion, governments behave as monopolist when they are formed by only one president, majority, governor, and so on in a legislature. This leads a strong scale economy because "only one majority can exist at a time" (Tullock, 1965, p. 459).

[12] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Luxemburg, Netherlands, Norway, Spain, Sweden, United Kingdom, United States.

Fund's (IMF) Government Finance Statistics (GFS). Government size (*EXP*) is measured by total government expenditure[13] as a percentage of gross domestic product (GDP). The effect of fiscal decentralization upon government size is detected with two standard fiscal decentralization indexes (*FDindex*). The first corresponds to the ratio of sub-national expenditure to total government expenditure. Current and capital transfers to other levels of national government are excluded in the amount of sub-national expenditure. A further index of fiscal decentralization is the ratio of sub-national total revenue to total government revenue. We refer to those variables as *EXPDEC* and *REVDEC*, respectively. A negative effect of both indexes on the growth of public sector size supports the Leviathan hypothesis.

Most empirical works use GFS data. Unfortunately, such data tend to overestimate the degree of both spending and taxation autonomy of local governments (for a detailed discussion see Ebel & Ylmaz, 2002). For example, local expenditure mandated by the central government is included in sub-national expenditure, or revenue collection at the local government level is not distinguished in shared taxes, piggybacked taxes, or "own-source" revenues. Recently, Stegarescu (2004, 2005) provided a new time series for 23 OECD countries for revenue and tax revenue decentralization in order to take this problem into account. He supplied a measure of revenue decentralization calculated as the share of the sub-central government's own tax revenue (including non-tax and capital revenue) on general government total tax revenue (including non-tax and capital revenue). As a tax revenue decentralization index, he uses the share of "own" taxes of sub-central government on general government total tax revenue. This measure is strongly recommended because it only refers to own taxes "independently chosen by sub-central governments as autonomous" (Stegarescu, 2005, p. 311).

With regard to our sample, a comparison between GFS and Stegarescu data on revenue decentralization[14] shows the presence of overestimation problems only for Austria (26% *versus* 13%, on average) and Germany (35% *versus* 21%, on average '78-96). On the tax revenue decentralization front, we detected major overestimation problems for all countries with the exception of Canada (average +2.79), Ireland (av. +4.78) and the Netherlands (av. +1.97). In our

[13] It corresponds to total government expenditure minus current and capital transfers to other levels of national government.

[14] Stegarescu (2004) does not provide data for sub-national expenditure.

empirical analysis, we accounted for the overestimation problems observed in tax revenue decentralization by considering Stegarescu's (2004) data. In particular, we implement a dummy variable termed *TAXAUT%* that assumes the value 1 when the share of "own" taxes of sub-central government on general government total tax revenue is higher than a threshold value (fixed at 33% or 50%), and zero otherwise. Likewise, higher levels of the threshold value are consistent with higher levels of tax competition.

As regards the political variables, data were collected from the *Database of Political Institutions 2004*. From this database, we extracted two indexes of legislative monopoly power (*LMP*): *i)* the *margin of majority* (*MAJORITY*), corresponding to the share of seats held by the government on total seats; *ii)* the *executive party control of all relevant Houses* (*ALLHOUSE*) which is a dummy that assumes the value 1 when the party of executive controls all relevant houses, and zero otherwise. According to the Leviathan theory, we expected a positive impact of legislative monopoly variables on the growth of public sector size. By contrast, a negative sign of the coefficients associated to these indexes could be consistent with the interest group theory developed by Buchanan (1974).

In our empirical analysis, we also accounted for the interaction term *FDindex·LMPindex* in order to investigate whether fiscal decentralization restrains public sector growth when there is legislative (party) control at the central government level. We controlled for a gradual increase in the degree of legislative power considering a threshold value of majority. In this case, a dummy variable *MAJ%* was considered. It assumes the value 1 if the share of votes is over 1/3 (1/2), and zero otherwise.

Another interesting analysis concerns the joint impact of fiscal decentralization funded by sub-national autonomy taxation and legislative monopoly on public sector size. In this case, we used the interaction term *FDindex·LMPindex·TAXAUT%*. According to the Leviathan hypothesis, we expected "power to tax" of sub-national governments to strengthen the impact of fiscal constraints on government size, reducing each influence of legislative power.

Finally, standard control variables were introduced in the empirical analysis (see table 1). They consist in: population size (*POP*); people *per* square kilometre (*DENS*); the percentage of the population located in urban areas (*URBAN POP*); the age dependency ratio (*DEPRATIO*) i.e., dependents to working-age population; *per capita GDP* (at constant prices of national currency); the share of *TRADE* (export plus import) as a percentage of *GDP*; *per capita GRANTS*

Tab. 1 Data source

Variable	Data source
EXP, EXPDEC, REVDEC	*International Monetary Fund's Government Finance Statistics - The World Bank Group web-site (Decentralization & Subnational Regional Economics)*
DEN, POP, DEPRATIO, URBANPOP, TRADE	*The World Bank Development Indicators 2005*
GDP *per capita*	*International Monetary Fund, World Economic Outlook Database, April 2004*
GRANTS	*OECD Statistic, Non-tax revenue, capital revenue and grants, 2006, edition 1*
MAJORITY (MAJ33; MAJ50), ALLHOUSE	*The World Bank - Political Institution data base DPI2004*
TAX REVENUE DECENTRALIZATION (TAXAUT33; TAXAUT50)	*Stegarescu, D. (2004). Public sector decentralization: measurement concepts and recent international trends, ZEW discussion paper No. 04-74*

corresponding to the ratio between transfers to sub-national from other levels of government and population.

5. Unit root and cointegration analysis

In recent decades, a growing literature has been developed on stationarity and cointegration problems which could affect dynamic panel data analysis. Several authors provide a review of the literature, discriminating between the first and second generation unit root tests.[15] Panel unit root tests belonging to the first generation generally allow for cross-sectional dependence in the error terms. Levin and Lin (1992, 1993) developed one of the first tests (LL, thereafter) starting from the augmented Dickey–Fuller (ADF) regression for each individual in the panel.[16] The final version of this test was published together with Chu (LLC, hereafter) in 2002 (Levin et al. 2002). The ADF equation is reported in (1), where Y is the dependent variable, α_i is the individual specific effect, τ is a linear time trend, and ξ is the error term. The LLC test assumes that the coefficient ρ of the lagged dependent variable Y is homogeneous across individuals i.e., $\rho_i = \rho$ for all panel units $i = 1,...,N$. The null hypothesis H_O: $\rho_i = \rho = 0$ implies that the time series contain a unit root (i.e., they are non-stationary) and $\alpha_i = 0 \ \forall \ i = 1,...,N$. By contrast, the alternative hypothesis is consistent with stationary hypothesis of the time series i.e., H_1: $\rho_i = \rho < 1 \ \forall \ i = 1,...,N$. The LLC test holds for heterogeneous serial correlation in the error term structure.

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15 Baltagi & Kao (2000), Hurlin & Mignon (2004), Breitung & Pesaran (2005).

16 A preliminary version of this test was developed by Levin and Lin (1992, 1993).

$$\Delta Y_{i,t} = \alpha_i + \delta\tau + \rho Y_{i,t-1} + \sum_{m=1}^{p_i} \beta_{i,m} \Delta Y_{i,t-m} + \xi_{i,t} \quad (1)$$

$$for\ i=1,\ldots,N \quad t=1,\ldots,T \quad \mu_{i,t}\ i.i.d.(0,\sigma^2_{\varepsilon_i})$$

Im, Pesaran and Shin (1995, 2003) (IPS, hereafter) developed a generalization of the LL unit root test, relaxing the homogeneous assumption made by LL in parameter ρ. This test implies that the null hypothesis is defined as H_O: $\rho_i = 0$ against the alternative H_1: $\rho_i < 0$ for $i = 1,\ldots,N_1$ and H_1: $\rho_i = 0$ for $i = N_{1+1},\ldots,N$ with $0 < N_1 \leq N$. In other words, if the null hypothesis is rejected, individual time series for $i=1,\ldots,N_1$ are non-stationary while the remaining ones are stationary.

Im et al. (2003) showed that the IPS test performs better than the LL test, as concluded by Maddala and Wu (1999). However, since the alternative hypotheses of IPS and LL tests are different, simulation results do not give robust indications on test comparison (Maddala & Wu, 1999; Levin et al., 2002). Additionally, Breitung (2000) finds that "the LL and IPS tests suffer from a severe loss of power if individual specific trends are included" (p. 175).

Maddala and Wu (1999) presented an additional unit root test based on Fisher-type test. Since, the Fisher and IPS tests are directly comparable, the power test comparison between them is well-founded. Maddala and Wu (1999) showed that the Fisher test: *i*) is less powerful than the IPS test when the error terms are not cross-sectionally correlated; *ii*) has a smaller size distortion than the IPS and LL tests for large T and small N when heteroschedasticity and serial correlation affect panel data and error terms are cross-correlated;[17] *iii*) is more powerful than the other tests when the panel data is a mix of stationary and non-stationary series; *iv*) performs better than the IPS test when the bootstrap method is adopted; *v*) allows for both balanced and unbalanced panel data.

Within the first generation test category, we also find the Hadri (2000) and Choi (2001) tests. Contrary to previous tests, the null hypothesis is based on stationarity of time series. Notably, the alternative hypothesis of Choi's (2001) test is heterogeneous, since it considers the presence of unit root for at least one *i* or for some *i*'s panel for infinite *N*.

In empirical works panel data are frequently affected by cross-sectional dependence across individuals. Unfortunately, the first generation tests perform poorly when this condition occurs. The unit root tests belonging to the second generation overcome this difficulty for both balanced and unbalanced

[17] They have the same size distortion for medium values of *T* and large *N*.

panels under the null hypothesis of non-stationary series. The Choi (2002) test solves the cross-sectional dependence problem by removing both cross-sectional correlation and deterministic trend components in panel data using a two-step procedure based on the approach proposed by Elliot et al. (1996). Chang (2002, 2003) developed two panel unit root tests with cross-sectional dependency based on non-linear IV (henceforth, NIV) estimation of the autoregressive coefficient (Chang, 2002) and on bootstrap methods (Chang, 2003). In both cases, Monte Carlo simulations show that the unit root test performs better than the IPS test for finite sample sizes. Notably, the NIV test is better than the IPS test for power too (Chang, 2002). However, Im and Pesaran (2003) concluded that Chang's (2002) Monte Carlo results depend on "her particular choice of the error correlation matrix, which results in weak cross section dependence" (Im & Pesaran, 2003, p. 1). Im and Pesaran (2003) suggest alternative unit root tests allowing for the cross-sectional dependence in panel data: Bai and Ng (2004), Phillips and Sul (2003), Pesaran (2003, 2007), Moon and Perron (2004). Gutierrez (2006) provides Monte Carlo simulations to compare second generation unit root tests developed by Choi (2002), Bai and Ng (2004), Moon and Perron (2004), and Phillips and Sul (2003). He finds that the Moon and Perron (2004) test performs well in terms of size and power for different *N*, *T* and model specifications. For all tests, a common result is the lack of power when a deterministic trend is included in the process.

In summarising the results of panel unit root tests for our data set (table 2) there is no clear evidence of non-stationarity in cross-sectional time series with the exception of the *ALLHOUSE* dummy variable. For the remaining variables, we observe ambiguous results. IPS and Fisher-ADF tests show a mix of stationary and non-stationary series for most variables. By contrast, the Fisher-PP test suggests the presence of unit root for fiscal variables (with the exception of *GRANTS*), *DEN*, *POP*, *per capita GDP*, and *TRADE*. The Breitung (2000) test shows similar evidence, rejecting the null of a common unit root for *REVDEC, DEPRATIO, per capita GDP*, and *GRANTS*. On the other hand, the Hadri (2000) test shows the presence of non-stationarity for all variables. However, it could be affected by over-rejection of the null in the presence of high autocorrelation. The Pesaran (2003, 2007) test results are more robust than others and have a good power when cross-sectional dependence is detected in the errors.[18]

[18] In the presence of cross-sectional correlation in the errors, the Fisher tests are more powerful than the IPS test (Maddala & Wu, 1999).

According to these test results, most variables could be affected by non-stationarity problems.

The unit root tests were also conducted for variables transformed in first order difference. We thus controlled whether non-stationary problems are removed after variable transformation. Generally, the tests indicated that this happens with the only exception of *DEPRATIO*. Only the Pesaran test rejected the null of non-stationarity for this variable in first difference.

Overall, the presence of unit roots cannot be excluded in our data set. Therefore, we need to investigate whether they are also cointegrated. This step is important in order to select the appropriate estimation techniques. Indeed, if time series are cointegrated, the literature suggests the Dynamic OLS[19] (DOLS) or Fully Modified OLS[20] (FMOLS) estimators to estimate the existence of the long-run relationship among variables, and the Error Correction Model (ECM) for the short-run relationship (Kao & Chiang, 2000). Both estimators can be implemented for homogeneous and heterogeneous panels. However, Kao and Chiang (2000) show that the DOLS estimator performs better than the FMOLS estimator.

In empirical studies of panel data, several diagnostic tests have been implemented to detect cointegration problems. Kao (1999) and Pedroni (1999, 2004) tests for the null of no cointegration were recurrently adopted in these analyses. Kao's (1999) tests are based on fixed effect residuals and consist in four DF-type tests, abbreviated to DF_ρ, DF_t, DF_ρ^*, DF_t^*, and one ADF-type test. Comparison tests were conducted by Kao (1999) using Monte Carlo experiments, showing that: *i)* DF_ρ^* and DF_t^* tests generally have better size and higher power than the other tests; *ii)* DF_ρ and DF_t tests are quite robust to different model specifications. For all tests, the asymptotic distribution is normal $N(0,1)$. The Kao (1999) tests are based on homogeneous panel assumptions on autoregressive root. By contrast, the Pedroni (1999) tests are available for various cases of heterogeneous panels. Notably, Pedroni (1999) developed four *panel cointegration statistics* (*panel*-ρ, *panel-v*, *parametric panel-t, non parametric panel-t*) and three *group mean panel cointegration statistics* (*group*-ρ, *parametric group-t; non-parametric group-t*). For panel statistics, the null hypothesis of no cointegration is H_0: $\theta_i = 1 \ \forall \ i = 1,\ldots,N$, where θ corresponds to the autoregressive coefficient of estimated regression residuals. By contrast, the

[19] Saikkonen (1991), Stock & Watson (1993), Kao & Chiang (2000).
[20] Pedroni (2000).

alternative hypothesis is H_1: $\theta_i = \theta < 1$ $\forall$ $i=1,\ldots,N$. Similar hypotheses are associated to the group mean panel cointegration statistics with heterogeneity assumption of parameter θ under the alternative hypothesis: H_0: $\theta_i=1$ $\forall$ $i=1,\ldots,N$ *versus* H_1: $\theta_i<1$ $\forall$ $i=1,\ldots,N$. Notably, in between-dimension statistics, $\theta_i = \theta$ is not assumed. Approximate critical values are calculated for each statistic and a Normal $N(0, 1)$ asymptotic distribution is provided by Pedroni (1999) for each test.

In the literature, the power of cointegration tests has been investigated. McCoskey and Kao (1999) performed Monte Carlo simulations for the Kao (1999) tests, Pedroni (1997, 2004), and the residual-based Lagrange Multiplier (LM) test (McCoskey & Kao, 1998). In particular, they show that the residual-based LM test outperforms both Kao (1999) and Pedroni (1997, 2004) tests. Furthermore, Gutierrez (2003) shows that in the case of homogeneous panels and for small T, the Kao tests perform better in terms of power than the Pedroni tests. Furthermore, he shows that both tests have higher power than the Larsson et al. (2001) test for cointegration. Recently, Dilan and Örsal (2008) made a Monte Carlo comparison between the LR-bar statistic (Larsson et al., 2001) and four of Pedroni's statistics (i.e., *panel*-ρ, *parametric panel-t*, *group*-ρ, *parametric group-t*), finding that *panel-t parametric* and the standardized LR-bar statistic are better than the other statistics in terms of both size and power. Recent advances in cointegration tests were made by Westerland (2007), who developed four new tests on the null of no cointegration based on an error-based correction model (Westerland, 2007). They consist in two panel (EP_γ, EP_t) statistics and two group mean (EG_γ, EG_t) statistics which have normal asymptotic distribution.

In table 3 we report some results of cointegration tests. Since critical values of Pedroni statistics are calculated only for six regressors, excluding constant and deterministic trend terms (Pedroni, 1999), we ran these tests to account for such critical values and according to indications on non-stationarity provided by Fisher-PP, Breitung, and Pesaran tests. Non-stationary variables are found to be cointegrated by Pedroni tests. The Kao ADF test also rejects the null of no cointegration for all variables considered (tabb. 5-7).

Tab. 2 Unit root test results

Variable in levels	IPS$^{(a, b, Z)}$		FISHER - ADF$^{(a, b, \chi)}$		FISHER - PP$^{(a, b, \chi)}$		PESARAN$^{(c)}$ - t-bar		BREITUNG$^{(a, Z)}$	HADRI$^{(b, Z)}$	
	ind. effect	*ind. effect & trend*	*ind. effect*	*ind. effect & trend*	*ind. effect*	*ind. effect & trend*	*ind. effect*	*ind. effect & trend*	*ind. effect & trend*	*ind. effect*	*ind. effect & trend*
EXP	-4.03***	-2.73***	75.36***	62.7***	33.75	16.05	-1.69	-1.99	0.90	7.72***	4.16***
EXPDEC	-2.04**	-2.40**	52.41**	53.94***	34.60	19.33	-2.15**	-2.52	0.34	9.18***	6.07***
REVDEC	-2.46**	-4.19**	68.89***	77.09***	37.72	39.69	-2.61***	-2.76**	-1.95**	9.57***	5.25***
DEN	6.72***	-7.40***	6.13	57.21***	6.71	75.50***	-3.03***	-3.39***	-1.03	10.88***	8.38***
POP	7.75***	1.57*	9.32	45.67*	9.73	14.09	-1.60	-1.75	1.04	11.69***	7.98***
DEPRATIO	-3.54***	2.20**	69.08***	25.78	66.42***	23.82	-1.84	-2.42	3.90***	8.78***	9.25***
URBANPOP	1.58*	1.55*	109.73***	48.34**	363.89***	90.72***	-1.77	-2.66*	-0.80	11.57***	7.81***
GDP PC	5.97***	-2.65**	8.05	55.37**	16.40	17.43	-2.80***	-2.80**	-1.42*	11.55***	6.22***
TRADE	-0.57	-0.10	47.02**	39.64	39.92	24.95	-2.01	-2.57	0.90	5.66***	5.64***
GRANTS PC	-3.33***	1.25	72.69***	42.74*	104.96***	27.40	-1.02	-1.45	6.00***	10.95***	7.72***
MAJORITY	-4.69***	-2.45**	76.76***	54.66**	67.54**	46.70**	-2.22**	-2.27	-1.04	3.27***	6.56***
ALLHOUSE	0.28	-0.09	2.11	5.63	2.09	2.78	1.64	0.819	-0.78	3.46***	2.27**
Variable in first-difference	IPS$^{(a, b, Z)}$		FISHER - ADF$^{(a, b, \chi)}$		FISHER - PP$^{(a, b, \chi)}$		PESARAN$^{(c)}$ - t-bar		BREITUNG$^{(a, Z)}$	HADRI$^{(b, Z)}$	
	ind. effect	*ind. effect & trend*	*ind. effect*	*ind. effect & trend*	*ind. effect*	*ind. effect & trend*	*ind. effect*	*ind. effect & trend*	*ind. effect & trend*	*ind. effect*	*ind. effect & trend*
ΔEXP	-5.70***	-3.63***	87.33***	60.45**	74.59***	56.05**	-2.70***	-2.93***	-3.85***	0.91	3.25***
ΔEXPDEC	-8.81***	-8.41***	133.86***	119.75***	149.93***	154.55***	-2.98***	-3.07***	-4.43***	1.29*	8.34***
ΔREVDEC	-11.03***	-9.07***	165.29***	128.15***	187.76***	141.737***	-3.25***	-3.27***	-5.27***	-0.23	3.75***
ΔDEN	-3.26***	-5.71***	74.82***	91.32***	136.95***	114.0***	-3.36***	-3.91***	-1.49*	4.23***	5.78***
ΔPOP	-2.46**	-1.57*	49.67**	49.26**	38.84	48.55**	-1.84	-2.43	-0.14	4.77***	7.10***
ΔDEPRATIO	0.36	-0.21	24.25	36.75	25.79	34.05	-2.48***	-3.13***	0.45	7.46***	6.16***
ΔURBANPOP	-6.75***	-9.53***	118.67***	143.14***	146.59***	153.35***	-2.86***	-3.68***	-1.33*	3.83***	7.31***
ΔGDP PC	-6.00***	-3.42***	93.07***	59.21**	91.78***	73.64***	-2.93***	-3.03**	-4.42***	1.63**	3.29***
ΔTRADE	-7.91***	-5.75***	118.46***	85.19***	102.26***	87.38***	-2.33**	-2.48	-4.04***	0.40	5.99***
ΔGRANTS PC	-6.70***	-8.06***	115.19***	114.24***	357.38***	119.06***	-2.24**	-2.79**	-6.87***	4.61***	7.97***
ΔMAJORITY	-11.39***	-16.10***	171.39***	146.91***	424.36***	195.54***	-2.84***	-2.98**	-6.28***	0.68	6.51***
ΔALLHOUSE	-1.71**	-3.43***	6.52**	21.43***	---	30.99***	1.45	0.71	-1.13	-0.95	2.65**

*Note: variables are in logarithmic form; (a) Schwarz criteria for lag length selection; (b) Bandwidth selection criteria: Newey-West; Kernel method: Bartlett; (c) lag length selection: t-1; *** 1%; ** 5%; * 1% correspond to rejection levels of the null hypothesis of unit root (the Hadri test null hypothesis is no unit root); Z= asymptotic Z-normal distribution;χ = asymptotic Chi square distribution.*

Tab. 3 Cointegration test results

EXP	x	x	x	x	x	x	x	x
EXPDEC		x		x		x		x
REVDEC	x		x		x		x	
DEN	x	x	x					
POP	x	x	x	x	x	x	x	x
DEPRATIO				x	x	x	x	x
URBANPOP								
GDP PC	x	x	x	x	x	x	x	
TRADE	x	x	x	x	x			x
GRANTS PC						x	x	x
MAJORITY								x
ALLHOUSE	x	x		x	x	x	x	
Pedroni test	*Individual effect*							
Panel v-Statistic	-0.65	-0.31	0.01	-0.22	0.78	-0.17	-0.42	-0.88
Panel rho-Statistic	1.91**	1.42*	3.05***	1.05	1.33*	1.28	0.83	4.17***
Panel PP-Statistic	0.13	0.20	1.01	-1.42*	-2.50**	-1.28	-3.41***	1.25
Panel ADF-Statistic	-0.02	0.73	0.14	-1.93**	-2.07**	-0.41	-3.05***	-0.04
Group rho-Statistic	2.54**	2.13**	4.64***	1.83**	1.95**	1.73**	1.56*	5.95***
Group PP-Statistic	0.33	0.31	2.13**	-1.06	-4.19***	-6.73***	-8.36***	1.57**
Group ADF-Statistic	0.36	0.82	0.74	-1.79**	-2.45**	-1.80**	-2.78**	-0.51
Pedroni test	*Individual effect & indiviaul trend*							
Panel v-Statistic	-1.12	0.20	-0.41	0.19	1.38*	0.98	-0.39	-1.03
Panel rho-Statistic	2.34**	1.12	4.11***	1.36*	1.23	0.77	0.73	5.23***
Panel PP-Statistic	-1.10	-5.40***	0.47	-5.64***	-12.50***	-12.77***	-8.51***	0.24
Panel ADF-Statistic	-1.42*	-4.50***	-0.66	-4.72***	-5.57***	-7.27***	-6.36***	-0.93
Group rho-Statistic	2.20**	1.82**	5.11***	2.16**	1.91**	1.50**	0.96	6.59***
Group PP-Statistic	-1.79**	-6.97***	-1.91**	-6.28***	-21.91***	-14.84***	-13.09***	-4.88***
Group ADF-Statistic	-1.79**	-3.43***	-2.19**	-3.91***	-6.24***	-7.11***	-7.86***	-2.14**

*Note: Schwarz criteria for lag length selection; Bandwidth selection criteria: Newey-West; Kernel method: Bartlett; *** 1%;** 5%; * 10% correspond to rejection levels of the null-hypothesis of no cointegration.*
Kao ADF statistic for all variables EXP, EXPDEC, LMPindex, control variables is -3.66 (p-value 0.000).
Kao ADF statistic for all variables EXP, REVDEC, LMPindex, control variables is -3.72 (p-value 0.000).

6. Methodology and empirical specification

According to our stationarity and cointegration test results, we estimate long- and short-run relationships by using an unrestricted panel-based error correction model *à la* Rodden (2003) according to a general specification.[21] This method is interesting because it supplies estimates for long- and short-run effects in the same model, simplifying the number of estimation results to be presented.

[21] Recently, Ashworth et al. (2006, 2009) investigated both long- and short-run effects with DOLS/FMOLS and ECM for testing the Leviathan hypothesis.

Basically, we use the general form of ECM illustrated in (1), where $\Delta y_t = y_t - y_{t-1}$ and y_{it} ($Nx1$) is the vector of the dependent variable for cross-sectional time series $i=1,\ldots,N$ for time period $t=1,\ldots,T$; x ($Kx1$) is the vector of explicative variables (regressors) and c ($Kx1$) is the vector of coefficients associated to regressors; p and m corresponds to the number of lagged differenced dependent variables and regressors included in the model, respectively. Coefficients c associated to Δx_t ($=x_t - x_{t-1}$) measure the short-run (or immediate) effects of changes in x on changes in y. The regressor Err is the error correction term and corresponds to ($y_{it-1} - x'_{it-1}\phi$), where ϕ ($Kx1$) is the vector of coefficients associated to the first-order lagged regressors. The coefficient α is equal to (γ -1) and captures the long-run effects between y and x (integrated) variables. Finally, b is the constant term; u_i and ε_{it} are fixed effects and an error term with zero mean and constant variance, respectively; τ_t is the $Nx1$ vector of time effects.

$$\Delta y_{it} = b + \sum_{j=1}^{p} \beta_{ij} \Delta y_{it-j} + \sum_{j=1}^{m} \Delta x'_{it-j} c_{ij} + \alpha Err_{it-1} + \mu_i + \tau_t + \varepsilon_{it} \qquad (1)$$

We use an unrestricted version of (1) in order to estimate long- and short-run effects in the same model. Our methodology is shown in equation (2) which accounts for the effects of fiscal decentralization and legislative monopoly on government size. EXP_{it} corresponds to the size of the public sector in country i at time period t and variable *FDindex* consists in the decentralization fiscal index already discussed in section 3. According to theoretical predictions, we expect a negative and significant impact of *FDindex* on the dependent variable. We also explore the legislative monopoly power hypothesis by *MAJORITY* and *ALLHOUSE* variables. Note that under Brennan and Buchanan's (1980) theory, the majority voting rule is not a powerful constraint for Leviathan fiscal exploitation. This means that the coefficient associated to *LMPindex* is expected to be positive. For this model, as well as for the others, z ($1xK$) is the vector of control variables.

$$\begin{aligned}\Delta EXP_{it} = {} & b + \beta_1 \Delta EXP_{it-1} + \alpha EXP_{it-1} + \delta \Delta FDindex_{it-1} + \delta_1 FDindex_{it-1} + \gamma \Delta LMPindex_{it-1} + \\ & + \gamma_1 LMPindex_{it-1} + \Delta z'_{it-1} c_{i1} + z'_{it-1} \delta_{i1} + \mu_i + \tau_t + \varepsilon_{it} \qquad (2)\end{aligned}$$

In model (3) we also investigate the joint effect of *FDindex* and *LMPindex* on public sector growth. This model specification helps clarify whether legislative monopoly power of government could invert the negative impact of fiscal decentralization on government size. To control for threshold effects of monopoly legislative power, we also replace in (3) *MAJORITY* with a dummy variable *MAJ%* that assumes the value 1 if the share of votes is higher than 1/3 (1/2), and zero otherwise.

$$\begin{aligned}\Delta EXP_{it} = {} & b + \beta_1 \Delta EXP_{it-1} + \alpha EXP_{it-1} + \delta \Delta FDindex_{it-1} + \delta_1 FDindex_{it-1} + \\ & + \gamma \Delta LMPindex_{it-1} + \gamma_1 LMPindex_{it-1} + \varphi \Delta FDindex_{it-1} \cdot \Delta LMPindex_{it-1} + \\ & + \varphi_1 FDindex_{it-1} \cdot LMPindex_{it-1} + \Delta z'_{it-1} c_{i1} + z'_{it-1} \delta_{i1} + \mu_i + \tau_t + \varepsilon_{it}\end{aligned} \tag{3}$$

Finally, since the Leviathan model works when there is high local tax autonomy, we investigate how the degree of sub-national tax autonomy interacts with monopoly power and fiscal decentralization. In other words, we inquire in what way legislative monopoly power and fiscal decentralization accompanied by a high level of local autonomous taxation can influence government size. This analysis throws light on the complex interaction effects of fiscal decentralization and political power. Accordingly, we estimate an extended version of (3), multiplying the interaction term *FDindex·LMPindex* by the *TAXAUT%* dummy variable. Our expectation on the sign of *FDindex·LMP·TAXAUT%* differs according to the kind of political or fiscal force which drives government size. This means that if the effects of fiscal decentralization funded by sub-national tax autonomy prevail over legislative monopoly power, a negative effect could be expected and *vice versa*. Equation (4) illustrates the empirical model.

$$\begin{aligned}\Delta EXP_{it} = {} & b + \beta_1 \Delta EXP_{it-1} + \alpha EXP_{it-1} + \delta \Delta FDindex_{it-1} + \delta_1 FDindex_{it-1} + \\ & + \phi \Delta FDindex_{it-1} \cdot \Delta LGMindex_{it-1} \cdot \Delta TAXAUT_{it-1} + \\ & + \phi_1 FDindex_{it-1} \cdot LGMindex_{it-1} \cdot TAXAUT_{it-1} + \\ & + \vartheta \Delta LGMindex_{it-1} \cdot \Delta TAXAUT_{it-1} + \vartheta_1 LGMindex_{it-1} \cdot TAXAUT_{it-1} + \\ & + \Delta z'_{it-1} c_{i1} + z'_{it-1} \delta_{i1} + \mu_i + \tau_t + \varepsilon_{it}\end{aligned} \tag{4}$$

The dynamic specification of empirical models leads the LSDV estimator to be inconsistent and unbiased when *T* is fixed and *N* goes to infinity (Verbeek, 2008). In this case, instrumental variable estimators are used to solve this econometric issue. For our analysis, we use the one-step version of the system-generalised method of moments (GMM-SYS) estimator (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998). There are few empirical works that have employed this estimator for a dynamic panel ECM (Yasar et al., 2006). The estimator is a combination of a set of standard equations in first difference and equations in levels, distinctly instrumented. For equations in levels we use as instrumental variables: ΔEXP_{it-1} and its first difference, constant term. Instead, for equations in first differences, instrumental variables used are: EXP_{it-2}, ΔEXP_{it-3}. The validity of the set of instruments is detected by the Sargan test of over-identifying restrictions. As regards additional instruments used for equation levels, their validity is tested by the Difference Sargan test (Arellano & Bond, 1991).

The GMM-SYS estimator requires the presence of second order autocorrelation in the differenced error terms to be consistent. This condition is detected by implementing a test (Arellano & Bond, 1991) that we call the *AB-AR2 test*. The first order autocorrelation in the differenced residuals is also detected by a (*AB-AR1*) test according to indications of Arellano and Bond (1991).

7. Estimation results

This section presents the estimation results of our econometric models. The results in table 4 show the impact of fiscal decentralization and legislative monopoly power indexes on public sector growth. We observe a negative impact of fiscal decentralization in the long run. Although this evidence is not significant, it could be a signal that the debate on Leviathan could be far from closed. As regards legislative monopoly power, table 4 shows that only the long-run coefficient of *ALLHOUSE* is statistically significant. However, its coefficient is negative, confirming empirical evidence on the US states by Anderson and Tollison (1988).

As may be seen from the estimation results of model (3) for the interaction effects between fiscal decentralization and legislative monopoly power i.e., *FDindex*LGMindex* (tabb. 5A-5B) the long-run parameter of *EXPDEC*ALLHOUSE* assumes a negative and significant sign (-0.09). This means that the public sector size decreases through fiscal decentralization in countries where governments have a strong executive party control of all relevant houses. These kinds of governments tend to behave as rent seekers more than others, increasing the public sector size in the long run. A stronger impact of fiscal decentralization is detected when we control for the degree of sub-national fiscal autonomy by estimating model (4). Table 6A shows that public sector growth is slower when governments have legislative party control and fiscal decentralization is funded by a degree of fiscal autonomy over 33%. An increase in the threshold level of sub-national tax autonomy does not bring about any significant result. These results are robust when we control for alternative set of instrumental variables in the panel dynamic regression analyses.[22]

Estimation results of interaction model (3) with the *MAJORITY* variable as the *LMP* index do not provide any statistically significant evidence. In fact, in table 5A, long-run coefficients of *EXPDEC*MAJORITY* and *REVDEC*MAJORITY* are not significant. Similar conclusions are made when we control for different threshold levels of majority (i.e., for *MAJ33* and *MAJ50* dummies) (tab. 5B). Significant results appear only when model (4) is estimated. In table 6B, we observe that in the long run, fiscal decentralization fails to constrain the size of government when majority rule works and the degree of sub-national tax autonomy is higher than 50%. As regards, the coefficient associated to interaction term *REVDEC*MAJORITY*TAXAUT50* is positive and statistically significant. Controlling for the threshold level of majority, we find that in the long run, public sector size increases when government hold a fraction of seats over 1/2 and fiscal decentralization is accompanied by a lower degree of tax revenue decentralization i.e., over 33% (tabb. 7C-7D). These results suggest that tax competition is not engaged across local jurisdictions when there are large majorities at the central government level and fiscal decentralization is accompanied by a lower threshold level of sub-nation tax authority. By contrast, fiscal decentralization becomes a significant constraint of government size when the degree of local autonomous taxation exceeds 50% (tab. 6D). This evidence is observed for a government majority with a share of seats in excess of 33% and 50%. In other words, for regimes of majority over 1/3 and 1/5, fiscal decentralization could be an effective constraint for government

[22] For instance, EXP_{it-2} (or EXP_{it-3}) for the first difference equations; ΔEXP_{it-2} and constant term for the level equations.

size when it is funded by a degree of local autonomous taxation over 50%. Changing the set of instrumental variables to check robustness, the coefficients of interaction terms lost statistical significance in most cases.[23] Therefore, we make caution on the interpretation of these results.

As regards control variables, several parameters are statistically significant in the long run. In particular, *DEN*, *DEPRATIO*, *per capita GDP, per capita GRANTS*, and *TRADE*. With the exception of the *TRADE* variable, they show a positive impact on public sector growth. On the other hand, for the short run, a small number of control variables are significant: *DEN*, *DEPRATIO*, *URBANPOP*, *per capita GDP*. Both *DEN* and *URBANPOP* have a positive impact in government size whereas *per capita GDP* shows a negative impact in the short run.

The model specification seems appropriate because the coefficients of ΔEXP_{it-1} and EXP_{t-1} are statistically significant in the panel dynamic regression analyses. Furthermore, estimation results are consistent because the *AB-AR2 test* accepts the null hypothesis of second order autocorrelation in the differenced residuals. Finally, the Sargan and Difference Sargan tests confirm the validity of instruments used.

Overall, estimation results seem to revive the Leviathan story. In particular this evidence is robust when we investigate the nexus between fiscal constraints and legislative monopoly power. Testing interaction models with fiscal and political variables, we find interesting results. Accounting for the executive party control of all houses, we show that in developing countries with strong legislative control, the public sector is restricted by a fiscal decentralization channel. In particular, this happens for a threshold level of sub-national tax autonomy over 33%. In this case, tax competition among local governments could work for lower regimes of local autonomous taxation.

On the other hand, accounting for the margin of majority, we show that for a threshold of majority and local tax autonomy over 50% and 33%, respectively, fiscal decentralization has a positive impact on government size in the long run. In other words, for higher regimes of government majority and smaller levels of local tax autonomy, fiscal decentralization could be an inefficient channel to tame Leviathan. A comparison with results in table 6A draws a conclusion that

[23] For instance, they are not statistically significance when we run regression analyses using the set of instrumental variables indicated in footnote 22.

for weaker degree of legislative control, fiscal decentralization fails to constraint government size when it is accompanied by a lower degree of sub-national autonomous taxation.

On the other hand, when the threshold level of local tax autonomy is raised to 50%, Leviathan revives for majorities with a share of seats over 1/3 and 1/2 too (tab. 6D). In this case, we conclude that for smaller regimes of legislative control, fiscal decentralization constrains the public sector size when it is funded by high levels of sub-national autonomous taxation. However, we remind that this evidence is not robust because depends on the instrumental variables selected in the dynamic panel regression analysis.

8. Conclusion

In this paper, we tested the short- and long-run effects of fiscal decentralization and legislative monopoly power on government size for a balanced panel data of developing countries. The impact of fiscal decentralization is in line with the Leviathan hypothesis although the long-run parameter was not found to be statistically significant. As regards legislative monopoly power, estimation results show that the strong executive party control of all relevant houses tends to tame Leviathan fiscal appetites contrary to Brennan and Buchanan's indications.

The joint effects of fiscal decentralization and legislative monopoly power on government size were also investigated so as to assess the Leviathan hypothesis thoroughly. Our estimation results seemed to revive Leviathan mainly when the degree of tax decentralization was considered. Leviathan revives when: *i)* the executive party controls all houses and fiscal decentralization is accompanied by a degree of sub-national power to tax over 33%; *ii)* governments hold a fraction of seats higher than 1/3 (1/5) and fiscal decentralization is funded by high levels of sub-national autonomous taxation. On the contrary, for regimes of government majority over 1/5 and smaller levels of local autonomous taxation, fiscal decentralization fails to tame Leviathan.

Summarizing, we found that in developing countries two alternative solutions are suggested for taming Leviathan fiscal appetites: *i)* strong legislative control; *ii)* weak legislative control accompanied by fiscal decentralization funded by high levels of sub-national autonomous taxation. In other words, for strong legislative control, fiscal decentralization constrains government selfishness through a lower degree of sub-national power to tax; *vice versa*, for smaller regimes of legislative control, fiscal decentralization constrains public sector size when it is funded by high levels of sub-national autonomous taxation. Since the latter result is not particularly robust, we infer an additional conclusion that probably, in the long run period, Leviathan "lives in the houses".

Tab. 4 Estimation results of the impact of fiscal decentralization and legislative monopoly power on government size

	ERROR CORRECTION MODEL (*eq. 2*)			
EXP_{t-1}	-0.23***	(-5.69)	-0.22***	(-5.47)
$EXPDEC_{t-1}$	-0.02	(-0.91)		
$REVDEC_{t-1}$			-0.01	(-0.58)
$MAJORITY_{t-1}$	0.022	(0.99)	0.02	(1.14)
$ALLHOUSE_{t-1}$	-0.016	(-1.20)	-0.02*	(-1.70)
DEN_{t-1}	0.012*	(1.93)	0.01**	(2.05)
POP_{t-1}	0.008	(0.88)	0.01	(0.77)
$DEPRATIO_{t-1}$	0.13**	(1.96)	0.13**	(1.98)
$URBAN\ POP_{t-1}$	0.01	(0.13)	0.02	(0.41)
$GRANTS_{t-1}$	0.02**	(2.82)	0.02**	(3.01)
$GDP\ PC_{t-1}$	0.01*	(-1.65)	0.01*	(1.84)
$TRADE_{t-1}$	-0.02	(-0.62)	-0.02	(-0.63)
ΔEXP_{t-1}	0.26***	(4.33)	0.21***	(4.00)
$\Delta EXPDEC_{t-1}$	-0.06	(-1.40)		
$\Delta REVDEC_{t-1}$			0.001	(0.02)
$\Delta MAJORITY_{t-1}$	-0.02	(-0.92)	-0.03	(-1.16)
$\Delta ALLHOUSE_{t-1}$	0.02	(0.95)	0.01	(0.65)
ΔDEN_{t-1}	0.45	(1.24)	0.42	(1.14)
ΔPOP_{t-1}	0.61	(0.63)	0.65	(0.67)
$\Delta DEPRATIO_{t-1}$	-0.03	(-0.08)	0.01	(0.04)
$\Delta URBAN\ POP_{t-1}$	2.82**	(2.71)	3.00**	(2.89)
$\Delta GRANTS_{t-1}$	-0.01	(-0.88)	-0.01	(-0.96)
$\Delta GDP\ PC_{t-1}$	-0.13	(-0.99)	-0.19	(-1.51)
$\Delta TRADE_{t-1}$	-0.04	(-0.67)	-0.03	(-0.49)
constant	0.75**	(2.18)	0.62*	(1.93)
AB-AR(1) test	0.000		0.000	
AB-AR(2) test	0.805		0.685	
Sargan test	0.467		0.427	
Difference Sargan test	0.268		0.210	
Kao ADF statistic	-3.66[a]		-3.72[a]	

Note: i) z-value and standard errors are in parentheses; ii) test results are in p-value; iii) coefficient significant at level*** 1%, ** 5%, * 10%; iv) (a) indicates rejection of the null-hypothesis of no cointegration at the 1% level; v) Kao ADF test (selection criteria): - Schwarz criteria for lag length selection; - Bandwidth selection criteria: Newey-West; - Kernel method: Bartlett.

Tab. 5A Estimation results of the joined impact of fiscal decentralization and legislative monopoly power on government size

	ERROR CORRECTION MODEL (*eq. 3*)							
	(1)		(3)		(5)		(7)	
EXP_{t-1}	-0.24***	(-5.91)	-0.23***	(-5.70)	-0.22***	(-5.53)	-0.22***	(-5.28)
$EXPDEC_{t-1}$	-0.01	(-0.56)			-0.02	(-0.61)		
$EXPDEC_{t-1}$*$MAJORITY_{t-1}$					0.01	(0.30)		
$EXPDEC_{t-1}$*$ALLHOUSE_{t-1}$	-0.09*	(-1.86)						
$REVDEC_{t-1}$			-0.01	(-0.41)			-0.005	(-0.22)
$REVDEC_{t-1}$*$MAJORITY_{t-1}$							0.01	(0.18)
$REVDEC_{t-1}$*$ALLHOUSE_{t-1}$			-0.004	(-0.17)				
$MAJORITY_{t-1}$					-0.03	(-0.20)	-0.0004	(0.00)
$ALLHOUSE_{t-1}$	0.33*	(1.78)	-0.01	(-0.12)				
DEN_{t-1}	0.01**	(2.10)	0.01**	(1.96)	0.01*	(1.79)	0.01***	(1.95)
POP_{t-1}	0.01	(0.96)	0.01	(0.86)	0.01	(0.68)	0.004	(0.42)
$DEPRATIO_{t-1}$	0.10	(1.47)	0.13*	(1.91)	0.12*	(1.86)	0.13**	(1.96)
URBAN POP_{t-1}	-0.03	(-0.44)	0.03	(0.52)	0.01	(0.22)	0.04	(0.59)
$GRANTS_{t-1}$	0.03**	(3.10)	0.02**	(3.05)	0.03***	(3.16)	0.02***	(3.23)
GDP PC_{t-1}	0.01**	(2.12)	0.01*	(1.93)	0.01	(1.62)	0.01**	(1.93)
$TRADE_{t-1}$	-0.01	(-0.51)	-0.01	(-0.45)	-0.02	(-0.80)	-0.02	(-0.75)
ΔEXP_{t-1}	0.24***	(3.98)	0.23**	(3.89)	0.27***	(4.45)	0.21***	(4.04)
$\Delta EXPDEC_{t-1}$	-0.08*	(-1.77)			-0.07	(-1.45)		
$\Delta EXPDEC_{t-1}$*$\Delta MAJORITY_{t-1}$					-0.02	(-0.41)		
$\Delta EXPDEC_{t-1}$*$\Delta ALLHOUSE_{t-1}$	-0.003	(-0.07)						
$\Delta REVDEC_{t-1}$			-0.005	(-0.13)			-0.01	(-0.24)
$\Delta REVDEC_{t-1}$*$\Delta MAJORITY_{t-1}$							-0.02	(-0.47)
$\Delta REVDEC_{t-1}$*$\Delta ALLHOUSE_{t-1}$			0.02	(0.73)				
$\Delta MAJORITY_{t-1}$					0.05	(0.30)	0.02	(0.22)
$\Delta ALLHOUSE_{t-1}$	0.03	(0.18)	-0.06	(-0.66)				
ΔDEN_{t-1}	0.32	(0.91)	0.32	(0.919	0.50	(1.35)	0.51	(1.35)
ΔPOP_{t-1}	0.59	(0.63)	0.67	(0.72)	0.38	(0.39)	0.35	(0.36)
$\Delta DEPRATIO_{t-1}$	-0.04	(-0.11)	0.032*	(0.08)	0.03	(0.07)	0.07	(0.18)
ΔURBAN POP_{t-1}	2.44**	(2.45)	2.89**	(2.92)	2.76**	(2.57)	2.79**	(2.58)
$\Delta GRANTS_{t-1}$	-0.01	(-1.02)	-0.01	(-0.92)	-0.01	(-0.95)	-0.01	(-1.01)
ΔGDP PC_{t-1}			-0.19	(-1.53)	-0.11	(-0.80)	-0.18	(-1.38)
$\Delta TRADE_{t-1}$			-0.03	(-0.56)	-0.03	(-0.54)	-0.01	(-0.27)
constant	0.81**	(2.39)	0.60*	(1.88)	0.74**	(2.12)	0.59*	(1.82)
AB-AR(1) test	0.000		0.000		0.000		0.000	
AB-AR(2) test	0.683		0.784		0.824		0.546	
Sargan test	0.469		0.337		0.475		0.435	
Difference Sargan test	0.244		0.161		0.319		0.232	
Kao ADF statistic	-3.75[a]		-3.77[a]		-3.49[a]		-3.42[a]	
$(\delta_i + \varphi)$ test	0.041		0.638		0.913		0.991	

Note: i) z-value and standard errors are in parentheses; ii) test results are in p-value; iii) coefficient significant at level *** 1%, ** 5%, * 10%; iv) (a) indicates rejection of the null-hypothesis of no cointegration at the 1% level; v) Kao ADF test (selection criteria): - Schwarz criteria for lag length selection; - Bandwidth selection criteria: Newey-West; - Kernel method: Bartlett.

Tab. 5B (continue) Estimation results of the joined impact of fiscal decentralization and legislative monopoly power on government size

	ERROR CORRECTION MODEL (*eq. 3*)							
	(9)		(11)		(13)		(15)	
EXP_{t-1}	-0.22***	(-5.58)	-0.21***	(-5.23)	-0.23***	(-5.78)	-0.22***	(-5.47)
$EXPDEC_{t-1}$	0.17	(0.26)			-0.02	(-0.85)	-0.01	(-0.87)
$EXPDEC_{t-1}$*$MAJ33_{t-1}$	-0.19	(-0.30)						
$EXPDEC_{t-1}$*$MAJ50_{t-1}$					0.01	(0.40)		
$REVDEC_{t-1}$			0.31	(0.44)				
$REVDEC_{t-1}$*$MAJ33_{t-1}$			-0.32	(-0.46)				
$REVDEC_{t-1}$*$MAJ50_{t-1}$							0.01	(0.55)
$MAJ33_{t-1}$	0.72	(0.29)	1.06	(0.45)				
$MAJ50_{t-1}$					-0.03	(-0.56)	-0.03	(-0.81)
DEN_{t-1}	0.01	(1.33)	0.01	(1.30)	0.01*	(1.75)	0.01**	(1.95)
POP_{t-1}	0.01	(0.70)	0.004	(0.47)	0.01	(0.79)	0.01	(0.57)
$DEPRATIO_{t-1}$	0.11*	(1.75)	0.11*	(1.67)	0.13**	(2.01)	0.14**	(2.04)
URBAN POP_{t-1}	0.03	(0.57)	0.06	(0.95)	0.03	(0.51)	0.05	0.89
$GRANTS_{t-1}$	0.03***	(3.08)	0.02**	(2.98)	0.02	(2.83)	0.02***	(3.31)
GDP PC_{t-1}	0.01	(1.65)	0.01*	(1.87)	0.01**	(1.95)	0.01**	(2.22)
$TRADE_{t-1}$	-0.02	(-0.70)	-0.02	(-0.61)	-0.02	(-0.60)	-0.02	(-0.86)
ΔEXP_{t-1}	0.27***	(4.52)	0.22***	(4.18)	0.26***	(4.41)	0.20***	(3.71)
$\Delta EXPDEC_{t-1}$	-0.55	(-1.24)			-0.07	(-1.50)		
$\Delta EXPDEC_{t-1}$*$\Delta MAJ33_{t-1}$	0.49	(1.12)						
$\Delta EXPDEC_{t-1}$*$\Delta MAJ50_{t-1}$					-0.01	(-0.84)		
$\Delta REVDEC_{t-1}$			0.28	(0.61)			0.01	(0.24)
$\Delta REVDEC_{t-1}$*$\Delta MAJ33_{t-1}$			-0.27	(-0.60)				
$\Delta REVDEC_{t-1}$*$\Delta MAJ50_{t-1}$							-0.01	(-1.11)
$\Delta MAJ33_{t-1}$	-1.87	(-1.13)	0.94	(0.60)				
$\Delta MAJ50_{t-1}$					0.05	(0.87)	0.04	(1.10)
ΔDEN_{t-1}	0.57	(1.58)	0.53	(1.40)	0.49	(1.37)	0.45	(1.27)
ΔPOP_{t-1}	0.29	(0.31)	0.20	(0.20)	0.41	(0.44)	0.50	(0.53)
$\Delta DEPRATIO_{t-1}$	0.02	(0.05)	0.01	(0.02)	0.04	(0.12)	0.12	(0.31)
ΔURBAN POP_{t-1}	2.47**	(2.44)	2.61**	(2.56)	2.60**	(2.60)	2.85***	(2.86)
$\Delta GRANTS_{t-1}$	-0.01	(-0.88)	-0.01	(-0.90)	-0.01	(-0.79)	-0.01	(-0.98)
ΔGDP PC_{t-1}	-0.14	(-1.08)	-0.21*	(-1.70)	-0.13	(-0.95)	-0.20	(-1.55)
$\Delta TRADE_{t-1}$	-0.02	(-0.42)	-0.02	(-0.44)	-0.04	(-0.73)	-0.02	(-0.35)
constant	-0.06	(-0.02)	-0.59	(-0.25)	0.67*	(1.95)	0.55*	(1.74)
AB-AR(1) test	0.000		0.000		0.000		0.000	
AB-AR(2) test	0.859		0.992		0.889		0.591	
Sargan test	0.477		0.494		0.413		0.315	
Difference Sargan test	0.406		0.338		0.152		0.116	
Kao ADF statistic	-3.64[a]		-3.69[a]		-3.35[a]		-3.43[a]	
$(\delta_l + \phi_l)$ test	0.220		0.522		0.491		0.549	

Note: i) z-value and standard errors are in parentheses; ii) test results are in p-value; iii) coefficient significant at level *** 1%,** 5%, * 10%; iv) (a) indicates rejection of the null-hypothesis of no cointegration at the 1% level; v) Kao ADF test (selection criteria): - Schwarz criteria for lag length selection; - Bandwidth selection criteria: Newey-West; - Kernel method: Bartlett.

Tab. 6A Estimation results of the joined impact of fiscal decentralization funded by local autonomous taxation and legislative monopoly power on government size

	ERROR CORRECTION MODEL (*eq. 4*)							
	(1)		(3)		(5)		(7)	
EXP$_{t-1}$	-0.24***	(-6.10)	-0.24***	(-5.96)	-0.24***	(-6.03)	-0.23***	(-5.59)
EXPDEC$_{t-1}$	-0.02	(-0.74)			-0.01	(-0.61)		
EXPDEC$_{t-1}$*ALLHOUSE*TAXAUT33$_{t-1}$	-0.43**	(-2.46)						
EXPDEC$_{t-1}$*ALLLHOUSE*TAXAUT50$_{t-1}$					-0.66	(-0.45)		
REVDEC$_{t-1}$			-0.004	(-0.25)			-0.002	(-0.14)
REVDEC$_{t-1}$*ALLHOUSE*TAXAUT33$_{t-1}$			-0.43**	(-2.61)				
REVDEC$_{t-1}$*ALLHOUSE*TAXAUT50$_{t-1}$							-2.86	(-0.90)
ALLHOUSE$_{t-1}$*TAXAUT33$_{t-1}$	1.67**	(2.42)	1.64**	(2.55)				
ALLHOUSE$_{t-1}$*TAXAUT50$_{t-1}$					2.60	(0.43)	11.29	(0.90)
DEN$_{t-1}$	0.01**	(2.25)	0.02**	(2.44)	0.01**	-2.04	0.01	(1.62)
POP$_{t-1}$	0.01	(0.94)	0.01	(0.85)	0.01	(0.98)	0.01	(0.76)
DEPRATIO$_{t-1}$	0.09	(1.33)	0.10	(1.44)	0.10	(1.49)	0.09	(1.34)
URBAN POP$_{t-1}$	-0.02	(-0.27)	-0.01	(-0.13)	-0.01	(-0.14)	0.03	(0.40)
GRANTS$_{t-1}$	0.03**	(3.14)	0.02***	(3.37)	0.02**	(3.04)	0.02**	(2.89)
GDP PC$_{t-1}$	0.01*	(1.68)	0.01**	(1.97)	0.01*	(1.85)	0.01*	(1.95)
TRADE$_{t-1}$	-0.02	(-0.75)	-0.02	(-0.64)	-0.01	(-0.59)	-0.01	(-0.43)
ΔEXP$_{t-1}$	0.24***	(4.06)	0.20***	(3.95)	0.24***	(4.11)	0.21***	(3.89)
ΔEXPDEC$_{t-1}$	-0.05	(-1.10)			-0.05	(-1.17)		
ΔEXPDEC$_{t-1}$*ΔALLHOUSE$_{t-1}$*ΔTAXAUT33$_{t-1}$	0.15	(0.54)						
ΔEXPDEC$_{t-1}$*ΔALLHOUSE$_{t-1}$*ΔTAXAUT50$_{t-1}$					0.01	(0.01)		
ΔREVDEC$_{t-1}$			0.00	(0.09)			0.003	(0.08)
ΔREVDEC$_{t-1}$*ΔALLHOUSE$_{t-1}$*ΔTAXAUT33$_{t-1}$			0.12	(0.54)				
ΔREVDEC$_{t-1}$*ΔALLHOUSE$_{t-1}$*ΔTAXAUT50$_{t-1}$					-0.02	(0.00)	5.11**	(2.15)
ΔALLHOUSE$_{t-1}$*ΔTAXAUT33$_{t-1}$	-0.57	(-0.54)	-0.46	(-0.54)				
ΔALLHOUSE$_{t-1}$*ΔTAXAUT50$_{t-1}$							-20.22**	(-2.15)
ΔDEN$_{t-1}$	0.16	(0.46)	0.15	(0.41)	0.14	(0.36)	-0.18	(-0.46)
ΔPOP$_{t-1}$	0.78	(0.85)	0.78	(0.84)	0.71	(0.77)	0.69	(0.70)
ΔDEPRATIO$_{t-1}$	-0.03	(-0.09)	-0.002	(0.00)	-0.05	(-0.14)	-0.10	(-0.25)
ΔURBAN POP$_{t-1}$	2.66**	(2.71)	2.80**	(2.87)	2.64**	(2.70)	2.41**	(2.34)
ΔGRANTS$_{t-1}$	-0.01	(-0.97)	-0.01	(-1.04)	-0.01	(-0.87)	-0.01	(-0.90)
ΔGDP PC$_{t-1}$	-0.14	(-1.04)	-0.19	(-1.53)	-0.12	(-0.93)	-0.19	(-1.48)
ΔTRADE$_{t-1}$	-0.06	(-1.02)	-0.05	(-0.82)	-0.05	(-0.92)	-0.03	(-0.44)
constant	0.85**	(2.55)	0.76**	(2.39)	0.77**	(2.34)	0.59*	(1.77)
AB-AR(1) test	0.000		0.000		0.000		0.000	
AB-AR(2) test	0.912		0.853		0.955		0.661	
Sargan test	0.501		0.458		0.410		0.729	
Difference Sargan test	0.204		0.167		0.151		0.821	
Kao ADF statistic	-3.76[a]		-3.87[a]		-3.78[a]		-3.83[a]	
$(\delta_i + \phi_i)$ test	0.011		0.009		0.648		0.366	

Note: i) z-value and standard errors are in parentheses; ii) test results are in p-value; iii) coefficient significant at level *** 1%, ** 5%, * 10%; iv) (a) indicates rejection of the null-hypothesis of no cointegration at the 1% level; v) Kao ADF test (selection criteria): - Schwarz criteria for lag length selection; - Bandwidth selection criteria: Newey-West; - Kernel method: Bartlett.

Tab. 6B (continue) Estimation results of the joined impact of fiscal decentralization funded by local autonomous taxation and legislative monopoly power on government size

	ERROR CORRECTION MODEL (*eq. 4*)							
	(9)		(11)		(13)		(15)	
EXP_{t-1}	-0.23***	(-5.67)	-0.22***	(-5.14)	-0.23***	(-5.84)	-0.23***	(-5.59)
$EXPDEC_{t-1}$	-0.03	(-1.08)			-0.02	(-0.91)		
$EXPDEC_{t-1}$*$MAJORITY_{t-1}$*$TAXAUT33_{t-1}$	-0.02	(-0.25)						
$EXPDEC_{t-1}$*$MAJORITY_{t-1}$*$TAXAUT50_{t-1}$					1.64	(1.18)		
$REVDEC_{t-1}$			-0.01	(-0.44)			-0.004	(-0.25)
$REVDEC_{t-1}$*$MAJORITY_{t-1}$*$TAXAUT33_{t-1}$			0.01	(0.11)				
$REVDEC_{t-1}$*$MAJORITY_{t-1}$*$TAXAUT50_{t-1}$							2.53*	(1.72)
$MAJORITY_{t-1}$*$TAXAUT33_{t-1}$	0.09	(0.26)	-0.03	(-0.08)				
$MAJORITY_{t-1}$*$TAXAUT50_{t-1}$					-6.64	(-1.18)	-10.1*	(-1.72)
DEN_{t-1}	0.01*	(1.85)	0.01	(1.49)	0.01*	(1.81)	0.01*	(1.71)
POP_{t-1}	0.005	(0.49)	0.01	(0.54)	0.004	(0.40)	0.002	(0.25)
$DEPRATIO_{t-1}$	0.12*	(1.84)	0.12*	(1.77)	0.12*	(1.91)	0.14**	(2.06)
URBAN POP_{t-1}	0.01	(0.12)	0.04	(0.65)	0.03	(0.46)	0.05	(0.83)
$GRANTS_{t-1}$	0.02**	(2.92)	0.02**	(3.03)	0.03**	(3.01)	0.02**	(2.94)
GDP PC_{t-1}	0.01*	(1.80)	0.01*	(1.95)	0.01*	(1.73)	0.01**	(2.16)
$TRADE_{t-1}$	-0.02	(-0.84)	-0.02	(-0.53)	-0.02	(-0.77)	-0.01	(-0.43)
ΔEXP_{t-1}	0.29*	4.74	0.21***	(4.01)	0.25***	(4.13)	0.21***	(4.07)
$\Delta EXPDEC_{t-1}$	-0.087**	-2.02			-0.06	(-1.39)		
$\Delta EXPDEC_{t-1}$*$\Delta MAJORITY_{t-1}$*$\Delta TAXAUT33_{t-1}$	-0.37*	-1.95						
$\Delta EXPDEC_{t-1}$*$\Delta MAJORITY_{t-1}$*$\Delta TAXAUT50_{t-1}$					-0.89	(-0.73)		
$\Delta REVDEC_{t-1}$			0.001	(0.02)			-0.01	(-0.17)
$\Delta REVDEC_{t-1}$*$\Delta MAJORITY_{t-1}$*$\Delta TAXAUT33_{t-1}$			-0.05	(-0.27)				
$\Delta REVDEC_{t-1}$*$\Delta MAJORITY_{t-1}$*$\Delta TAXAUT50_{t-1}$							-3.15**	(-2.45)
$\Delta MAJORITY_{t-1}$*$\Delta TAXAUT33_{t-1}$	1.37*	1.89	0.13	(0.18)				
$\Delta MAJORITY_{t-1}$*$\Delta TAXAUT50_{t-1}$					3.62	(0.73)	12.53**	(2.45)
ΔDEN_{t-1}	0.43	1.05	0.64	(1.50)	0.29	(0.78)	0.26	(0.72)
ΔPOP_{t-1}	0.23	0.22	0.03	(0.03)	0.39	(0.41)	0.21	(0.22)
$\Delta DEPRATIO_{t-1}$	0.08	0.23	0.08	(0.21)	0.05	(0.14)	0.03	(0.09)
ΔURBAN POP_{t-1}	2.60**	2.55	2.76**	(2.65)	2.57**	(2.56)	2.61**	(2.60)
$\Delta GRANTS_{t-1}$	-0.01	-0.85	-0.01	(-0.96)	-0.01	(-0.84)	-0.01	(-0.86)
ΔGDP PC_{t-1}	-0.09	-0.67	-0.18	(-1.42)	-0.13	(-0.98)	-0.24*	(-1.93)
$\Delta TRADE_{t-1}$	-0.02	-0.35	-0.01	(-0.23)	-0.03	(-0.54)	-0.02	(-0.43)
constant	0.84**	2.43	0.54	(1.66)	0.84**	(2.36)	0.64*	(1.94)
AB-AR(1) test	0.000		0.000		0.000		0.000	
AB-AR(2) test	0.910		0.624		0.830		0.662	
Sargan test	0.523		0.520		0.428		0.437	
Difference Sargan test	0.207		0.218		0.324		0.336	
Kao ADF statistic	-3.63[a]		-3.72[a]		-3.74[a]		-3.78[a]	
$(\delta_l + \phi_l)$ test	0.620		0.967		0.248		0.087	

Note: i) z-value and standard errors are in parentheses; ii) test results are in p-value; iii) coefficient significant at level *** 1%, ** 5%, * 10%; iv) (a) indicates rejection of the null-hypothesis of no cointegration at the 1% level; v) Kao ADF test (selection criteria): - Schwarz criteria for lag length selection; - Bandwidth selection criteria: Newey-West; - Kernel method: Bartlett.

Tab. 6C (continue) Estimation results of the joined impact of fiscal decentralization funded by local autonomous taxation and legislative monopoly power on government size

	ERROR CORRECTION MODEL (*eq. 4*)							
	(17)		(19)		(21)		(23)	
EXP_{t-1}	-0.25***	(-6.00)	-0.25***	(-6.41)	-0.23***	(-5.79)	-0.25***	(-6.36)
$EXPDEC_{t-1}$	-0.04*	(-1.83)	-0.03	(-1.31)	-0.03	(-1.37)	-0.03	(-1.37)
$EXPDEC_{t-1}*MAJ33_{t-1}*TAXAUT33_{t-1}$	0.11	(1.63)						
$EXPDEC_{t-1}*MAJ33_{t-1}*TAXAUT50_{t-1}$			-0.55	(-0.73)				
$EXPDEC_{t-1}*MAJ50_{t-1}*TAXAUT33_{t-1}$					0.16*	(1.80)		
$EXPDEC_{t-1}*MAJ50_{t-1}*TAXAUT50_{t-1}$							-0.46	(-0.60)
$MAJ33_{t-1}*TAXAUT33_{t-1}$	-0.37	(-1.52)						
$MAJ33_{t-1}*TAXAUT50_{t-1}$			2.30	(0.76)				
$MAJ50_{t-1}*TAXAUT33_{t-1}$					-0.58*	(-1.75)		
$MAJ50_{t-1}*TAXAUT50_{t-1}$							1.93	(0.62)
DEN_{t-1}	0.02**	(2.32)	0.02***	(2.66)	0.02**	(2.36)	0.02**	(2.62)
POP_{t-1}	-0.01	(-0.57)	-0.01	(-0.98)	-0.006	(-0.53)	-0.01	(-0.80)
$DEPRATIO_{t-1}$	0.12*	(1.90)	0.14**	(2.26)	0.14**	(2.05)	0.13**	(2.02)
$URBAN\ POP_{t-1}$	0.03	(0.48)	0.03	(0.60)	0.03	(0.54)	0.03	(0.46)
$GRANTS_{t-1}$	0.03**	(3.07)	0.02**	(2.86)	0.03**	(3.08)	0.02**	(2.94)
$GDP\ PC_{t-1}$	0.01**	(2.02)	0.01*	(1.80)	0.01*	(1.67)	0.01	(1.60)
$TRADE_{t-1}$	-0.04	(-1.53)	-0.05*	(-1.77)	-0.04	(-1.55)	-0.05*	(-1.71)
ΔEXP_{t-1}	0.30***	(5.11)	0.25***	(4.17)	0.27***	(4.51)	0.25***	(4.09)
$\Delta\ EXPDEC_{t-1}$	-0.09**	(-2.11)	-0.05	(-1.28)	-0.08*	(-1.88)	-0.05	(-1.02)
$\Delta EXPDEC_{t-1}*\Delta MAJ33_{t-1}*\Delta TAXAUT33_{t-1}$	0.43**	(2.33)						
$\Delta EXPDEC_{t-1}*\Delta MAJ33_{t-1}*\Delta TAXAUT50_{t-1}$			0.40	(0.55)				
$\Delta EXPDEC_{t-1}*\Delta MAJ50_{t-1}*\Delta TAXAUT33_{t-1}$					-0.05	(-0.41)		
$\Delta EXPDEC_{t-1}*\Delta MAJ50_{t-1}*\Delta TAXAUT50_{t-1}$							0.33	(0.45)
$\Delta MAJ33_{t-1}*\Delta TAXAUT33_{t-1}$	-1.64**	(-2.42)						
$\Delta MAJ33_{t-1}*\Delta TAXAUT50_{t-1}$			-1.68	(-0.58)				
$\Delta MAJ50_{t-1}*\Delta TAXAUT33_{t-1}$					0.16	(0.38)		
$\Delta MAJ50_{t-1}*\Delta TAXAUT50_{t-1}$							-1.44	(-0.48)
ΔDEN_{t-1}	0.42	(1.14)	0.35	(0.99)	0.318	(0.78)	0.51	(1.11)
ΔPOP_{t-1}	0.10	(0.10)	0.09	(0.10)	0.392	(0.41)	0.08	(0.08)
$\Delta DEPRATIO_{t-1}$	0.11	(0.32)	0.05	(0.14)	0.060	(0.16)	0.03	(0.10)
$\Delta URBAN\ POP_{t-1}$	1.81*	(1.82)	2.15**	(2.20)	2.39**	(2.39)	2.16**	(2.19)
$\Delta GRANTS_{t-1}$	-0.01	(-0.65)	-0.01	(-0.85)	-0.01	(-0.79)	-0.01	(-0.96)
$\Delta GDP\ PC_{t-1}$	-0.11	(-0.87)	-0.14	(-1.13)	-0.10	(-0.72)	-0.16	(-1.26)
$\Delta TRADE_{t-1}$	0.0003	(0.01)	-0.02	(-0.38)	-0.02	(-0.37)	-0.03	(-0.59)
constant	1.10**	(3.02)	1.19***	(3.22)	1.02**	(2.72)	1.24***	(3.33)
AB-AR(1) test	0.000		0.000		0.000		0.000	
AB-AR(2) test	0.460		0.793		0.911		0.797	
Sargan test	0.516		0.398		0.535		0.508	
Difference Sargan test	0.498		0.559		0.510		0.639	
Kao ADF statistic	-3.67[a]		-3.76[a]		-3.56[a]		-3.76[a]	
$(\delta_i + \phi_i)$ test	0.329		0.440		0.163		0.520	

Note: i) z-value and standard errors are in parentheses; ii) test results are in p-value; iii) coefficient significant at level *** 1%, ** 5%, * 10%; iv) (a) indicates rejection of the null-hypothesis of no cointegration at the 1% level; v) Kao ADF test (selection criteria): - Schwarz criteria for lag length selection; - Bandwidth selection criteria: Newey-West; - Kernel method: Bartlett.

Tab. 6D (continue) Estimation results of the joined impact of fiscal decentralization funded by local autonomous taxation and legislative monopoly power on government size

	ERROR CORRECTION MODEL (*eq. 4*)							
	(25)		(27)		(29)		(31)	
EXP_{t-1}	-0.22***	(-5.20)	-0.24***	(-6.14)	-0.22***	(-5.40)	-0.27***	(-6.42)
$REVDEC_{t-1}$	-0.01	(-0.85)	-0.01	(-0.57)	-0.01	(-0.99)	-0.02	(-1.10)
$REVDEC_{t-1}*MAJ33_{t-1}*TAXAUT33_{t-1}$	0.10	(1.36)						
$REVDEC_{t-1}*MAJ33_{t-1}*TAXAUT50_{t-1}$			-1.15***	(-1.84)				
$REVDEC_{t-1}*MAJ50_{t-1}*TAXAUT33_{t-1}$					0.12*	(1.83)		
$REVDEC_{t-1}*MAJ50_{t-1}*TAXAUT50_{t-1}$							-1.05*	(-1.70)
$MAJ33_{t-1}*TAXAUT33_{t-1}$	-0.36	(-1.30)						
$MAJ33_{t-1}*TAXAUT50_{t-1}$			4.64***	(1.88)				
$MAJ50_{t-1}*TAXAUT33_{t-1}$					-0.42*	(-1.77)		
$MAJ50_{t-1}*TAXAUT50_{t-1}$							4.21*	(1.73)
DEN_{t-1}	0.01*	(1.81)	0.02**	(2.47)	0.02**	(2.39)	0.02**	(2.90)
POP_{t-1}	-0.005	(-0.45)	-0.01	(-1.16)	-0.01	(-0.55)	-0.01	(-0.93)
$DEPRATIO_{t-1}$	0.13*	(1.89)	0.15**	(2.32)	0.14**	(2.07)	0.19**	(2.69)
$URBAN\ POP_{t-1}$	0.08	(1.28)	0.06	(1.01)	0.06	(1.08)	0.05	(0.91)
$GRANTS_{t-1}$	0.02**	(2.75)	0.02**	(2.42)	0.02***	(3.27)	0.02**	(2.48)
$GDP\ PC_{t-1}$	0.01**	(2.09)	0.01**	(2.24)	0.01**	(1.97)	0.01*	(1.83)
$TRADE_{t-1}$	-0.03	(-1.09)	-0.04	(-1.43)	-0.04	(-1.49)	-0.06**	(-1.98)
ΔEXP_{t-1}	0.21***	(4.03)	0.21***	(4.00)	0.21***	(3.97)	0.19***	(3.72)
$\Delta REVDEC_{t-1}$	-0.01	(-0.15)	-0.01	(-0.41)	-0.01	(-0.15)	0.005	(0.16)
$\Delta REVDEC_{t-1}*\Delta MAJ33_{t-1}*\Delta TAXAUT33_{t-1}$	0.17	(0.88)						
$\Delta REVDEC_{t-1}*\Delta MAJ33_{t-1}*\Delta TAXAUT50_{t-1}$			1.69**	(2.63)				
$\Delta REVDEC_{t-1}*\Delta MAJ50_{t-1}*\Delta TAXAUT33_{t-1}$					0.03	(0.28)		
$\Delta REVDEC_{t-1}*\Delta MAJ50_{t-1}*\Delta TAXAUT50_{t-1}$							1.60**	(2.51)
$\Delta MAJ33_{t-1}*\Delta TAXAUT33_{t-1}$	-0.67	(-0.99)						
$\Delta MAJ33_{t-1}*\Delta TAXAUT50_{t-1}$			-6.77**	(-2.66)				
$\Delta MAJ50_{t-1}*\Delta TAXAUT33_{t-1}$					-0.11	(-0.32)		
$\Delta MAJ50_{t-1}*\Delta TAXAUT50_{t-1}$							-6.48**	(-2.57)
ΔDEN_{t-1}	0.50	(1.32)	0.27	(0.79)	0.19	(0.48)	0.66*	(1.75)
ΔPOP_{t-1}	-0.03	(-0.03)	-0.12	(-0.13)	0.53	(0.56)	-0.21	(-0.23)
$\Delta DEPRATIO_{t-1}$	0.10	(0.27)	0.04	(0.1)	0.11	(0.28)	-0.05	(-0.13)
$\Delta URBAN\ POP_{t-1}$	2.06**	(1.99)	2.17**	(2.21)	2.54**	(2.57)	2.39**	(2.47)
$\Delta GRANTS_{t-1}$	-0.01	(-0.81)	-0.01	(-0.84)	-0.01	(-0.92)	-0.01	(-0.94)
$\Delta GDP\ PC_{t-1}$	-0.22*	(-1.76)	-0.26**	(-2.11)	-0.19	(-1.5)	-0.24*	(-1.86)
$\Delta TRADE_{t-1}$	-0.01	(-0.11)	-0.01	(-0.24)	-0.005	(-0.08)	-0.03	(-0.58)
constant	0.64*	(1.86)	1.01**	(2.93)	0.74**	(2.17)	1.20***	(3.54)
AB-AR(1) test	0.000		0.000		0.000		0.000	
AB-AR(2) test	0.815		0.472		0.774		0.578	
Sargan test	0.572		0.496		0.386		0.455	
Difference Sargan test	0.477		0.602		0.327		0.509	
Kao ADF statistic	-3.75^{a}		-3.80^{a}		-3.63^{a}		-3.81^{a}	
$(\delta_i + \phi_i)$ test	0.227		0.063		0.102		0.083	

Note: i) z-value and standard errors are in parentheses; ii) test results are in p-value; iii) coefficient significant at level *** 1%, ** 5%, * 10%; iv) (a) indicates rejection of the null-hypothesis of no cointegration at the 1% level; v) Kao ADF test (selection criteria): - Schwarz criteria for lag length selection; - Bandwidth selection criteria: Newey-West; - Kernel method: Bartlett.

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