# THE LEVIATHAN STORY AND LEGISLATIVE MONOPOLY POWER: EVIDENCE FROM OECD COUNTRIES

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# The Leviathan story and legislative monopoly power: Evidence from OECD countries

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Abstract. In this paper we make a thorough empirical investigation of Leviathan hypotheses on OECD countries by testing the joint impact of fiscal decentralization and legislative power on government size. As regards, we consider two proxies of legislative power: the margin of majority and the executive party control of all relevant houses. Controlling for different regimes of majority, estimation results show a weak evidence of Leviathan: that is, fiscal decentralization reduces government size when it is mainly funded by high levels of sub-national autonomous taxation. In particular, we observe that the reduction in government size is higher for lower margins of majority. Additionally, controlling for the executive party control (i.e., for the legislative monopoly power), we find that fiscal decentralization constraints government size even if it is not accompanied by high levels of sub-national tax autonomy. Although not in line with the Leviathan story, this finding suggests a new scenario to reduce the growth of government size by the fiscal decentralization channel. Overall, we show that the effects of fiscal decentralization on government size also depend on the nature of legislative power.

Key words: legislative monopoly power • fiscal decentralization • government size • dynamic panel-based error correction model

JEL Classification: D72 • H72 • H77

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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 after Oates's (1985) seminal empirical analysis. Recently, empirical evidence shows that mixed results depend on the kind of financial resources devoted to fiscal decentralization financing. In particular, Rodden (2003) finds that fiscal decentralization reduces the government size when it is mainly funded by autonomous local taxation rather than by common pool resources i.e., grants and revenue-sharing. Although Rodden (2003) revives the Leviathan story, his analysis does not account for the additional hypothesis of legislative power. Brennan and Buchanan (1980) argue that voting majority rule could lead to an increase in the government size by means of legislative control, strengthening fiscal appetites of Leviathan. They also emphasize that the primary means of constraining the selfishness of a monolithic government should be imposed on the fiscal decision-making process rather than on the electoral one. It follows that if the Leviathan idea works well, fiscal constraints should prevail on electoral constraints in order to drive government activities. In this paper we account for this reasoning by performing a joint test of fiscal decentralization and legislative power hypotheses. In this way, we investigate the Leviathan theory thoroughly, checking robustness for Rodden's (2003) results on OECD countries.

At first, we test the hypotheses of fiscal decentralization and legislative control, separately, by using advanced panel data techniques on 16 OECD member countries. As index of fiscal decentralization, we consider both revenue and expenditure decentralization. On the side of legislative power, we consider two proxies: the margin of majority and the executive party control of all relevant houses. We account for a gradual increase in the legislative power by considering different regimes of margin of majority and we account for legislative monopoly power by using a dummy variable associated to the executive party control. Estimation results show that fiscal decentralization tends to reduce government size, although this result becomes significant only in the short run period. On the other hand, legislative monopoly power is a powerful and significant constraint of government size in the long run period. It is clear that the latter evidence does not support the Leviathan story; on the contrary, it supports the Andersson and Tollison (1998) evidence.[1]

A second step concerns the joint test of fiscal decentralization and legislative power on government size according to different regimes of legislative power and tax autonomy, respectively. In this way, we follow Rodden's (2003) analysis and,

[1] See paragraph 1.2 for details.

additionally, we control for legislative power effects. In details, the joint analysis of the *margin of majority* and *fiscal decentralization* shows that government size is restricted by the fiscal decentralization channel when the degree of sub-national tax autonomy is over 50% and government holds a fraction of seats higher than 1/3 or 1/2. In particular, we observe that the reduction in government size is higher for lower margins of majority i.e., 1/3. We also find that fiscal decentralization fails to tame Leviathan in the presence of smaller levels of local autonomous taxation and higher regimes of government majority i.e., over 1/5. Although, these results are not particularly robust in the dynamic panel regression analysis, they are consistent with the Leviathan story, suggesting that fiscal decentralization restricts the government size when it is mainly funded by local autonomous taxation. Thereby, this evidence supports Rodden's (2003) results.

On the other hand, when we control for the joint impact of *legislative monopoly power* and *fiscal decentralization*, we observe a significant reduction in government size, particularly when fiscal decentralization is accompanied by a lower regime of local tax autonomy i.e., over 33%. This result is particularly robust in the regression analysis and shows that in the presence of legislative monopoly power, fiscal decentralization constraints government size even if it is not mainly funded by sub-national tax autonomy. It follows that legislative monopoly power could be considered as a powerful constrain of government size.

To sum-up, according to different degree of legislative power, results suggest two alternative scenarios to control the growth of government size by the fiscal decentralization channel: 1) *high degree of sub-national fiscal autonomy accompanied by lower regimes of government majority*; 2) *low degree of sub-national fiscal autonomy accompanied by a legislative monopoly power at the central government level*. We find that the second scenario, although not in line with the Leviathan story, is particularly robust in the regression analysis. This finding suggests a new way to reduce the growth of government size by the fiscal decentralization channel. In other words, this means that federalism could not be the only way to tame the Leviathan fiscal appetites in the long run period but an alternative solution, consisting in a concentration of tax and legislative power in the hands of the central government, could be considered to reduce the government size by fiscal decentralization.

Overall, we find an additional result than Rodden (2003) i.e., that the effects of fiscal decentralization on government size also depend on the nature of legislative power. This represents a further contribution in the empirical literature.

The rest of the paper is organized as follows. Section 2 introduces an overview of the literature. Section 3 presents data and variables. Section 4 illustrates the unit root and cointegration analysis. Empirical specifications and estimation techniques are described in section 5. Estimation results are commented upon in section 6, and conclusions are drawn in section 7.

## 2. An overview of the literature

Brennan and Buchanan's (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. 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.[2]

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. This is well known as *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 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; 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.

Although some empirical evidence is consistent with the Leviathan hypothesis, mixed results emerge. 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

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

[3] For example see: Marlow (1988), Grossman (1989), Zax (1989), Raimondo (1989), Joulfain & Marlow (1990, 1991), Shadbegian (1999).

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 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* 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*. Collusion consists in agreement between state and local governments to establish a uniform tax system across all jurisdictions in order to reduce 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.

A further Leviathan hypothesis concerns the issue on *legislative power*. Brennan and Buchanan (1980) argue that voting majority rule could be inadequate to constrain selfish behaviour of government. This implies a positive relationship between legislative control and the government size. A similar conclusion is drawn by the theory based on monopoly power (Tullock, 1965) which suggests that when potential entry barriers are high in politics, political competition could lead an

increase in government activities and, consequently, in the government size. The impact of legislative monopoly power upon government size is empirically tested by Anderson and Tollison (1988) on US states. As a proxy of legislative monopoly power, they use the percentage of seats held by the majority party in the Senate and in the House of Representatives. They show that concentration of legislative power in the government's own hands is consistent with a reduction in government size. This result is interesting because it brings federalism into question as a constraint of central government actions. Additionally, this evidence supports their extension of Buchanan's (1974) model on organized crime to government behaviour. They argue that, when political entry barriers are high, governments "tend to *behave* like organized crime in the Buchanan sense[4] – by restriction output" (Anderson and Tollison, 1988, p. 530) and, afterward, transferring wealth from taxpayers to interest groups.

Figure 1 summarizes the empirical nexus between Leviathan hypotheses and government size.

*Insert Fig. 1 - The Leviathan scheme*

## 3. Data

For our empirical analysis, we used *balanced* cross-sectional time series data on 16 OECD member countries[5] from 1978 to 1997. Fiscal budget data were collected from *Fiscal Decentralization Indicators* of the International Monetary Fund's (IMF) Government Finance Statistics (GFS). Government size (*EXP*) is measured by total government expenditure[6] 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

[4] Buchanan (1974) argues 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, bootlegging, etc.), this leads to a downturn of prices with an increase in the quantity of criminal activities produced.

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

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

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[7] shows the presence of overestimation problems only for Austria (26% *versus* 13%, on average) and Germany (35% *versus* 21%, on average '78-96). Since overestimation problems are not severe for revenue decentralization data and we work with balanced panels, we use the GFS data.[8] 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). Since these problems are not a negligible aspect in the measure of tax revenue decentralization, we accounted for them 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 power (*LP*): *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. We account for a gradual increase in the legislative power by considering different degree of margin of majority and we account for a legislative monopoly power by the executive party control dummy. According to the Leviathan story, we expected a positive impact of legislative power variables on the growth of government size. By contrast, a negative sign of the coefficients associated to these indexes could be consistent with the interest group theory based on Buchanan's (1974) model (see Andersson & Tollison, 1988).

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

[8] Only for Luxembourg, we find missing data for 1989 year in GFS data set, replacing it by average 1988-1990. According to our OECD sample, we find several missing data for the revenue decentralization index developed by Stegarescu (2004). In details, missing data refer to the following countries and years: Canada (1978); Germany (1997); Luxembourg (1989); Norway (1978; 1979); USA (1978; 1979).

In our empirical analysis, we also accounted for the interaction term *FDindex·LPindex* in order to investigate whether fiscal decentralization restrains government size when there is legislative power at the central government level. According to the Leviathan hypothesis, we expect that the impact of fiscal decentralization on government size reduces each influence of legislative control. With this aim, we also control for growing regimes of government majority considering a dummy variable *MAJ%* that 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 power on government size. In this case, we used the interaction term *FDindex·LPindex·TAXAUT%*. In accordance with the Leviathan theory, 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. Therefore, we expect that for high levels of sub-national tax autonomy, tax competition works well taming the Leviathan selfishness.

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

*Insert Tab. 1 - Data source*

## 4. The 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.[9] 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. 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, $\alpha_i$ is the individual specific effect, $\tau$ is a linear time trend, and $\xi$ is the error term. The LLC test assumes that the coefficient $\rho$ 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

[9] Baltagi & Kao (2000), Hurlin & Mignon (2004), Breitung & Pesaran (2005).

consistent with stationary hypothesis of the time series i.e., $H_1$: $\rho_i = \rho < 1 \ \forall \ i = 1,\ldots,N$. The LLC test holds for heterogeneous serial correlation in the error term structure.

$$\Delta Y_{i,t} = \alpha_i + \delta\tau + \rho Y_{i,t-1} + \sum_{m=1}^{p_i} \beta_{i,m} \Delta Y_{i,t-m} + \xi_{i,t} \qquad (1)$$
$$\text{for } i=1,\ldots,N \quad t=1,\ldots,T \quad \mu_{i,t} \ i.i.d.(0,\sigma_{\varepsilon_i}^2)$$

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 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. (1995, 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;[10] *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 panels under the null hypothesis of non-stationary series. The Choi (2002) test solves the cross-sectional dependence problem. 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)

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

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).[11]

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 (2007) test results are more robust than others and have a good power when cross-sectional dependence is detected in the errors.[12] 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[13] (DOLS) or Fully Modified OLS[14] (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 and one ADF-type test. 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

[11] See Im and Pesaran (2003) for a list of alternative unit root tests allowing for the cross-sectional dependence in panel data.

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

[13] Saikkonen (1991), Stock & Watson (1993), Kao & Chiang (2000).

[14] Pedroni (2000).

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 and group mean panels statistic, the heterogeneity assumption of null hypothesis is no cointegration. 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.[15]

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, 2004), 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).

*Insert Tab. 2 - Unit root test results*
*Insert Tab. 3 - Cointegration test results*

## 5. 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.[16] 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.

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

[15] Recently, Westerland (2007) develops additional cointegration tests.
[16] Ashworth et al. (2006) investigated both long- and short-run effects with DOLS/FMOLS and ECM for testing the Leviathan hypothesis.

the number of lagged differenced dependent variables and regressors included in the model, respectively. Coefficients *c* associated to $\Delta x_t$ ($=x_t-x_{t-1}$) 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 $\phi$ (*Kx1*) is the vector of coefficients associated to the first-order lagged regressors. The coefficient $\alpha$ is equal to ($\gamma$ *-1*) and captures the long-run effects between *y* and *x* (integrated) variables. Finally, *b* is the constant term; $u_i$ and $\varepsilon_{it}$ are fixed effects and an error term with zero mean and constant variance, respectively; $\tau_t$ is the *Nx1* vector of time effects.

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

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 power on government size. $EXP_{it}$ corresponds to the size of government 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 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 *LPindex* is expected to be positive. For this model, as well as for the others, z (*1xK*) is the vector of control variables.

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

In model (3) we also investigate the joint effect of *FDindex* and *LPindex* on the government growth. This model specification helps clarify whether legislative power of government could invert the negative impact of fiscal decentralization on government size. To control for threshold effects of 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.

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

Finally, since the Leviathan model works well when there is high local tax autonomy, we investigate how the degree of sub-national tax autonomy interacts with legislative 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·LPindex* by the *TAXAUT%* dummy variable. Our expectation on the sign of *FDindex·LPindex·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 power, a negative effect could be expected and *vice versa*. Equation (4) illustrates the empirical model.

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

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: $\Delta EXP_{it-1}$ and its first difference, constant term. Instead, for equations in first differences, instrumental variables used are: $EXP_{it-2}$, $\Delta EXP_{it-3}$. 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).

## 6. 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 power indexes on government 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, supporting empirical evidence on the US states of Anderson and Tollison (1988). This result suggests that, probably, performing regression analyses of models (3) and (4), legislative monopoly power will not invert the negative impact of fiscal decentralization on government size; on the contrary, it could strengthen it.

As may be seen from the estimation results of model (3) for the interaction effects between fiscal decentralization and legislative power i.e., *FDindex*LPindex* (tabb. 5A-5B), the long-run parameter of *EXPDEC*ALLHOUSE* assumes a negative and significant sign (-0.09). This means that the government size decreases through fiscal decentralization in countries where governments have a strong executive party control of all relevant houses. A stronger impact of fiscal decentralization is detected when we control for the degree of sub-national tax autonomy by estimating model (4). Table 6A shows that, in the presence of legislative party control, the growth of government size is slower when fiscal decentralization is accompanied by lower regimes of tax autonomy i.e., over 33%. An increase in the regimes of sub-national tax autonomy (i.e., over 50%) 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.[17] Overall, these evidence are particularly interesting because suggest that, in the presence of legislative monopoly power, fiscal decentralization is a powerful constraint of government size even if it is not accompanied by high sub-national tax autonomy.

Estimation results of interaction model (3) with the *MAJORITY* variable as the *LP* 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 the kind of financial resources devoted to fiscal decentralization financing are considered. In table 6B, we observe that in the long run, fiscal decentralization fails to constrain the size of government when the margin of majority is considered together with the high degree of sub-national tax autonomy (i.e., over 50%). As regards, the coefficient associated to interaction term *REVDEC*MAJORITY*TAXAUT50* is positive and statistically significant. This evidence implies that legislative power could invert fiscal decentralization effects on government size even if it is funded by high local tax autonomy. Since the coefficient

[17] For instance: $EXP_{it-2}$ (or $EXP_{it-3}$) for the first difference equations; $\Delta EXP_{it-2}$ and constant term for the level equations.

is statistically significant at level of 10%, we also control for a gradual increase in the degree of government majority. We find that in the long run, government size increases when government hold a fraction of seats over ½ and fiscal decentralization is accompanied by a lower degree of tax revenue decentralization i.e., over 33% (tabb. 6C-6D). 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 lower regimes 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% (see 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 size when it is funded by a degree of local autonomous taxation over 50%. In particular, we observe that the reduction in government size is higher for lower margins of majority i.e., 1/3. Changing the set of instrumental variables to check robustness, the coefficients of interaction terms lost statistical significance in most cases.[18] Therefore, we make caution on the interpretation of these results. Although not particularly robust, we find a weak empirical evidence of Leviathan.[19]

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 $\Delta EXP_{it-1}$ 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.

[18] For instance, they are not statistically significance when we run regression analyses using the set of instrumental variables indicated in footnote 17.

[19] In order to control the robustness of this result, we also perform regression analyses with the revenue decentralization index developed by Stegarescu (2004) which is briefly named as STREVDEC in the present study. Generally, we find that previous results are confirmed. The main differences consist in the lack of statistical significance in the long-run coefficient ALLHOUSE estimated in model (2). Moreover, we observe that the coefficient STREVDEC*ALLHOUSE*TAXAUT50% becomes positive and statistically significant. In this case, a higher degree of sub-national autonomous taxation, accompanied to a legislative monopoly power, could work against tax competition mechanism, increasing the government size. Probably, the central government needs to concentrate on its own hands not only legislative power but also tax power in order to significantly control the growth of the government size. Finally, the coefficients devoted to detect the Leviathan hypothesis i.e., STREVDEC*MAJ33%*TAXAUT50% and STREVDEC*MAJ50%*TAXAUT50%, although negative, become not statistically significant in the regression analysis. These results confirm that previous evidences on Leviathan are not particularly robust in the long run period. Estimation results are available on request to the author.

## 7. Conclusion

In this paper, we test the Leviathan theory thoroughly, by performing a joint test of fiscal decentralization and legislative power hypotheses on a sample of developed countries. The joint effect of fiscal decentralization and legislative power on government size seems to raise the Leviathan story when the degree of tax decentralization is considered in the empirical analysis. In details, Leviathan revives when, in the presence of different regimes of government majority, fiscal decentralization is funded by high levels of sub-national autonomous taxation. In particular, we observe that the reduction in government size is higher for lower margins of majority i.e., 1/3. On the contrary, we observe that fiscal decentralization fails to tame Leviathan in the presence of smaller levels of local autonomous taxation and high regimes of government majority i.e., over 1/5. These evidences, although not particularly robust in the regression analysis, confirm Rodden's (2003) results.

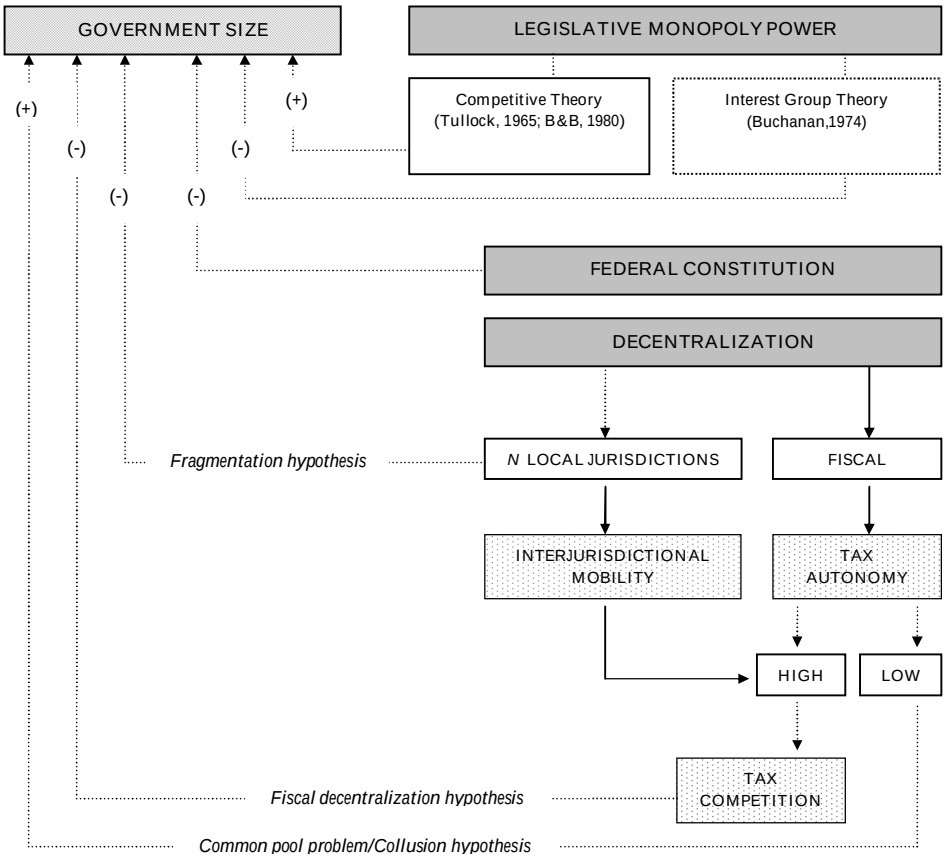
On the other hand, controlling for the executive party control proxy, we observe that the government size is reduced by the fiscal decentralization channel, particularly when fiscal decentralization is accompanied by a lower regime of local tax autonomy i.e., over 33%. This evidence is interesting because, in the presence of legislative monopoly power, we find that fiscal decentralization is a powerful constraint of government size even if it is not accompanied by high sub-national autonomous taxation.

Results suggest two alternative ways for controlling the growth of government size by the fiscal decentralization channel: 1) *high degree of sub-national fiscal autonomy accompanied by lower regimes of majority at central governmental level*; 2) *low degree of sub-national fiscal autonomy accompanied by legislative monopoly power*. Although, both scenarios produce similar effects on the government size, we find that the second one is more robust in the regression analysis. Therefore, although not in line with the Leviathan story, it is shown that a concentration of the legislative and tax power on the hands of the central government could be an efficient way to tame Leviathan fiscal appetites by fiscal decentralization in the long-run period.

Overall, we show that the effects of fiscal decentralization on government size also depend on the nature of legislative power.

*Insert Tab. 4*
*Insert Tab. 5A*
*Insert Tab. 5B (continue)*
*Insert Tab. 6A*
*Insert Tab. 6B (continue)*
*Insert Tab. 6C (continue)*
*Insert Tab. 6D (continue)*

*Fig. 1 - The scheme of Leviathan*



*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* |

*Tab. 2 - Unit root test results*

| Variable in levels | IPS[a, b, Z] | | FISHER - ADF[a, b, χ] | | FISHER - PP[a, b, χ] | | 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 | 0.82 | -0.78 | 3.46*** | 2.27** |
| Variable in first-difference | IPS[a, b, Z] | | FISHER - ADF[a, b, χ] | | FISHER - PP[a, b, χ] | | 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*** | 141.74*** | -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*** |

*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, LPindex, control variables is -3.66 (p-value 0.000).*

*Kao ADF statistic for all variables EXP, REVDEC, LPindex, control variables is -3.72 (p-value 0.000).*

*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) |
| $\Delta EXP_{t-1}$ | 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) |
| $\Delta DEN_{t-1}$ | 0.45 | (1.24) | 0.42 | (1.14) |
| $\Delta POP_{t-1}$ | 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-values 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) |
| $\Delta EXP_{t-1}$ | 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) | | | | |
| $\Delta DEN_{t-1}$ | 0.32 | (0.91) | 0.32 | (0.91) | 0.50 | (1.35) | 0.51 | (1.35) |
| $\Delta POP_{t-1}$ | 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) |
| $\Delta URBAN\ POP_{t-1}$ | 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) |
| $\Delta GDP\ PC_{t-1}$ | | | -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-values 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) |
| $\Delta EXP_{t-1}$ | 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) |
| $\Delta DEN_{t-1}$ | 0.57 | (1.58) | 0.53 | (1.40) | 0.49 | (1.37) | 0.45 | (1.27) |
| $\Delta POP_{t-1}$ | 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) |
| $\Delta URBAN\ POP_{t-1}$ | 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) |
| $\Delta GDP\ PC_{t-1}$ | -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] | |
| $(\delta_1 + \phi_1)$ test | 0.220 | | 0.522 | | 0.491 | | 0.549 | |

Note: i) z-values 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) |
| $\Delta EXP_{t-1}$ | 0.24*** | (4.06) | 0.20*** | (3.95) | 0.24*** | (4.11) | 0.21*** | (3.89) |
| $\Delta EXPDEC_{t-1}$ | -0.05 | (-1.10) | | | -0.05 | (-1.17) | | |
| $\Delta EXPDEC_{t-1}$*$\Delta ALLHOUSE_{t-1}$*$\Delta TAXAUT33_{t-1}$ | 0.15 | (0.54) | | | | | | |
| $\Delta EXPDEC_{t-1}$*$\Delta ALLHOUSE_{t-1}$*$\Delta TAXAUT50_{t-1}$ | | | | | 0.01 | (0.01) | | |
| $\Delta REVDEC_{t-1}$ | | | 0.00 | (0.09) | | | 0.003 | (0.08) |
| $\Delta REVDEC_{t-1}$*$\Delta ALLHOUSE_{t-1}$*$\Delta TAXAUT33_{t-1}$ | | | 0.12 | (0.54) | | | | |
| $\Delta REVDEC_{t-1}$*$\Delta ALLHOUSE_{t-1}$*$\Delta TAXAUT50_{t-1}$ | | | | | -0.02 | (0.00) | 5.11** | (2.15) |
| $\Delta ALLHOUSE_{t-1}$*$\Delta TAXAUT33_{t-1}$ | -0.57 | (-0.54) | -0.46 | (-0.54) | | | | |
| $\Delta ALLHOUSE_{t-1}$*$\Delta TAXAUT50_{t-1}$ | | | | | | | -20.22** | (-2.15) |
| $\Delta DEN_{t-1}$ | 0.16 | (0.46) | 0.15 | (0.41) | 0.14 | (0.36) | -0.18 | (-0.46) |
| $\Delta POP_{t-1}$ | 0.78 | (0.85) | 0.78 | (0.84) | 0.71 | (0.77) | 0.69 | (0.70) |
| $\Delta DEPRATIO_{t-1}$ | -0.03 | (-0.09) | -0.002 | (0.00) | -0.05 | (-0.14) | -0.10 | (-0.25) |
| $\Delta URBAN\ POP_{t-1}$ | 2.66*** | (2.71) | 2.80*** | (2.87) | 2.64*** | (2.70) | 2.41** | (2.34) |
| $\Delta GRANTS_{t-1}$ | -0.01 | (-0.97) | -0.01 | (-1.04) | -0.01 | (-0.87) | -0.01 | (-0.90) |
| $\Delta GDP\ PC_{t-1}$ | -0.14 | (-1.04) | -0.19 | (-1.53) | -0.12 | (-0.93) | -0.19 | (-1.48) |
| $\Delta TRADE_{t-1}$ | -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] | |
| $(\delta_1 + \phi_1)$ test | 0.011 | | 0.009 | | 0.648 | | 0.366 | |

Note: i) z-values 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) |
| $\Delta EXP_{t-1}$ | 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) |
| $\Delta DEN_{t-1}$ | 0.43 | (1.05) | 0.64 | (1.50) | 0.29 | (0.78) | 0.26 | (0.72) |
| $\Delta POP_{t-1}$ | 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) |
| $\Delta$URBAN $POP_{t-1}$ | 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) |
| $\Delta$GDP $PC_{t-1}$ | -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] | |
| $(\delta_1 + \phi_1)$ test | 0.620 | | 0.967 | | 0.248 | | 0.087 | |

Note: i) z-values 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) |
| $\Delta EXP_{t-1}$ | 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) |
| $\Delta DEN_{t-1}$ | 0.42 | (1.14) | 0.35 | (0.99) | 0.318 | (0.78) | 0.51 | (1.11) |
| $\Delta POP_{t-1}$ | 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] | |
| $(\delta_1+\phi_1)$ test | 0.329 | | 0.440 | | 0.163 | | 0.520 | |

Note: i) z-values 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) |
| $\Delta EXP_{t-1}$ | 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) |
| $\Delta DEN_{t-1}$ | 0.50 | (1.32) | 0.27 | (0.79) | 0.19 | (0.48) | 0.66* | (1.75) |
| $\Delta POP_{t-1}$ | -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] | |
| $(\delta_1+\phi_1)$ test | 0.227 | | 0.063 | | 0.102 | | 0.083 | |

Note: i) z-values 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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