# ASSESSING DEGREES OF FISCAL RULES

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# Assessing Degrees of Fiscal Rules*

PRELIMINARY VERSION. PLEASE DO NOT CIRCULATE

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**Abstract**

When dealing with fiscal rules at subnational level, the literature agree over their necessity in order to cope with common pool and soft budget constraint problems. Different perfomances among different countries are often linked to different degrees of stringency of the fiscal rules. However this is hard to be stated for good given the endogeneity problems conneted to the effectiveness of the rules. Additionally the more stringent the fiscal rules the higher the probability to deal with window dressing and ugly outcomes if sub-national governments do not receive adeguate funding to finance the service they provide or if they are not adequately monitored. Using the unique case study of Italy where within the same country several rules has been enforced with several stringency degrees, we adress the impact of fiscal rules on several fiscal outcomes at the municipal level.

**Keywords**: Fiscal Rules Stringency, Municipalities, Difference in Difference, Italy

**JEL classification**: H72, H75, H77

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# 1 Introduction

Various institutions have been recognized to affect the economic and fiscal performances of different countries, ranging from the electoral rules to the system of government, the political party system to the budgetary procedures[1] . Among the latter, fiscal rules are increasingly considered a key policy instrument in achieving fiscal discipline at sub-national and/or local level and guaranteeing fiscal sustainability.While the debate on the merit of fiscal rules continues and their effectiveness is often assumed, differences in countries fiscal performances might be linked to different degrees of rules stringency [see on this point Broyles et al., 2009].

The origin of the fiscal rules, their different nature and their effectiveness have been widely discussed in the theoretical and empirical literature. The evaluation of their impact on budgetary outcomes at sub-national level in decentralized systems has been the focus of several papers, such as Bartolini and Santolini [2009], Broyle et al. [2009], Sutherland et al. [2006], Lübke [2005], Joumard and Giorno [2005], Miaja [2005], Alesina et al [1999], Poterba (1994), Alt and Lowry (1994), Bohn and Inman (1995), Bunch [1991], von Hagen [1991]. The major methodological problems of these works consists either in an unsatisfactory treatment of the potential endogeneity problem related to the fiscal rules or in the difficulty of evaluating their impact in heterogeneous contexts. As matter of fact the link between rules characteristics and voters' preferences, for instance in terms of fiscal prudence, has been addressed as a problem of omitted variable bias [e.g. Tommasi and Braun, 2004]. In other words, a certain set of rules could be more effective due to the fact that the constituency which will be affected by it is more parsimonious as far as public spending is concerned, or because it exerts more control on its politicians, but not because the rule is per se more effective compare to anything similar enforced in another constituency. The endogeneity problem is often the reason why many times the compliance of the rule is taken as a measure of its effectiveness.

This paper is an attempt to address this identification problem related to the effectiveness of fiscal rules by providing an analysis of the different types of fiscal rules that are generally drawn up as well as of the local rules adopted in Italy from 1999 to 2006 in the Special Statute Regions (SSR). The reason of this choice resides in the circumstance that the autonomous provinces of Trento and Bolzano and the municipalities of the SSR have a legislative competence in local finance based on which they may differentiate autonomously their discipline of the DSP with respect to the national one[2] Following the law n.289/2002 (art.29, co.18) the provinces of Trento and Bolzano and the municipalities of Friuli Venezia Giulia and Valle d'Aosta have made use of this faculty. The municipalities of Sardegna and Sicilia instead adopted the national legislation

[1] See, among others, Ferejohn and Krehibel (1987), von Hagen (1992), Hallerberg and von Hagen (1997), Lagona and Padovano (2007).

[2] It is not obvious why the central government granted such an extra autonomy to these territories which in terms of fiscal autonomy show a high degree of dependency from the central transfers and consequently high fiscal imbalances.

of the DSP[3]. Such a differentiation of fiscal discipline in terms of degree of stringency within a homogeneous, national institutional context characterized by similar economic and fiscal shocks creates a quasi-experimental environment where it is possible to evaluate their impact on budgetary outcomes by avoiding the endogeneity problem as well as the difficulty in evaluating such an impact in heterogeneous contexts characterized by . Preliminary results show that in terms of expenditures reduction the local rules are not more effective than the national rules.

The paper is organized as follows: in Section 2 we briefly review the literature on fiscal rules at sub-national level. Section 3 illustrates the institutional context where the DSP is applied. Section 4 presents the methodology we follow to assess the impact of the fiscal rules of the DSPon the budgetary aggregates for a selected sample of municipalities of the SSR, the municipalities of the autonomous provinces of Trento and Bolzano. Preliminary empirical results are discussed in Section 5.

# 2 Fiscal Rules Stringency and Outcomes Assessments

The rationales for the introduction of fiscal rules at local level reside in some aspects that generally characterize decentralized states. First, the existence of vertical fiscal imbalances at sub-national levels, that is the fiscal gap between the expenditures assigned to the local governments and their revenue competences, may encourage an excess of local expenditure financed by the common pool of central or regional transfers rather than by local tax autonomy [Weingast et al., 1981]. Then the need for sub-national fiscal rules is considered higher the greater the vertical imbalance of local governments, that is, the greater their dependence on central government transfers [Eichengreen and von Hagen, 1996].

Secondly, a problem of moral hazard derives from the insurance effect provided by the expectation that the higher-levels of government would intervene to face local deficits with special transfers or by taking over their liabilities. This because sub-national governments are 'too big to fail' [Wildasin, 1997] and intervention measures are preferable in terms of maximization of the social welfare of the federal state [Persson and Tabellini, 1996]. Also, the political cost of the non-intervention policy would be higher for the central government than the cost of the intervention especially when the local services provided by the local authorities are fundamental (economic externalities) and/or when the local consent is also relevant for national decisions (political expernalities). In short a problem of soft budget constraint for the local governments emerges [Dafflon, 2002; Rodden, 2002; Breullié et al., 2007]. More specifically for the EMU case, there is also a problem of asymmetry of powers since the central government is responsible for the respect of the European fiscal discipline while the behavior

[3] As matter of fact the autonomous provinces of Trento and Bolzano started to slightly differentiate already in 2000 even though overall they followed the statediscipline.

of the local governments affect the national deficits as well.

These underlying issues can be addressed through the design and adoption of stringent sub-national fiscal rules. There are many fiscal rules applicable at sub-national level, defined as formalized numerical restrictions on relevant aggregate fiscal parameters and able to foster fiscal discipline by reducing the degree of discretion in the decision making process, promoting an interest in sustainability issues, and reducing the scope for time-inconsistent decisions. In particular Kopits and Symansky [1998] identify several key features of fiscal rules such as 1) the objective the rules have (target or ceiling); 2) their effective period; 3) whether they are included in the constitution rather than any other law; 4) which government level is affected; and 5) whether any penalty for noncompliance is established. Sub-national fiscal rules can be listed as follows: rules on budget balances, expenditure caps (both characterizing the Italian case), ceilings on the own revenue of sub-national entities, limits on the stock of debt or on the issuance of new debt, restrictions on the type of expenditure that can be financed with debt, and limits on the debt linked to the cost of debt service or indicators of the ability to service the debt [see, among others, Gastaldi and Giuriato, 2009]. All these measures are usually introduced in different combinations, in order to reach more effectively the scope of limiting the common pool and moral hazard issues faced by the local authorities.

The introduction of fiscal rules is controversial though. Opponents argue that fiscal rules limit the degree of autonomy of sub-national governments and reduce the expenditures for essential public services that local governments generally provide. Besides that, Milesi-Ferretti [2003] argues that a fiscal rule may produce three possible outcomes: "good outcomes" if it favors governments' virtuous behavior; "bad outcomes" as it may hinder the use of countercyclical fiscal policy and limit the functioning of the automatic stabilizers; or "ugly outcome" as it may lead to the use of 'creative accounting' and windows dressing rather than to fiscal adjustment, thereby reducing the degree of transparency in the government budget and the desirability and effectiveness of fiscal rules. An improvement in the government budget is considered to be an "ugly outcomes", that is creative accounting if it does not imply an improvement in the intertemporal budgetary position of the government sector at large. If, for example, the costs of creative accounting are large even for small amounts of window dressing, less restrictive rules may be met while tighter rules may induce creative accounting and not only fiscal adjustment.

# 3 Fiscal Rules at Subnational Level: The Italian Case Study

To guarantee that all levels of government do not engage in opportunistic conduct, several EMU countries have laid down various rules of financial coordination and fiscal discipline imposed by the Stability and Growth Pact (Ambrosano and Bordignon [2007]). These constraints force the countries to control their

budget balances and the stock of debt with reference to general government, i.e. to the consolidated accounts of central government, local government and social security institutions. Control of the public finances thus requires the cooperation of all the levels of government, even though only the central government is committed to the respect of the European fiscal targets. Italy introduced a Domestic Stability Pact (DSP) for the very first time in 1999 through the national balance law. Since then every year the national government sets both the requirements and the targets of the DSP. Previous works have addressed the ability of Regions and local governments (regions, municipalities, and provinces) to meet the DSP requirements (among the others, Patrizii, Rapallini and Zito, 2005; Giuriato and Gastaldi, 2009). Brugnano and Rapallini [2009] evaluate the effects of the DSP on local public borrowing requirements from 1999 to 2005. Bartolini and Santolini [2009] conduct a panel data analysis on the current expenditures of 246 Italian municipalities to capture the impact of the DSP on both the opportunistic behavior of incumbent politicians and the yardstick competition and show that the introduction of the DSP significantly reduces the level of public spending but strenghtens the opportunistic behavior of incumbent politicians in pre-electorals years.

Starting from 2002 (effective 2003) SSR are allowed to differentiate their own DSP. Even if the rationale of this measure is not very clear in terms of policy opportunity, given the high level of grants and transfers that these regions obtain from the central government (see Appendix), the possibility to adopt local rules has set the scenario for different stringency levels of the DSP within the same country. As a matter of fact the provinces of Trento has already follow this way since 2000, and Bolzano (the second province of Trentino) followed up starting from 2001-2002. Sardegna and Sicilia standed with the national DSP, anche because of this we will not consider them for the moment being.

Trento's and Bolzano's municipalities are very similar in geographical, political (i.e. "nationalistic" parties), and socio-economic terms. However starting from 2000, as we mention above, the DSP that their municipalities were required to meet started to be differentiated: in 2000 municipalities belonging to Trento were subjected to the DSP set autonomously by Trento administration, while municipalities in the province of Bolzano continued to follow the national law.We use the evidence from Trento and Bolzano to provide a first assessment of the impact of fiscal rules of different stringency within a same institutional context[4]. The basic idea is that given the different stringency of the Trento's rules- effective monitoring, punishments as diminished transfers, no items excluded- compared to the national rules, if we assumed that the fiscal rules are effectivethen the different performances of the two sets of municipalities could be linked to the different rules stringency. The chance is unique given that we are dealing with municipalities belonging to the same region of the same country.

In Italy, municipalities (or groups of municipalities) traditionally handle the

[4]WE ARE STILL RECOVERING INFORMATION ON FRIULI VENEZIA GIULIA (FVG) AND VALLE D'AOSTA (VDA).

direct provision of local services. They are responsible, for instance, for the provision of crèches, care of the elderly, welfare programs at the local level, as well as street maintenance, public transportation and security, among the others. While the latter are listed as "essential services", some of the former are listed as services "upon individual demand". Usually, services "upon individual demand" are partially financed by corresponding revenues and proceeds and partially financed by other revenues, such as fiscal instruments and transfers. In front of such an increase in the provision of public services by sub-national governments the introduction of the fiscal rules play an important role for the achievement of stabilization, allocative efficiency and lon-term fiscal sustainability. The impact fiscal rules may have in different areas of fiscal policy, the factors that make their implementation effective and the interaction between various types of rules is the focus of our empirical analysis.

# 4 Methodology

Given that a set of municipalities were subject to more stringet fiscal rules from a certain year while another set stays under milder rules, we use difference in difference to calculate the causal impact of such a policy change in terms of both spending and taxing decisions. For instance of we regard $\mathrm{Y}_{mt}$ the current expenditures for municipality $m$ at time $t$, then the original DD scenario states that in the absence of a fiscal rule change, the level of current expenditure is determined by the sum of a time-invariant municipality effect and a year effect that is common across municipalities (Angrist and Pischke [2009]). If $D_{mt}$ is a dummy for municipalities treated and time periods, then we have

$$Y_{mt} = \gamma_m + \lambda_t + \delta D_{mt} + \varepsilon_{mt} \tag{1}$$

where $\mathrm{E}(\varepsilon_{mt}|m,t) = 0$. 1. The population difference-in-differences is

$$\begin{aligned} &\{E\left[Y_{mt}|m \in Trento, t = 2000\right] - E\left[Y_{mt}|m \in Trento, t = 1999\right]\} - \\ &\{E\left[Y_{mt}|m \in Bolzano, t = 2000\right] - E\left[Y_{mt}|m \in Bolzano, t = 1999\right]\} = \delta \end{aligned} \tag{2a}$$

where $\delta$ is the causal effect of interest (Angrist and Pischke [2009]). In other word, the population average difference over time in the control group (municipalities in Bolzano province) is subtracted from the population average difference over time in the treatment group to remove a common trend unrelated to the intervention (Imbens and Woolridge[2009]).

We are applying this approach using only two years, before and after the reform, aware of the limitations that this could have dealing with municipal data. As a matter of fact in this short window we could not be able to appropriately detect ugly outcomes as addressed by Milesi-Ferretti [2003].

# 5 Descriptive Statistics and Results

SSR have a small number of municipalities: from the 74 of Valle df'Aosta (VDA) to the 223 of Trento. Generally the majority of these municipalities have small dimensions (see table xxx). In table xxx2 the sample as far as Bolzano and Trento municipalities are concerned: the number of included municipalities increases with the time. Between 1999 and 2000, between the 75 and the 81% of the entire municipal population of Bolzano is covered and around the 77% of Trento's municipalities are in the sample.

Table xxx3 shows the descriptive statistics for both the treated (Trento municipalities) and the control group (Bolzano municipalities). The values are in per capita terms and deflated to 2000. While municipalities of OSR on average between 1999 and 2004 were spending around 600 euros per capita (Balduzzi and Grembi, 2010), the values of for these municipalities are around 1000 euros. High are also the values of capital expenditures, and both the items are quite distinguishable compared to the revenues from taxes and fares.

Preliminary results show that, controlling for several characteristics of the municipal level and finance- the proportion of old people as well the proportion of young, and the transfers and grants quota- we have that the DD coefficient (treated) is significant only for the taxes revenues and the fares revenues cases. It seems that the new fiscal rules had a positive effect of the tax revenues and a negative of the fares revenues, addressing a sort of opportunistic bevahious of the local administrations. The significance of the tax revenues coefficient disappear when the vertical imbalance level is included in the regressions: only the fares revenues coefficient stands significant and with a negative sign. So it would appear that at least in the immediate aftermath of the reform, the main impact of it at the local decision level was a decrease in the fees and charges revenues.

# 6 Conclusive Remarks

Fiscal rules are increasingly considered a key policy instrument in achieving fiscal discipline at sub-national and/or local level and guaranteeing fiscal sustainability. Our work is a contribution in assessing the impact of different combinations of fiscal rules on the targeted fiscal items and aggregates. Very preliminary results on the Italian case study shows that when a more stringent rule is enforced there seems not to be any effect in terms of expenditures decisions while taxing and charging decisions are affected.

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## 7 Tables and Figures

| RSS | Year | Comprehensiveness | | | Inflation RateAdjustment | Monitoring | Time horizon | Rewards a |
|---|---|---|---|---|---|---|---|---|
| | | *Municipalities* | *Indicators* | *Excluded items* | | | | |
| Bolzano | 2002 | >5000 | expenditure cap | yes | no | yes | 3-year | |
| Trento | | all | deficit | no | yes | yes | 3-year | |
| FVG | | >5000 | expenditure cap | yes | yes | yes | 3-year | |
| VDA | | all | deficit | yes | yes | yes | | |
| Bolzano | 2003 | >1200 | expenditure cap | yes | no | yes | 3-year | |
| Trento | | all | deficit | yes | yes | yes | 3-year | |
| FVG | | >5000 | expenditure cap | yes | yes | yes | 3-year | |
| VDA | | all | deficit | yes | yes | yes | | |
| Bolzano | 2004 | >1200 | expenditure cap | yes | no | yes | 3-year | |
| Trento | | all | deficit | yes | yes | yes | 3-year | |
| FVG | | >5000 | expenditure cap | yes | yes | yes | 3-year | |
| VDA | | all | deficit | yes | yes | yes | | |
| Bolzano | 2005 | all | | yes | no | yes | 3-year | |
| Trento | | all | deficit | yes | yes | yes | 3-year | |
| FVG | | >5000 | expenditure cap | yes | yes | yes | 3-year | |
| VDA | | all | deficit | yes | yes | yes | | |
| Bolzano | 2006 | all | deficit | yes | no | yes | 3-year | |
| Trento | | all | deficit | yes | yes | yes | 3-year | |
| FVG | | >5000 | deficit | yes | yes | yes | 3-year | |
| VDA | | all | deficit | yes | yes | yes | | |

| Bolzano | Local Authorities | Rule | Trento | Local Authorities | Rule |
|---|---|---|---|---|---|
| 1999 | All | national | 1999 | All | national |
| 2000 | All | national | 2000 | All | local |
| 2001 | >5000 | local | 2001 | All | local |
| 2002 | >5000 | local | 2002 | All | local |
| 2003 | >1200 | local | 2003 | All | local |
| 2004 | >1200 | local | 2004 | All | local |
| 2005 | All | local | 2005 | All | local |

| **SSR** | **Municipalities** | | Total |
|---|---|---|---|
| | pop>=5000 | pop<5000 | |
| FVG | 57 | 162 | 219 |
| Bolzano | 16 | 101 | 117 |
| Trento | 12 | 211 | 223 |
| VDA | 1 | 73 | 74 |
| Total | 337 | 1,059 | 1396 |

| **Provinces** | **1999** | **2000** | **2001** | **2002** | **2003** | **2004** | **2005** | **2006** | **Total** |
|---|---|---|---|---|---|---|---|---|---|
| Bolzano | 88 | 95 | 96 | 94 | 98 | 92 | 104 | 103 | 770 |
| Trento | 172 | 169 | 197 | 203 | 213 | 221 | 221 | 221 | 2,019 |
| Total | 260 | 264 | 293 | 297 | 311 | 313 | 325 | 324 | 2,789 |

| ***Variables*** | ***Control Group*** | | ***Treated Group*** | |
|---|---|---|---|---|
| | ***(mean/s.d.)*** | | ***(mean/s.d.)*** | |
| | ***before*** | ***after*** | ***before*** | ***after*** |
| Taxes revenues | 305.31 | 197.81 | 284.82 | 266.78 |
| | 191.1 | 141.05 | 208.9 | 169.95 |
| Fares revenues | 209.07 | 315.36 | 393.00 | 406.29 |
| | 196.17 | 240.23 | 393.88 | 468.22 |
| Transfers and grants | 576.77 | 549.68 | 656.93 | 638.67 |
| | 140.00 | 130.00 | 254.09 | 242.93 |
| Current expenditures | 991.62 | 949.04 | 1075.23 | 1035.78 |
| | 354.61 | 312.52 | 481.34 | 478.32 |
| Capital expenditures | 1634.93 | 1232.87 | 1832.80 | 1515.07 |
| | 914.05 | 791.90 | 2480.84 | 1624.58 |
| Vertical Imbalance | 0.31 | 0.21 | 0.27 | 0.26 |
| | 0.13 | 0.10 | 0.13 | 0.12 |
| Proportion of <=14 | 0.19 | 0.19 | 0.15 | 0.15 |
| | 0.02 | 0.02 | 0.02 | 0.02 |
| Proportion of >=65 | 0.14 | 0.14 | 0.18 | 0.18 |
| | 0.03 | 0.03 | 0.04 | 0.04 |

| **COEFFICIENT** | **Current Expenditures** | **Capital Expenditures** | **Total Expenditures** | **Taxes Revenues** | **Fares Revenues** |
|---|---|---|---|---|---|
| *group did* | 0.06 | -0.17 | -0.03 | -0.11 | 0.56*** |
| | (1.32) | (-1.67) | (-0.47) | (-1.55) | (5.69) |
| *treatment* | -0.04 | -0.37** | -0.18* | -0.48*** | 0.51*** |
| | (-0.71) | (-3.24) | (-2.47) | (-5.96) | (4.51) |
| *treated* | -0.00 | 0.25 | 0.11 | 0.43*** | -0.53*** |
| | (-0.04) | (1.75) | (1.19) | (4.39) | (-3.82) |
| *Constant* | 6.85*** | 7.27*** | 7.91*** | 5.59*** | 5.08*** |
| | (185.42) | (88.88) | (150.82) | (97.62) | (63.30) |
| *Observations* | 523 | 522 | 523 | 519 | 522 |
| *R-squared* | 0.01 | 0.02 | 0.02 | 0.07 | 0.07 |
| *F test* | 1.69 | 4.31 | 2.76 | 13.82 | 12.62 |
| *Adj Rsq* | 0.00 | 0.02 | 0.01 | 0.07 | 0.06 |

t statistics in parentheses *** p<0.001, ** p<0.01, * p<0.05

| **COEFFICIENT** | **Current Expenditures** | **Capital Expenditures** | **Total Expenditures** | **Taxes Revenues** | **Fares Revenues** |
|---|---|---|---|---|---|
| *group did* | -0.03 | -0.23* | -0.12 | -0.08 | 0.43*** |
| | (-0.66) | (-2.11) | (-1.80) | (-0.99) | (3.86) |
| *treatment* | -0.00 | -0.33** | -0.14* | -0.45*** | 0.53*** |
| | (-0.11) | (-3.04) | (-2.18) | (-5.84) | (4.87) |
| *treated* | -0.01 | 0.22 | 0.09 | 0.42*** | -0.54*** |
| | (-0.23) | (1.68) | (1.14) | (4.42) | (-3.97) |
| *young* | -0.41*** | 0.37 | 0.00 | -0.82*** | -0.68** |
| | (-4.03) | (1.46) | (0.03) | (-4.53) | (-2.68) |
| *old* | -0.23** | 0.26 | 0.05 | -0.81*** | -0.24 |
| | (-2.86) | (1.30) | (0.45) | (-5.71) | (-1.22) |
| *grants quota* | 0.65*** | 0.82*** | 0.81*** | 0.14 | 0.54*** |
| | (13.55) | (6.78) | (11.16) | (1.57) | (4.44) |
| *Constant* | 1.57*** | 3.22** | 2.92*** | 1.73* | 0.03 |
| | (3.51) | (2.89) | (4.36) | (2.16) | (0.03) |
| *Observations* | 519 | 518 | 519 | 518 | 520 |
| *Adj Rsq* | 0.30 | 0.11 | 0.23 | 0.13 | 0.11 |
| *F test* | 38.26 | 12.14 | 26.49 | 13.46 | 11.98 |
| *R-squared* | 0.31 | 0.12 | 0.24 | 0.14 | 0.12 |

t statistics in parentheses *** p<0.001, ** p<0.01, * p<0.05

| VARIABLES | **Current Expenditures** | **Capital Expenditures** | **Total Expenditures** | **Taxes Revenues** | **Fares Revenues** |
|---|---|---|---|---|---|
| *group did* | -0.03 | -0.22* | -0.11 | -0.03 | 0.41*** |
| | (-0.66) | (-2.00) | (-1.71) | (-0.66) | (3.83) |
| *treatment* | -0.00 | -0.23* | -0.09 | -0.00 | 0.37** |
| | (-0.05) | (-2.03) | (-1.30) | (-0.05) | (3.29) |
| *treated* | -0.01 | 0.12 | 0.04 | -0.01 | -0.38** |
| | (-0.20) | (0.90) | (0.47) | (-0.20) | (-2.81) |
| *young* | -0.40*** | 0.46 | 0.06 | -0.40*** | -0.86*** |
| | (-3.92) | (1.81) | (0.37) | (-3.92) | (-3.42) |
| *old* | -0.22** | 0.38 | 0.12 | -0.22** | -0.48* |
| | (-2.68) | (1.89) | (1.01) | (-2.68) | (-2.41) |
| *grants quota* | 0.66*** | 0.93*** | 0.87*** | 0.66*** | 0.33** |
| | (12.94) | (7.41) | (11.48) | (12.94) | (2.63) |
| *vertical imbalance* | 0.01 | 0.22** | 0.12** | 1.01*** | -0.37*** |
| | (0.21) | (2.97) | (2.66) | (33.58) | (-5.01) |
| *Constant* | 1.58*** | 3.17** | 2.90*** | 1.58*** | 0.15 |
| | (3.54) | (2.85) | (4.34) | (3.54) | (0.13) |
| *Observations* | 517 | 516 | 517 | 517 | 517 |
| *R-squared* | 0.31 | 0.14 | 0.25 | 0.73 | 0.16 |
| *F test* | 32.77 | 11.81 | 23.91 | 198.34 | 14.16 |
| *Adj Rsq* | 0.301 | 0.128 | 0.237 | 0.728 | 0.151 |

t statistics in parentheses *** p<0.001, ** p<0.01, * p<0.05

# 8 Appendix

**Tax Autonomy**

| Regions | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | Total |
|---|---|---|---|---|---|---|---|---|---|
| FVG | 0.31 | 0.30 | 0.30 | 0.30 | 0.29 | 0.28 | 0.28 | 0.28 | 0.29 |
| Sardegna | 0.16 | 0.17 | 0.17 | 0.17 | 0.17 | 0.18 | 0.18 | 0.19 | 0.17 |
| Sicilia | 0.21 | 0.23 | 0.21 | 0.22 | 0.22 | 0.22 | 0.22 | 0.21 | 0.22 |
| Trentino | 0.23 | 0.20 | 0.20 | 0.20 | 0.19 | 0.19 | 0.19 | 0.18 | 0.20 |
| Valle d'Aosta | 0.20 | 0.17 | 0.19 | 0.17 | 0.18 | 0.18 | 0.18 | 0.19 | 0.18 |
| SSR | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.21 | 0.22 |
| Municipalities | 1006 | 1065 | 1138 | 1144 | 1125 | 1173 | 1168 | 1160 | 8979 |

**Fares Autonomy**

| Regions | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Friuli VG | 0.18 | 0.19 | 0.19 | 0.18 | 0.20 | 0.18 | 0.18 | 0.19 | 0.19 |
| Sardegna | 0.10 | 0.10 | 0.10 | 0.09 | 0.11 | 0.11 | 0.12 | 0.11 | 0.10 |
| Sicilia | 0.10 | 0.11 | 0.12 | 0.12 | 0.11 | 0.13 | 0.12 | 0.12 | 0.12 |
| Trentino | 0.23 | 0.27 | 0.26 | 0.27 | 0.27 | 0.26 | 0.28 | 0.30 | 0.27 |
| VDA | 0.13 | 0.12 | 0.14 | 0.12 | 0.13 | 0.13 | 0.13 | 0.14 | 0.13 |
| SSR | 0.14 | 0.14 | 0.15 | 0.15 | 0.15 | 0.16 | 0.16 | 0.17 | 0.15 |
| Municipalities | 1006 | 1065 | 1138 | 1144 | 1125 | 1173 | 1168 | 1160 | 8979 |

**Grants Quota**

| Regions | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | Total |
|---|---|---|---|---|---|---|---|---|---|
| FVG | 0.51 | 0.52 | 0.51 | 0.52 | 0.51 | 0.53 | 0.54 | 0.54 | 0.52 |
| Sardegna | 0.74 | 0.73 | 0.73 | 0.74 | 0.73 | 0.71 | 0.70 | 0.70 | 0.72 |
| Sicilia | 0.69 | 0.67 | 0.67 | 0.66 | 0.66 | 0.65 | 0.66 | 0.67 | 0.67 |
| Trentino | 0.53 | 0.53 | 0.54 | 0.53 | 0.55 | 0.54 | 0.53 | 0.52 | 0.53 |
| VDA | 0.66 | 0.71 | 0.67 | 0.71 | 0.68 | 0.69 | 0.69 | 0.67 | 0.69 |
| SSR | 0.64 | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 | 0.62 | 0.62 | 0.63 |
| Municipalities | 1006 | 1065 | 1138 | 1144 | 1125 | 1173 | 1168 | 1160 | 8979 |

**Vertical Imbalance**

| Regions | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | Total |
|---|---|---|---|---|---|---|---|---|---|
| FVG | 0.34 | 0.34 | 0.33 | 0.33 | 0.32 | 0.31 | 0.32 | 0.31 | 0.33 |
| Sardegna | 0.17 | 0.19 | 0.18 | 0.18 | 0.18 | 0.19 | 0.19 | 0.19 | 0.18 |
| Sicilia | 0.22 | 0.24 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 |
| Trentino | 0.28 | 0.24 | 0.25 | 0.25 | 0.23 | 0.24 | 0.23 | 0.22 | 0.24 |
| VDA | 0.24 | 0.20 | 0.22 | 0.22 | 0.22 | 0.22 | 0.21 | 0.23 | 0.22 |
| SSR | 0.24 | 0.25 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| Municipalities | 1006 | 1065 | 1138 | 1144 | 1125 | 1173 | 1168 | 1160 | 8979 |