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## Who do you blame in local finance? An analysis of municipal financing in Italy

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# Who do you Blame in Local Finance? An Analysis of Municipal Financing in Italy

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# Who do you Blame in Local Finance? An Analysis of Municipal Financing in Italy

## Abstract

A 1999 reform allowed Italian Mayors to partially substitute a more accountable source of tax revenue (the property tax) with a less transparent one (a surcharge on the personal income tax). Theoretical analysis suggests this should give incompetent Mayors a less costly way to hide themselves, so allowing them to be more easily re-elected. An empirical analysis on Piedmont municipalities confirms these hypotheses.

JEL-Code: H71, H77, D78.

Keywords: partial decentralization, fiscal federalism, transparency, political behavior.

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# 1 Introduction

Traditional claims in favor of decentralization are in terms of better representation of local preferences and better accountability of local politicians. The recent economic literature offers support for both these claims (e.g. Lockwood, 2006). But skeptical views remain. An interesting and well founded objection is that decentralization is not akin to separation; in a unitary State, decentralization is usually only "partial" as financing remains largely in the hands of the central government (Brueckner, 2009; Ambrosanio and Bordignon, 2006; Boadway, 2006). According to critics, this implies that decentralization may weaken, rather than reinforce, political accountability (Devarajan et al., 2007). Intuitively, if citizens are uncertain about whom to blame for the taxes they have to pay, they would also be less able to punish or reward governments for their behavior. In turn, this may lead to more slack in the provision of public services. Accordingly, it is self financing, more than decentralization per sé, a key ingredient of a successful decentralization process.

Given its policy relevance, it would be clearly important to assess the validity of this claim. Doing this in general terms may be difficult, but one can at least try to learn something from specific real world examples. This is what we attempt to do in this paper, by focussing on an important local finance reform in the Italian context. In 1999, following a decade of decentralization, it was decided to offer Italian municipalities a more robust source of tax revenue, by allowing them to levy a surcharge on their residents' personal income tax (PIT) base, the most important national tax. This surcharge was to accompany the traditional source of tax revenue for local governments, a property tax (ICI) raised on the municipality housing (estimated) wealth. But there was an important difference. While the choices concerning the property tax –including tax rates and a tax allowance for resident owners– could clearly and unambiguously attributed to the municipal government, this was not the case with the PIT surcharge. Central government maintained its full powers on PIT, including the definition of tax base and tax brackets – all features that indeed are usually (marginally) changed on a yearly basis by the central government. Municipal governments could only raise a flat surcharge on their PIT base, by 0.2% per year up to a total of 0.5%. In contrast, the average central government tax rate on the PIT base was about 18% in our sample in the same period. As a result, citizens might have had some difficulty in discerning in the total PIT they had to pay, the part which was due to municipal decisions –and maybe even few incentives to learn about it, given its small share on the total<sup>1</sup>. On the contrary, the property tax rate is independently paid by each house owner directly to the municipality where the estate is located, a task which requires each taxpayer to get informed about the property tax rate and the tax allowance, again usually set up and changed on a yearly basis by municipal governments.

Summing up, it is then realistic to assume that the municipal surcharge on the PIT base was for most citizens less "transparent" than the municipal property tax, in the sense of allowing for a less precise attribution of responsibility

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<sup>1</sup>It is true that the municipal surcharge rate is indicated in the PIT tax form of each tax payer. But, as a matter of fact, most Italians never actually come to see their tax form. For dependent workers, the PIT, including the municipal surcharge tax, is directly withheld by the company they work for on a monthly base; and most self-employers also use tax professionals to fill properly the their tax forms.

to the different levels of government (e.g. Bordignon and Minelli, 2001). Going back to the previously mentioned literature, this would suggest that the political incentives for using the two different taxes may also have been different. In the next section, with the aim of uncovering these different incentives, we study these effects in a simple political agency model *a' la* Besley (2007). In our model, municipal Mayors may be of two types, competent or incompetent. Incompetent Mayors can replicate the fiscal choices of competent Mayors, but at a higher cost in terms of effort. The economy lasts two periods, an assumption which captures an important feature of Italian municipal governments as Mayors are subjected to a term limit (they can only run twice). Lacking electoral incentives, incompetent Mayors would then raise more taxes and exert less effort than competent ones. But in their first term in power, incompetent Mayors may nevertheless prefer to imitate efficient ones, in the hope that this will result in a re-election, as citizens cannot directly observe the type of Mayor, but can only try to infer it by observing his tax choices. Using this simple model, we then study political equilibria in the two cases, when Mayors can only use the property tax, as in the pre-1999 reform period, and when they can use both the property tax and the tax surcharge on PIT. Importantly, in the latter case, we assume that citizens are unable to discern precisely which part is played by each level of government in setting up the total PIT tax rate. We show that pooling equilibria are more likely after the reform than before it; in equilibrium, in the first term in office, incompetent Mayors make a larger use of the surcharge rate on PIT, which can only be imperfectly observed by citizens, as this offers them a less costly way to imitate the competent governments. A number of empirically testable implications derive from these theoretical observations. Specifically, we show that: 1) first term Mayors should use the PIT surcharge more than second term Mayors; 2) political turnover should be lower following the reform, and in particular for Mayors using more the PIT surcharge. Furthermore, 3) the reform might also affect the decision to run again by Mayors, as it should be easier to get re-elected after the reform. We then take these predictions to data, building a comprehensive data set on Piedmont, a region in the North of Italy with a very large number of municipalities (around 1,200), and collecting municipal fiscal and political data both before and after the reform. Our empirical results turn out to be broadly consistent with our predictions. In particular, we find strong support for prediction 1 above, and some support for predictions 2 and 3. Vindicating the above literature, our results then support the idea that transparency in financial tools is indeed a crucial factor for political accountability. This has important implications for the optimal design of local financing, a point to which we will come back again in the conclusions.

We are of course not the first to raise the issue of accountability in government financing. Versions of the same idea have already appeared in the theoretical literature (see Besley, 2007 for a review) and applied to such different items as the observability of government reporting procedures (Milesi-Ferretti 2000), government's choice between taxes or debt (Alt and Dreyer Lassen 2003), the hidden financing of interest groups (Coate and Morris 1995), the trade off between accountability and efficiency (Bordignon and Minelli, 2001), the political economic budget cycle (Rogoff and Siebert 1988), local public good provision under shared accountability (Joanis, 2010) and so on. But, to the best of our knowledge, we are the first to attempt to provide a direct test of the idea, by comparing the fiscal and political choices of local governments both before and

after a reform that directly affected the transparency of their financing tools.

The rest of the paper is organized as follows. Section 2 sets up the model and derives our theoretical results. Section 3 derives and summarizes the main empirical predictions of the model. Section 4 describes the data set and explains in more detail the Italian local institutions. Section 5 describes our empirical strategy and derives and comments our results. Section 6 concludes. The Appendix collects the proofs of the propositions and presents some extra data and results.

## 2 The Model

### 2.1 Consumers

We consider an economy with a large number of identical citizens. The representative consumer in this economy has utility function:

$$u = U(h) + c + V(1 - l) \tag{1}$$

where  $h$  is housing services,  $c$  is private consumption,  $l$  is labor supply.  $U(\cdot)$  and  $V(\cdot)$  are both increasingly and strictly concave functions, differentiable to any required order. Buying a house is costly, but we assume consumers expect from investing in housing, in addition to current housing services, some future returns (e.g. capital gains due to an increase in housing pricing). Let  $r < 1$  indicate the present net value of these returns for each unity of housing bought. We assume that the (local) property tax has mainly the effect of reducing these net returns, an hypothesis which finds some empirical support in the Italian context. The consumer is also taxed on her labor income, in a way which will be better detailed below. Normalizing units so that buying one unit of housing costs one unit of numeraire, and also assuming the (fixed) wage rate to be one, the consumer's budget constraint can be written as:

$$c + (1 - (1 - \tau)r)h = (1 - \theta)l \tag{2}$$

where  $\tau$  is the property tax on housing wealth and  $\theta$  is the labor tax. In the following, we will identify the personal income tax with the labor tax – a very good approximation for the Italian context as labor (and pension) incomes cover more than 90% of the total income tax base<sup>2</sup>. The consumer supplies labor and uses her net labor income to buy private consumption and housing services. Because of the expected future returns from housing, the price of a unit of housing is less than one,  $p \equiv (1 - (1 - \tau)r)$ . Notice that  $dp/d\tau = r > 0$ , so that a higher property tax increases the current price of one unit of housing.

The FOC conditions for the consumer's problem<sup>3</sup> can be written as:

$$U'(h^*) = p \tag{3}$$

$$V'(1 - l^*) = 1 - \theta \tag{4}$$

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<sup>2</sup>Most capital incomes are subjected to separate taxation and except for dividends for firm owners, do not enter into the income tax base of the tax payer.

<sup>3</sup>SOC are automatically satisfied by the assumed concavity of  $U(\cdot)$  and  $V(\cdot)$ . We assume internal solutions.

where a prime indicates a derivative and an asterisk optimal values. Inverting these functions, we obtain the consumer's demand functions,

$$h^* = H(\tau) \quad (5)$$

and

$$l^* = L(\theta) \quad (6)$$

Notice that separability and linearity in private consumption implies that each demand (=supply, in the case of labor) is a function of its net of tax price only. This will be useful below. Furthermore, strict concavity implies  $H'(\tau) < 0$  and  $L'(\theta) < 0$ . For future reference, let  $\varepsilon^h = -\tau H'(\tau)/H(\tau)$  and  $\varepsilon^l = -\theta L'(\theta)/L(\theta)$  be the corresponding price elasticities.

## 2.2 Governments

The utility function of a generic local policy maker (e.g. "Mayor" from now on) is given by

$$w = u + E - \frac{s}{2}e^2 \quad (7)$$

where  $u$  is the utility of the (representative) consumer,  $E > 0$  is an exogenous utility deriving from the pleasure of being in office ("ego rents", including any monetary benefits from holding office), and  $e$  is the "effort" that the Mayor makes in order to increase the efficiency of public services (see below). That is, local policy makers are benevolent, but also like to be in office and dislike having to make an effort in order to increase the productivity of public services. The marginal disutility of effort depends on a parameter  $s$ , with a higher  $s$  implying a higher utility loss for any given level of effort. Policy makers differ in the parameter  $s$ . For simplicity, we assume there are only two types of Mayors, a "competent" one, with marginal disutility of effort given by  $\underline{s}$  and an "incompetent" one, with marginal disutility given by  $\bar{s}$ , where  $\bar{s} > \underline{s} > 0$ . We assume thorough that  $e \geq 0$ , that basically means that a Mayor cannot cash the local tax revenue for private consumption, surely a reasonable assumption in the Italian context.

Policy makers, when in office, need to offer a (fixed) amount of per capita public services (=public goods), which we normalize to unity<sup>4</sup>. Letting  $R$  indicate per capita local tax revenue, local government's budget constraint can then be written as

$$1 = R + e \quad (8)$$

Hence, "effort" is here introduced as a (partial) "substitute" for tax revenue; effort can be used to reduce the amount of tax revenue that needs to be levied in order to provide the given amount of public services. As an interpretation,  $e$  can be thought of as the ability of the local government to collect other resources

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<sup>4</sup>Local public goods enter separately in the utility function of consumers and can therefore be ignored in the following analysis.

beside tax revenues, or as his ability to organize the municipal administration so as to reduce the tax revenue needed to finance a given unity of services. To  $R$  can be given different interpretations, as discussed below.

### 2.3 Benchmark analysis

To begin our analysis, let us start by assuming that local governments can only use the property tax (the income tax is set by the central government and is therefore given for the local government). As discussed in the Introduction, this captures the situation of Italian municipalities before the 1999 reform (see section 4 for more details). Let us also suppose that the economy lasts one time period only. A Mayor of type  $s$ , when in charge, would then choose the property tax and his level of effort so as to maximize his welfare function subject to the budget constraint; that is:

$$\text{Max } U(H(\tau)) - pH(\tau) + (1 - \theta)L(\theta) + V(1 - L(\theta)) + E - \frac{s}{2}e^2 \quad (9)$$

s.t.

$$1 = \tau H(\tau) + e \quad (10)$$

Notice that the Mayor takes into account the effect of his choices on the consumer's utility and demand functions. Substituting for the budget constraint in the welfare function of Mayors, invoking the envelope theorem, and assuming interior solutions<sup>5</sup>, the FOC condition for this problem can be written as:

$$r = s(1 - \tau^* H(\tau^*))(1 - \varepsilon^h(\tau^*)) \quad (11)$$

The SOC condition for the same problem requires:

$$-sH(\tau^*)(1 - \varepsilon^h(\tau^*))^2 - se^* \varepsilon_\tau^h(\tau^*) < 0 \quad (12)$$

where  $\varepsilon_\tau^h(\tau^*)$  is the derivative of the price elasticity with respect to property tax rate. A sufficient condition for the SOC to hold is therefore that  $\varepsilon_\tau^h(\tau^*) > 0$ . In the following, we will assume this to be the case.

Totally differentiating (11), it is easy to check that  $d\tau^*/ds > 0$ . As  $\varepsilon^h(\tau^*) < 1$  at the optimum, this also implies by the government budget constraint, that  $de^*/ds < 0$ . That is, quite intuitively, "incompetent" Mayors would provide less effort in equilibrium and therefore tax consumers more than "competent" ones. To emphasize this fact, let us rewrite the optimal choices of Mayors as a function of  $s$ ;  $\tau^*(s)$ ,  $e^*(s)$ . Our previous discussion therefore implies  $\tau^*(\bar{s}) > \tau^*(\underline{s})$  and  $e^*(\bar{s}) < e^*(\underline{s})$ .

### 2.4 Two periods with asymmetric information

To provide electoral incentives to governments, let us now instead assume that there are two periods<sup>6</sup>. In the first period, after that the central government

<sup>5</sup>To insure interior solutions, it is sufficient to assume that  $s$  is large enough.

<sup>6</sup>This fits quite nicely with the Italian situation, as Mayors are allowed to serve for two terms only.



has set the tax on labor, the incumbent local government sets up effort and the property tax. Consumers then make their choices about housing and labor supply. At the end of this period, an election takes place and consumers vote for re-electing the incumbent or for electing an opposing candidate. In the second period, whoever is in charge sets again the property tax rates, and consumers make their choices. The world ends here. Thus, the two periods are identical, except that at the end of the first period there is an election. The consumers do not observe the type of Mayor or the level of effort that the Mayor makes in equilibrium, but observe the tax rates they have to pay. Consumers however expect politicians –both incumbent policy makers and the opponent candidates –to be competent with probability  $q$ . Mayors instead know their type. What would then be the choices of the two types of government and of the consumers?

To answer this question, we look at the *Bayesian perfect equilibria* of this game; that is, at equilibria where each agent's strategy is optimal given the strategies of any other agent and given his beliefs about any other agent's type, and where beliefs, whenever it is possible, are derived according to Bayes' rule. A usual, to solve the model, we work backwards. In the second period, as there is no future ahead, each government would just select his favorite choices; i.e.  $\tau^*(s)$ ,  $e^*(s)$ , for  $s = (\bar{s}, \underline{s})$ . But in the first period, the incompetent Mayor may attempt to exploit his superior knowledge in order to convince the voter he is competent and so be re-elected. To analyze this case, as customarily in this literature (e.g. see Besley, 2007), we suppose that the competent government does not play strategically and only plays his preferred strategy in all periods (e.g., he plays  $\tau^*(\underline{s})$ ,  $e^*(\underline{s})$  in both periods)<sup>7</sup>. This allows us to fix out-of-equilibrium beliefs in a very convenient way, as this assumption implies that if the rational consumer observed in the first period anything different from  $\tau^*(\underline{s})$  (the optimal choice for the competent government), she would immediately understand that the incumbent Mayor is incompetent and thus vote for the opposing candidate at the ensuing elections. In turn, this implies that the incompetent Mayor has really only two strategies to play in the first period (as can be easily shown, any other strategy is strictly dominated by one of these two). He might either play his preferred strategy, sets  $\tau^*(\bar{s})$  in the first period, saves effort and accepts defeat at the elections. Or he can mimic the competent type, plays  $\tau^*(\underline{s})$ , selects  $e$  appropriately, and hopes this will result in a re-election. By playing the mimicking strategy, the incompetent Mayor suffers a loss in the first period, which is readily computed to be

$$-\Delta w_1 = u(\tau^*(\underline{s})) - \frac{\bar{s}}{2}(e^*(\underline{s}))^2 - (u(\tau^*(\bar{s})) - \frac{\bar{s}}{2}(e^*(\bar{s}))^2) < 0 \quad (13)$$

This welfare loss must be compared with the potential advantage in terms of the probability of being re-elected. Suppose that  $n_1$  is the probability of re-election that the incompetent government expects by playing the mimicking strategy (if the incumbent is not re-elected, his utility is normalized to zero in the second period). The incompetent Mayor would then play the mimicking strategy if

$$-\Delta w_1 + n_1 \delta (u(\tau^*(\bar{s})) - \frac{\bar{s}}{2}(e^*(\bar{s}))^2 + E) \geq 0 \quad (14)$$

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<sup>7</sup>The equilibrium we describe would still exist even if competent Mayors behaved strategically; however, it would not be unique. See the technical discussion in Besley, 2007.

or if

$$n_1 \delta \geq \frac{\Delta w_1}{(u(\tau^*(\bar{s})) - \frac{\bar{s}}{2}(e^*(\bar{s}))^2 + E)} \equiv k_1 \quad (15)$$

where  $\delta \in (0, 1)$  is the discount factor. Notice that  $0 < k_1 < 1$  and that  $k_1$  is strictly increasing in the difference between  $(\bar{s} - \underline{s})$  and strictly decreasing in the exogenous utility for holding office,  $E$ . This is intuitive. A larger difference between  $(\bar{s} - \underline{s})$  implies a higher cost for the incompetent Mayor to mimic the competent one, while a larger  $E$  implies a higher reward for the incompetent government if he manages to be re-elected.

To see if the mimicking strategy pays for the incompetent Mayor, we have to compute the equilibrium election probability  $n_1$ . At the equilibrium, the rational consumer would of course expect the incompetent incumbent Mayor to play the mimicking strategy. But as she observes the same choices by both types of government in all cases, her ex post beliefs, having observed  $\tau^*(\underline{s})$ , can only coincide with her ex ante beliefs,  $q$ . In other words, under these equilibrium strategies for the two types of governments, the voter does not learn anything about the quality of government from first period observations. Hence, the consumer is indifferent between re-electing the incumbent or electing the opposing candidate. To rule out mixed strategy equilibria, let us then just assume that when indifferent, the consumer votes for the incumbent. This implies  $n_1 = 1$ . We can then conclude that the incompetent Mayor will play the mimicking strategy in the first period whenever  $\delta \geq k_1$ . For future reference, let us call a *fully pooling equilibrium* an equilibrium where the incompetent Mayor in the first period just does what the competent one would do in the same case.

On the other hand, if  $\delta < k_1$ , it is easy to check that the *fully pooling equilibrium* cannot be sustained, while a *separating equilibrium*, where each type of Mayor plays his favorite strategy in the first period, can be sustained. At a separating equilibrium, the rational consumer will assign probability 1 that the government playing  $\tau^*(\underline{s})$ ,  $e^*(\underline{s})$  is a competent one and will then re-elect him for sure (as  $1 > q$ ) at the ensuing elections. But as  $\delta < k_1$  deviating to  $\tau^*(\underline{s})$ ,  $e^*(\underline{s})$  from the separating equilibrium, it is however not convenient for the incompetent Mayor -whatever the beliefs of the consumers upon observing this deviation- as he is however better off by sticking at his preferred strategy  $\tau^*(\bar{s})$ ,  $e^*(\bar{s})$  and losing the election. This implies that the separating equilibrium is an equilibrium for our game when  $\delta < k_1$ . By the same token, the separating equilibrium cannot be an equilibrium for  $\delta \geq k_1$ , as the incompetent Mayor would then have a profitable deviation (e.g. playing  $\tau^*(\underline{s})$ ,  $e^*(\underline{s})$  and being re-elected for sure) which would destroy this equilibrium. We can then summarize this discussion as follows:

**Proposition 1** *Consider a two period economy, where local governments can only select the property tax and where competent Mayors always play their favorite strategy in each period. If  $\delta \geq k_1$  there exists a pure strategy fully pooling equilibrium where the incompetent Mayor will mimic the competent one in the first period, setting  $\tau^*(\underline{s})$ ,  $e^*(\underline{s})$  in this period. At this pooling equilibrium, the incompetent Mayor will be re-elected for sure. If  $\delta < k_1$  there exists a pure strategy separating equilibrium where each type of government selects his favorite strategy in the first period (e.g. the incompetent Mayor plays  $\tau^*(\bar{s})$ ,  $e^*(\bar{s})$ )*

*in the first period). At this equilibrium, the competent Mayor is re-elected for sure, while the incompetent Mayor is defeated at the elections.*

Quite intuitively, then, it will be the more likely to observe pooling equilibria, the smaller the difference in productivity between competent and incompetent Mayors, the more policy makers care about being in office, and the more they care about the future.

## 2.5 A local surcharge on the income tax

Let us now study how results change when a surcharge rate on the national income tax is also offered to the local government<sup>8</sup>. Suppose then now that the total income tax rate is the summation of a central tax rate  $T$  and a local surcharge one  $t \geq 0$ , so that  $\theta = T + t$ . Also assume that the central government moves first, and the local government moves later, having observed the  $T$  chosen by the central government. Consider then again our game above, maintaining all our previous assumptions unchanged. If the consumer could also observe  $T$  (as she certainly observes  $\theta$  and therefore  $t$ ), it is easy to see that our previous results would go through (qualitatively) unchanged. Again, in the first period the incompetent Mayor would only have the choice of fully imitating the competent Mayor's choices (concerning now both  $t$  and  $\tau$ ) and be re-elected for sure, or deviate, playing his preferred strategy, and being defeated at the elections<sup>9</sup>. But as explained in the Introduction, in the Italian context is more natural to assume that the citizen observes  $\theta$ , the total personal income tax she pays, but she is unable to distinguish between  $T$  and  $t$ . Notice that this then offers the incompetent Mayor a further possibility for pooling; he can use his superior knowledge about the move of the Central government to pretend that a different  $T$  has been chosen, and use the extra revenue he can then collect from the income tax to reduce the effort he has to make in order to imitate the competent Mayor. Intuitively, this should make pooling easier. In the rest of this section, we investigate under which conditions this occurs.

Let us then suppose that while the consumer cannot observe the move of the Central government, she has some expectations about this move. In particular, suppose that the consumer expects the central government to set in the first period a high tax rate  $\bar{T}$  with probability  $\pi$  and a low tax rate  $\underline{T}$  with probability  $1 - \pi$ , where  $\bar{T} > \underline{T} > 0$ <sup>10</sup>. For simplicity, in what follows, we study only the case where  $\pi \geq \frac{1}{2}$ <sup>11</sup>.

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<sup>8</sup>The Italian reform did not involve an offsetting reduction in transfers (see below). This was so because the surcharge tax was an opportunity, not an obligation, for municipalities. Notice also that the surcharge could not become a subsidy, implying  $t \geq 0$ .

<sup>9</sup>See the Appendix 1 for a full derivation of this case.

<sup>10</sup>As an interpretation, one may think that the central government needs to supply a separate (not modeled here) national public good and that the cost of providing this public good is subject to a technological shock, with a negative shock occurring with ex ante probability  $\pi$ . Assuming that the central government is benevolent and that it does not care for local government choices, it will then set up a high tax rate when the shock is negative and a low one when the shock is positive. If the shock is not observable by citizens, we then get the situation described in the text.

<sup>11</sup>Our main result below, that the incompetent politician may prefer to play the partial

To solve the model, we again work backwards. In the second period, as there are no electoral incentives, a Mayor of type  $s$ , when faced with a central government income tax rate  $T$ , would then choose  $(t, e, \tau)$  so as to

$$\text{Max } U(H(\tau)) - pH(\tau) + (1 - (T+t))L(T+t) + V(1 - L(T+t)) + E - \frac{s}{2}e^2 \quad (16)$$

subject to:

$$1 = \tau H(\tau) + tL(T+t) + e \quad (17)$$

The solutions to this problem implicitly determine the optimal choices of government as a function of the two parameters of the problem,  $s$  and  $T$ :  $\tau^*(s, T), t^*(s, T), e^*(s, T)$ . As shown in the Appendix, the SOC conditions for a local maximum are certainly satisfied if both elasticities are strictly increasing in their prices (e.g.  $\varepsilon_\theta^l(\theta) > 0$  and  $\varepsilon_\tau^h(\tau^*) > 0$ ) and these conditions are also enough to sign unambiguously the effect of a change in  $s$  on the optimal choices of the government:  $\partial\tau^*(s, T)/\partial s > 0, \partial t^*(s, T)/\partial s > 0, \partial e^*(s, T)/\partial s < 0$ . The effect of a small change in  $T$  on the optimal choices of the local government is instead generally ambiguous<sup>12</sup>.

Substituting back these optimal choices in the objective function, we obtain the maximum utility that a government of type  $s$  could get, by solving the maximization problem above, when the central tax rate is  $T$ ,  $w(T, s) = u(\tau^*(s, T), t^*(s, T), T) + E - \frac{s}{2}(e^*(s, T))^2$ . Differentiating the FOC for problem (16) and invoking the envelope theorem, it is easy to check that  $\partial w(T, s)/\partial T < 0$ ; both types are worse off when the central government sets up a higher tax rate<sup>13</sup>. This will be useful below.

### 2.5.1 The partial pooling strategy

Consider then the first period. As anticipated, the basic difference with respect to the previous section is in terms of the strategies that the incompetent Mayor can now play. As in the previous section, he can still play his preferred strategies in the first period (i.e. setting  $\tau^*(\bar{s}, T), t^*(\bar{s}, T), e^*(\bar{s}, T)$  for any  $T = \{\underline{T}, \bar{T}\}$ ), and be defeated at the elections, or he can still play the fully pooling strategies (i.e. setting  $\tau^*(\underline{s}, T), t^*(\underline{s}, T), e^*(\underline{s}, T)$  for any  $T = \{\underline{T}, \bar{T}\}$ ). But he can now also play a *partial pooling strategy*, exploiting his superior knowledge about the central government's move to pretend instead that a different choice about  $T$  has

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pooling strategy in the first period, could go through even for  $\pi \leq \frac{1}{2}$  (when the central government sets  $T = \bar{T}$ ). But the conditions to support this as an equilibrium would be considerably more restrictive than in the case studied into the text. Details are available by the authors on request.

<sup>12</sup>As is well known by the literature on vertical externalities (e.g. Keen, 1998), an increase in the national tax rate may reduce or increase the local tax rate on the same tax base, depending on if the two tax rates are strategically substitute or complements. Our theoretical results below do not depend on this sign, but the empirical specification implicitly assumes  $\partial\theta/\partial T = \partial t(T, \underline{s})/\partial T + 1 > 0$ , a rather innocuous assumption.

<sup>13</sup>Intuitively, if central government raises its tax rate, the consumers are worse off (because taxes are higher) and both types of Mayor need to offer more effort to compensate for the change. Hence, both elements in  $w(T, s)$  fall as  $T$  rises.

been made. Notice that the incompetent Mayor, if he lies about  $T$ , pretending that  $\bar{T}$  instead has occurred (where  $T \neq \bar{T}$ ), needs to lie consistently. In particular, he needs to set the observable tax variables, that is,  $\tau$  and  $\theta$ , at the level which would be set by a competent Mayor facing a central income tax rate equal to  $\bar{T}$ . Otherwise, the consumer would immediately understand that the Mayor is incompetent and vote him out of office at the ensuing elections.

Suppose then that the central government has set  $\underline{T}$  in the first period. If the incompetent Mayor pretends instead that  $\bar{T}$  has been played, he must select the surcharge tax  $t$  so that:

$$\tilde{t} = \bar{T} - \underline{T} + t(\underline{s}, \bar{T}) \quad (18)$$

by the same token, he must also select the property tax at the same level it would be chosen by the competent Mayor if the central government had selected  $\bar{T}$ ,  $\tau(\underline{s}, \bar{T})$ . By the government budget constraint, the effort level the incompetent Mayor need to offer by playing the partial pooling strategy can be readily computed as<sup>14</sup>:

$$\tilde{e} = 1 - \tilde{t}L(\bar{T} + t(\underline{s}, \bar{T})) - \tau(\underline{s}, \bar{T})H(\tau(\underline{s}, \bar{T})) \quad (19)$$

$$\tilde{e} = 1 - t(\underline{s}, \bar{T})L(\bar{T} + t(\underline{s}, \bar{T})) - \tau(\underline{s}, \bar{T})H(\tau(\underline{s}, \bar{T})) - (\bar{T} - \underline{T})L(\bar{T} + t(\underline{s}, \bar{T})) \quad (20)$$

Which finally implies:

$$e(\underline{s}, \bar{T}) - \tilde{e} = (\bar{T} - \underline{T})L(\bar{T} + t(\underline{s}, \bar{T})) > 0 \quad (21)$$

In words, if the incompetent Mayor pretends that  $\bar{T}$  has been played, while in fact  $\underline{T}$  was played, the level of effort that he needs to make to support the choices that a competent government would do had  $\bar{T}$  been played is reduced by an amount equal to  $(\bar{T} - \underline{T})L(\bar{T} + t(\underline{s}, \bar{T}))$ , the extra revenue on the labor income that the incompetent Mayor can appropriate in order to keep the pretence that  $\bar{T}$  was in fact played and he (the incompetent Mayor) is a competent one. Let us also define with  $-\Delta w_2(T) = u(\tau^*(\underline{s}, T), t^*(\underline{s}, T), T) - \frac{\bar{s}}{2}(e^*(\underline{s}, T))^2 - w(T, \bar{s}) < 0$  the first period loss that the incompetent Mayor would suffer by playing the fully pooling strategy when the central tax rate is  $T$ . Using this expression, the utility loss for the incompetent Mayor in the first period if he plays the partial pooling strategy and pretends  $T = \bar{T}$  while  $T = \underline{T}$  was in fact chosen, call it  $-\Delta \tilde{w}_2(\bar{T}; \underline{T})$ , can be written as:

$$-\Delta \tilde{w}_2(\bar{T}; \underline{T}) = -\Delta w_2(\bar{T}) + (w(\bar{s}, \bar{T}) - w(\bar{s}, \underline{T})) + \frac{\bar{s}}{2}((e^*(\underline{s}, \bar{T}))^2 - \tilde{e}^2) \quad (22)$$

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<sup>14</sup>Notice that as we assumed that effort cannot become negative (the Mayor cannot cash the extra revenue as private consumption), for the incompetent Mayor to be able to play the partial pooling strategy we need to assume that  $\tilde{e} \geq 0$ , that is,  $e(\underline{s}, \bar{T}) \geq (\bar{T} - \underline{T})L(\bar{T} + t(\underline{s}, \bar{T}))$ .

The expression is intuitive. By pretending  $T = \bar{T}$  when in fact  $T = \underline{T}$  and playing in the first period the same choices a competent government would have made at  $T = \bar{T}$ , the incompetent Mayor suffers in the first period the same loss he would incur by imitating the competent government when  $T = \bar{T}$ , expressed by  $(-\Delta w_2(\bar{T}))$ , plus the extra loss deriving by the fact that he could have played his optimal choices for  $\underline{T}$  rather than his optimal choices for  $\bar{T}$ . As  $w(\bar{s}, \bar{T}) < w(\bar{s}, \underline{T})$ , the first two terms in the expression above are certainly negative. In exchange of these losses, however, the incompetent Mayor can now cash the extra revenue obtained by lying in form of reduced effort,  $e(\underline{s}, \bar{T}) - \tilde{e}$ , which give him an extra utility equal to  $\frac{\bar{s}}{2}((e^*(\underline{s}, \bar{T}))^2 - (\tilde{e})^2) > 0$ .

Subtracting  $-\Delta w_2(\underline{T})$  from  $-\Delta \tilde{w}_2(\bar{T}; \underline{T})$ , it follows that if the condition

$$(*) \Delta w_2(\underline{T}) - \Delta \tilde{w}_2(\bar{T}; \underline{T}) > 0 \quad (23)$$

is satisfied the incompetent Mayor is better off, in terms of first period losses, by playing the partial pooling strategy rather than the fully pooling one. In the Appendix we prove

**Lemma 1** *If types are sufficiently close, (\*) is violated, if types are sufficiently apart, (\*) is satisfied.*

Intuitively, if  $(\bar{s} - \underline{s})$  is smaller than a given threshold, the fully pooling strategy is not very costly for the incompetent Mayor, and the extra revenue which he could get by lying does not compensate for the extra utility loss which he suffers by pretending that  $\bar{T}$  was played. The opposite is true if the difference between  $\bar{s}$  and  $\underline{s}$  is large.

### 2.5.2 Equilibria with the surcharge tax on income

Of course, even if condition (\*) is satisfied, this is still not a sufficient condition for the incompetent government to be willing to play the partial pooling strategy. This also depends on the probability of being re-elected if he plays this strategy. At a partial pooling equilibrium, the rational consumer will of course be able to predict correctly the equilibrium strategy of the incompetent government. This implies, by Bayes' rule, that upon observing  $\bar{\theta} = \bar{T} + t(\underline{s}, \bar{T})$  and  $\bar{\tau} = \tau(\underline{s}, \bar{T})$ , the consumer's revised beliefs on the type of government,  $\mu(\bar{\theta}, \bar{\tau})$  will be given by:

$$\mu(\bar{\theta}, \bar{\tau}) = \frac{q\pi}{q\pi + (1-q)(1-\pi)} \quad (24)$$

it follows that the consumer will re-elect the incompetent government if  $\mu(\bar{\theta}, \bar{\tau}) \geq q$  or if  $\pi \geq \frac{1}{2}$ , which in our case holds by assumption. Finally, the incompetent government will play the partial pooling equilibrium rather than deviate and plays his preferred strategy if :

$$\delta \geq \frac{\Delta \tilde{w}_2(\bar{T}; \underline{T})}{\xi w(\bar{s}, T) + E} \equiv k_3(\bar{T}). \quad (25)$$

where  $\xi$  is the expectation operator and where expectations are taken upon the realization of  $T$  in the second period. Notice that providing that the condition (\*) is satisfied and  $\delta \geq k_3(\bar{T})$ , playing the partial pooling strategy is the best strategy for the incompetent Mayor. There is no reasons to deviate and play the fully pooling strategy instead because, whatever the beliefs of the consumer upon observing  $\underline{\theta} = \underline{T} + t(s, \underline{T})$  and  $\underline{\tau} = \tau(s, \underline{T})$ , this cannot give the incompetent government a better chance of re-election and furthermore, the fully pooling strategy produces a higher first period loss; and there is no reason to play his preferred strategy, as this would lead to sure loss at the elections, and the condition  $\delta \geq k_3(\bar{T})$  guarantees that the first period loss of the partial pooling strategy are dominated by the future expected benefits.

Consider next the opposite case, where that the central government has set  $\bar{T}$  in the first period. In this case, the partial pooling strategy is clearly a dominated strategy for the incompetent Mayor. In fact, by Bayes' rule,  $\pi \geq \frac{1}{2}$  implies that the incompetent Mayor would not be re-elected by playing the partial pooling strategy in this case; realizing that, the incompetent Mayor would then be better off by playing his preferred strategy in the first period too. In turn, this means that when the central government chooses  $\bar{T}$ , then the incompetent Mayor has only two choices. Playing his preferred strategy in the first period too, and being defeated for sure, or playing the fully pooling strategy and being reelected for sure (given our assumptions above). The Appendix proves that the incompetent Mayor will prefer to pool by playing the fully pooling strategy if and only if

$$\delta \geq \frac{\Delta w_2(\bar{T})}{\xi(w(\bar{s}, T)) + E} \equiv k_2(\bar{T}) \quad (26)$$

We are now in a position to summarize the results of our analysis, deriving all the perfect Bayesian equilibria (in pure strategies) of our game. Repeating all our previous arguments (see the Appendix 1 for a more detailed proof) leads to the following

**Proposition 2** *Consider a two period economy, where local governments can select both the property tax and a surcharge on the income tax base. Suppose the citizen does not observe the labor tax rate selected by the national government but expects that the higher tax rate will be selected with probability  $\pi \geq \frac{1}{2}$ . Providing that the two types of Mayor are sufficiently apart, so that condition (\*) is satisfied, if the national government selects  $\underline{T}$  and  $\delta \geq k_3(\bar{T})$ , there exists a partial pooling equilibrium in pure strategies where the incompetent Mayor plays in the first period the corresponding strategies of the competent Mayor for the case  $T = \bar{T}$ . If the national government selects  $\bar{T}$  and  $\delta \geq k_2(\bar{T})$  there exists a fully pooling equilibrium in pure strategies, where the incompetent Mayors just replicates the choices of the competent one in the first period. If either the national government selects  $\underline{T}$  and  $\delta < k_3(\bar{T})$  or the national government selects  $\bar{T}$  and  $\delta < k_2(\bar{T})$ , there exist separating equilibria where the incompetent Mayor*

*just selects his preferred choices in the first period. At both the fully pooling equilibrium or at the partial pooling equilibrium, both types of government will be re-elected for sure. At the separating equilibria, the competent Mayor will be re-elected, and the incompetent Mayor defeated, at the ensuing elections.*

### 3 Interpretation and empirical predictions

The main theoretical result of the paper is contained in the following corollary, which derives directly from Proposition 2:

**Corollary 1** *The set of values of  $\delta$  which supports pooling equilibria when the move by the central government is observable by citizens is a proper subset of the set of values of  $\delta$  which supports pooling equilibria when the move by the central government is not observable by citizens*

**Proof 1** *This follows directly by the observation that  $k_2(\underline{T}) > k_3(\bar{T})$ .*

Intuitively, the surcharge rate on PIT, which can only be imperfectly observed by citizens, offers incompetent Mayors a less costly way to imitate the competent ones, and this is reflected in a larger set of parameters supporting pooling equilibria. Hence, the reduction in accountability induced by the surcharge rate reduces the ability of citizens to distinguish between competent and incompetent local politicians. Note further, by comparing the equation defining  $k_1(T)$  (equation 15) and the equation above defining  $k_2(T)$ , that  $k_1(T) \geq k_2(T)$  is also at least likely<sup>15</sup>. By a revealed preference argument, the expected utility of being re-elected is certainly at least as large when the Mayor can introduce a surcharge tax on income than when he cannot (as the Mayor can always set this surcharge equal to zero, so replicating the choice without the surcharge), implying that the denominator in the equation defining  $k_2(T)$  is at least as large as the denominator in the equation defining  $k_1(T)$ . Hence, unless  $\Delta w_2(T)$  is also larger than  $\Delta w_1(T)$  (and there is no reason why this should be generally the case), we should also expect  $k_2(T)$  to be smaller than  $k_1(T)$ . The general conclusion is that the introduction of the surcharge tax should make pooling equilibria more likely after the reform than before it.

On empirical grounds, the model then produces several predictions. First, we should observe a general reduction of the tax rate on the property tax following the introduction of the surcharge tax on income, as some Municipalities substitute the property tax for the income tax (a straightforward consequence of Ramsey's rule). Second, however, this reduction should be more pronounced for first term Mayors who still have electoral incentives than for second term

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<sup>15</sup>In the equation defining  $K_1$ , for simplicity, we did not consider the dependence of  $K_1$  on the realization of  $\theta$ . Observe that  $\theta = T$  when the local government cannot introduce a surcharge tax. Reintroducing it and considering the uncertainty surrounding the choice of  $T$  by the central government in the second period, the comparative static argument discussed into the text becomes obvious.



ones<sup>16</sup>. Third, the replacement ratio of Mayors should be lower after the reform than before it<sup>17</sup>. Finally, if first term Mayors are able to predict that following the reform is easier to be re-elected, we should also observe more incumbent Mayors willing to run again after the reform than before it<sup>18</sup>. In the following, we take these predictions to data. But before doing it, we first outline the institutions and describe our data set.

## 4 Institutions and data set

### 4.1 Local taxes

Municipal finance in Italy has been historically characterized by a large share of the financial needs being covered by grants from the central governments. Because of the several inefficiencies that this system created, several steps were taken in the 90's to increase local tax autonomy. Property tax rate was established in 1992 and applied to real estate. The tax base is determined essentially on cadastral income and revised only rarely<sup>19</sup>. The range of municipal property tax rates is restricted to lie in the interval from a minimum of 0.4% up to a maximum of 0.7% . As for tax allowances, municipalities can introduce specific tax rates and deductions for resident owners only<sup>20</sup>. As a result of this latter distinction, each municipality is allowed to levy two distinct property tax rates, one called the ordinary or business tax rate, and the other devoted to main residence only. We will come back to this below. In our sample, business property tax produced approximately 70% of the total property tax revenue.

The Municipal Personal Income Surcharge (PIT surcharge, from now on) was introduced in 1998 essentially as a tool to give local municipalities a more elastic source of revenues, given the rigidity of the property tax base, and to increase their tax autonomy. Its base is the total taxable income for the national income tax (PIT) declared by residents of the municipality. As already anticipated in the Introduction, the range of the PIT surcharge goes from a minimum of 0% up to a maximum of 0.5%, but municipalities were forced to spread the increase of the rates to attain the maximum in at least three years, or to a maximum of 0.2% per year. However, a freeze on the PIT surcharge was imposed by the national government in 2003 to be relaxed again in 2007. In the following, we exploit this variation in our analysis.

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<sup>16</sup>Besley and Case (1995a) uses term limit as an identifying strategy for the agency model of politics described above. Bordonon et al. (2003) use the same strategy for the Italian municipal context, finding strong support for the hypothesis.

<sup>17</sup>To get this prediction explicitly from our theoretical results is enough to assume that the discount rate  $\delta$  has some distribution across the population of Mayors. As  $k$  falls following the reform, we should observe more pooling behavior and hence more Mayors being re-elected.

<sup>18</sup>Strictly speaking, we have not modelled a decision to run or not run again in the previous sections. But notice that deviating and playing the separating strategy in the first period could be interpreted as a choice not to run again, as it would lead to a sure defeat in our model.

<sup>19</sup>In the period we consider there was only a major adjustment, an across-the-board 5% increase in the tax base of the property tax in 1997.

<sup>20</sup>A fixed sum across municipalities from 1993 to 1996, a variable sum, that can be defined differently by each municipality for different personal characteristics of house owners, from 1996 onwards.

Table 1: Structure of revenues

In % of total revenues	1998	2006	In % of own revenues	1998	2006
Own revenues (a)	37,3	32,8	Property tax	44,5	45,0
Grants and other current transf.	25,9	23,1	Pit surcharge	-	7,8
Rev. from Fees and User Charges	17,0	15,9	Other taxes(b)	33,7	27,4
Capital revenues	19,8	28,1	Other taxes(c)	21,7	19,8
Obs.	1062	1206		1178	1206

(a):property tax and pit surcharge. Minor revenues from billposting fees  
(b):waste treatment, revenues from occupancy of public areas  
(c):fees and charges from individual demand services

Table 1 presents the overall structure of local revenues, drawn from our financial dataset, for the municipalities in our sample (better detailed below). Transfers from the upper levels of government cover only about 1/4 of total revenue, fees and user charges about 16%. The rest is made up by taxes and capital revenues, with a sharp increase of the latter in the period, from 20% in 1998 to 28% in 2006. Tax revenues are composed mainly of property tax revenue (44,5% of the total own revenues in 1998 and 45% in 2006) and revenues from taxes on waste treatment and fees from chargeable public goods (nearly 55% on total own revenues in 1998 and 47% in 2006). In 2006, the PIT surcharge accounted for about 8% of tax revenue in 2006 (it was of course zero in 1998).

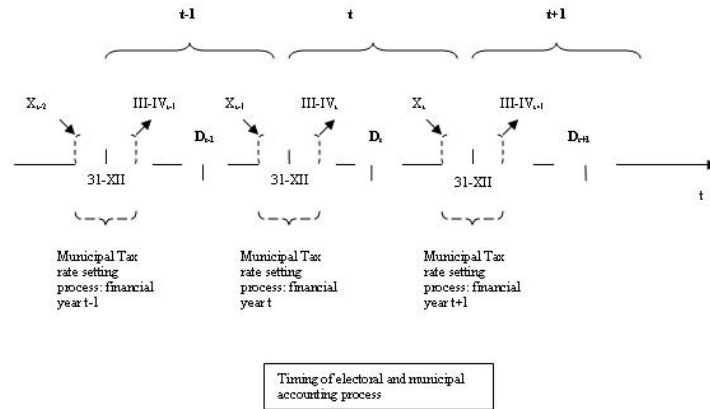


Figure 1: Timing of Elections and Municipal accounting process

In figure 1 we sketch the timing of tax choices. Generally all municipalities

make their resolutions on tax rates relative to fiscal year  $t$  from October of year  $t - 1$  to April of year  $t$ . Differently from property tax revenues, which is directly paid to municipalities, PIT surcharge revenues are transferred from the central government to municipalities after the completion of a process of assessment and collection at the central level, hence with some delay (generally one to two years). As for the timing of the decisions on the two tax rates, as we can observe in figure 1, the process is not simultaneous, and it does not overlap with electoral dates ( $D_{t-1}$  to  $D_{t+i}$  in figure 1) which are generally held in May or June. Property tax rate for year  $t$  is usually set during fiscal year  $t$ , while the PIT surcharge is generally set at year  $t - 1$  for fiscal year  $t$ .

## 4.2 Local electoral system

The electoral system of Italian municipalities was reformed in 1993, with the introduction of the direct election of the Mayors, wiping away a long tradition of indirect elections of Mayors via proportional election of the council. Elected Mayors carry with them the majority of their council (the lists supporting the Mayors receive a prize in terms of seats in the council, which ensures the Mayor a strong majority). If a Mayor loses the confidence of the council, he has to resign, but in that case new elections need take place. This had the effect of increasing the stability of municipal governments, a sharp difference with the pre-reform case where the council frequently changed Mayors between elections. Under the new regime a Mayor is elected for a 4-year time span; in 2000, this interval was further extended to five years. Mayors cannot run for more than one term after the first, and to be re-elected again they have to stay out for one or more legislatures. All Mayors in charge at the time of the reform (1993) were not considered as such for the computation of the terms, so that they could run again for two terms irrespective of the time they had already been in office prior of the reform.

## 4.3 Fiscal and political data

We exploit the entire set of Piedmont municipalities balance sheets, containing local financial data, from 1998 to 2006. Piedmont have 1206 municipalities with a total population of nearly 4,5 million. 1074 municipalities have less than 5000 inhabitants while only 44 have more than 15000 inhabitants. Along with financial data, we collected data relative to elections and other political variables. Our political dataset is composed of Piedmont municipal elections from 1997 to 2006<sup>21</sup>. We built this dataset from the Italian Interior Ministry Official Report on Municipal Elections, which collects and makes available extensive data starting from 1997. For each municipality we also gathered some socio-demographic variables, some time-invariant and other time-varying, that we use below as controls in our regressions. Table 2 describes these variables. Notice that we introduce a variable which captures the touristic vocation of the municipality (this may be important, because touristic municipality usually have more vacation houses which are subjected to the business property tax with no allowance) and another which captures the "rigidity" of the expenditure side of the budget

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<sup>21</sup>We have only partial data on 2006 elections.

Table 2: Descriptive Statistics

Variable		Mean	Std. Dev.	Min	Max
Proportion of people employed in tourism(a)	overall	0,27	0,62	0,004	8,66
	between		0,62	0,004	8,66
	within		0	0,27	0,27
Grants per capita(c)	overall	237,16	187,65	0,16	3082,89
	between		172,93	42,45	1457,14
	within		71,89	-597,94	1939,81
Other revenues from tax. and tarif.(c)	overall	181,95	268,54	0,046	9452,18
	between		234,36	18,95	2715,53
	within		128,57	-1513,12	6918,59
Rigid exp. per cap(b,c)	overall	270,48	155,41	0	2009,47
	between		148,13	40,39	1564,44
	within		46,20	-383,59	814,71
Municipal per capita Income(c)	overall	13169,14	2755,54	2697,58	31746,47
	between		2522,59	4153,22	28105,26
	within		1110,96	8080,12	26729,55
Prop. young aged (0-15)	overall	0,11	0,02	0,008	0,21
	between		0,02	0,018	0,18
	within		0,009	0,025	0,17
Prop. elderly (aged 65+)	overall	0,25	0,066	0,08	0,67
	between		0,064	0,10	0,63
	within		0,012	0,17	0,33
Population	overall	3558,12	26538,71	43	909717
	between		26539,14	46,88	890274,3
	within		605,67	-29283,21	23000,79
		<i>Observations:</i>	<i>10854</i>	<i>Municipalities:1206</i>	<i>Years: 9</i>

(a) on total employed people

(b) sum of personnel and debt service exp.

(c) current euro per capita

(expenditure on personell and debt interests expressed in per capita term) as this may also affect tax decisions.

#### 4.4 Descriptive statistics

In this section we present some descriptive statistics, pertaining to the main predictions of our model we intend to test.

Table 3 provides some evidence on the evolution of the different tax rates in the period 1993-2006 for our sample. As is clear from the table, municipalities were increasingly using their available room on the business and main residence

Table 3: Annual % growth of mean values of Property and PIT tax rates. Piedmontese municipalities

Year	Main Resid.	Business	PIT	N. munic. using PIT
1994	4,7	4,7	-	
1995	1,4	1,5	-	
1996	2,8	3,4	-	
1997	0,9	2,2	-	
1998	0,9	1,9	-	
1999*	0,1	1,1	*	381
2000	1,0	2,6	38,3	668
2001	0,5	1,5	26,6	777
2002	0,6	1,4	11,3	843
2003	-2,8	0,9	0,4	847
2004	3,3	0,8	-0,5	851
2005	0,7	1,5	-4,3	898
2006	0,2	0,9	-1,7	919

\*In 1999 the mean pit surcharge rate increased from 0 level to 0,182%.

property tax rate, with always increasing average tax rates in the period 1993-1999. The introduction of the PIT surcharge in 1999 allowed them to partially substitute the income tax for the property tax, reducing the rate of growth of the property tax rates and in some cases (as in 2003) by making it negative. Interestingly, the trade off appears to be particular strong between the PIT surcharge and the Main Residence Property tax, which is paid only by the municipal residents and therefore by people who certainly are eligible as voters in the municipal elections<sup>22</sup>. As shown in the table, the average rate of growth of the PIT surcharge rate was very large in the first years following the reform, to fall (as a joint effect of the PIT rate freeze and the increasing number of municipalities using it for the first time at a lower rate) after the freeze decided by the national government in 2003<sup>23</sup>.

Table 4: Correlation between changes in Property and PIT tax rates in different sub-samples. Piedmont municipalities

	Change in Business Prop. tax				
	Overall sample	<i>Inc. reelect.</i>	<i>Defeat.</i>	<i>Inc. reelect.</i>	<i>Defeat.</i>
	1999-2006	1999-2006	1999-2006	1999-2003	1999-2003
Change in Pit tax	0,0669	-0,039	0,060	-0,059	0,056
Obs.	9645	1008	94	712	63

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 4 and 5 provide some evidence of the correlation between municipals' property tax changes (for both the resident and the business tax) and PIT

<sup>22</sup>The business property tax is paid by second house owners and by owners (citizens and firms) of commercial and industrial estate. The latter therefore may or may not be voters in the municipalities where they pay the business property tax.

<sup>23</sup>The freeze allowed those municipalities that had never used the PIT surcharge tax before 2003 to introduce it after, while for the others, they could maintain the PIT surcharge at the level that they had already chosen, but could not increase it further. More precisely, in the period from 2004 to 2006, municipalities that had not made use of the PIT surcharge before, could introduce it at a constrained rate of 0,1% per fiscal year.

Table 5: Correlation between changes in Property and PIT tax rates in different sub-samples. Piedmont municipalities

	Change in Main resid. Prop. tax				
	Overall sample	<i>Inc. reelect.</i>	<i>Defeat.</i>	<i>Inc. reelect.</i>	<i>Defeat.</i>
	1999-2006	1999-2006	1999-2006	1999-2003	1999-2003
Change in Pit tax	0,0036	-0,068	-0,070	-0,135*	-0,087
Obs.	9645	1008	94	712	63

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 6: Incumbents statistics

years	1 Number of elections	2 Number of First Term incumb.	3 % of Incumbents who have run again	4 % of First Term inc. who have run again and won	5=3×4 Confirmed inc. who have run and won the el.	6=(5×2)/1
1993	109	n.a.	n.a.	n.a.	n.a.	52.3%
1994	34	n.a.	n.a.	n.a.	n.a.	26.5%
1995	1006	n.a.	n.a.	n.a.	n.a.	56.1%
1996	27	n.a.	n.a.	n.a.	n.a.	18.5%
1997	120	119	70.6%	82.1%	58.0%	57.5%
1998	43	40	72.5%	89.7%	65.0%	60.5%
1999	961	912	84.3%	85.9%	72.5%	68.8%
2000	35	30	76.7%	87.0%	66.7%	57.1%
2001	130	68	72.1%	77.6%	55.9%	29.2%
2002	67	31	67.7%	85.7%	58.1%	26.9%
2003	21	18	61.1%	100.0%	61.1%	52.3%
2004	943	351	76.9%	83.7%	64.4%	24.0%
2005	43	17	64.7%	81.8%	52.9%	20.9%
2006	137	102	81.7%	77.7%	63.5%	53.3%

surcharge tax changes from 1999 to 2006. For the entire sample, we observe a positive and significant correlation between the one year change in the business property tax rates and one year change in the PIT surcharge rates. However, if we restrict our sample only to the incumbent Mayors who ran again and were re-elected, our data show a negative correlation between the PIT surcharge and the business property tax (-0,039). The correlation becomes instead positive when observations are limited to incumbents who ran again and were defeated. Notice also that the coefficients maintain the sign, and the correlation is more intense, when we restrict the analysis to the 1999-2003 subsample (-0,059). This is as expected as the government freeze reduced the possibility for municipalities to use the PIT surcharge after 2003. The same pattern emerges for the correlation between the main residence property tax rate and PIT surcharge (table 5). If the case of correlation between one-year changes in main residence property tax and PIT surcharge we observe a stronger negative coefficient in all subsamples, notably during the restricted 1999-2003 subsample.

Table 6 looks instead to incumbents and replacement rates. According to our model, the 1998 reform should have made easier for low quality Mayors to "hide" their quality, at least until the 2003 national freeze. Accordingly, we would expect a higher probability of re-election for this pool of candidates in the period 1998-2003 and a reduction after. As potential candidates might have also anticipated that is easier to be re-elected after the reform, we may also expect a rise in the fraction of first term incumbents that decided to run again in the same period. Table 6 presents some preliminary evidence on these predictions. Column 1 gives the number of elections for each year, column 2 the number of first term incumbents in those elections, column 3 the percentage of first

term incumbents who decided to re-run, column 4 the percentage of first term incumbents who, having decided to re-run, won the elections. Finally, column 5 give the percentage of first term incumbents who run and won the elections, the product of column 3 and 4. For the years preceding 1997 we do not have detailed information on Mayors, but we can observe the ones who run and were re-elected <sup>24</sup>. In column 6, accordingly, we compute the percentage of confirmed incumbents for the entire period.

The table provides some preliminary evidence on our predictions. As the table shows, most elections took place in 1995, 1999 and in 2004. Comparing 1999 with 1995, we observe a sharp increase in the number of incumbents who were confirmed at the elections, from 56% in 1995 to 69% in 1999. This is in line with one of our prediction, as in 1999 Mayors could use the PIT surcharge and indeed about 40% of them actually did so (see the last column in Table 3). Comparing 1999 with 2004, where we have more data, we first notice that the percentage of first term incumbents who decided to run again is higher in 1999 than in 2004, 84% against 77%. This is again in favour of our predictions, if we assume that incumbents, predicting that it is easier to be re-elected when the PIT is in place, are more willing to run. Among the first term incumbents who decided to re-run, 86% were re-elected in 1999, when the reform was in place, where a slightly smaller number, 84%, were re-elected in 2004, when the national government's freeze had eliminated for most municipalities the possibility to use the PIT surcharge. This is again, although weakly, in accordance with our predictions.

## 5 Empirical analysis

We now investigate our data set in more details, testing each hypothesis one by one. We begin with our predictions about the tax rates.

### 5.1 Tax rates setting

We begin by postulating that the local choice for the property tax rate in municipality  $i$  at period  $t$  is a function of six variables:

$$\tau_{it} = f(t_{it}, Y_{it}, D_{it}, \Phi_{it}, X'_{it}, c_i, ) \quad (27)$$

In the equation  $\tau_{it}, t_{it}$  are respectively the property tax rate and the PIT surcharge tax rate,  $D_{it}$  are electoral dummies relative to first and second term electoral rounds for incumbents,  $Y_{it}$  stands for local per capita revenues from fees and tariffs,  $\Phi_{it}$  for per capita grants accruing from other level of governments,  $X'_{it}$  stands for other socio economic determinants of property tax setting and  $c_i$  stands for unobservable components at the municipal level, possibly correlated with one or more variables in the vector of regressors. To  $X'_{it}$  we also added a specific regressor built on financial data relative to fiscal years 1998-2006 which controls for local expenditures rigidity (see table 2). Since a separate vector of tax rates or fees for local services (like waste and water services, or

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<sup>24</sup>In this period, we do not know if an incumbent is not re-elected because he decided not to run, or because he was defeated.

other minor taxes and fees) is not available, we use as a proxy the sum of per capita revenues from the different types of tariffs and fees revenues. The result is a single gross endogenous variable  $Y_{it}$ , used as a further control with respect to  $\tau$  and  $t$  and comprising all alternative source of own revenues for each municipality. In the following, this variable will be exploited to test for simultaneity in the choice of Property Tax and PIT surcharge rates. Grants accruing from other level of governments are considered exogenous, along with idiosyncratic socioeconomic characteristics of local municipalities .

The simple model above encompasses many traditional models of tax reaction functions (Besley and Rosen, 1998; Redoano et al., 2007; Esteller-Moré and Solé-Ollé, 2001; Buettner, 2001) at local and state level (Inman, 1989).

In its simplest expression, the model we study is a static linear specification of the tax determination formula in semi-logarithmic form<sup>25</sup>:

$$\log\tau_{it} = \alpha t_{it} + \beta \log Q_{it} + c_i + \gamma D_{it} + \epsilon_t \quad (28)$$

where  $\alpha$ ,  $\beta$  and  $\gamma$  are parameters,  $Q_{it}$  collects all the vector of controls  $\Phi_{it}$ ,  $X'_{it}$  described in (27) ,  $D_{it}$  is our set of political dummies and  $\epsilon_t$  is an unobservable stochastic term. The linear specification and the additivity between  $t$  and other controls implies of course a restriction on preferences, but we draw here from an extensive empirical literature dealing with determinants of tax rates to justify this choice (e.g. Brett and Pinske, 2000; Besley and Rosen, 1998).

Notice that in equation (28) the PIT surcharge is introduced as an exogenous variable explaining the property tax. But the PIT surcharge itself is of course a function of the property tax rate in the same period, and it has to be considered as simultaneously determined with the latter. This is therefore a typical case in which the OLS estimator is biased. A natural way to cope with simultaneity would consist in estimating a simultaneous system of tax setting equations by instrumental variable methods. Unfortunately, the lack of good exogenous variables do not allow us to pursue this solution here. We then decided to start with a differenced OLS specification of our property tax determination function above. In a further step, we attempt to take into account the endogeneity of the PIT tax rate decision using a System GMM estimator for dynamic panel data.

### 5.1.1 The choice of the property tax rate

Before turning to discussing results, some further comments are useful in order to justify our choices for the property tax rate variables. For the latter we do not have any detailed and time-varying figures about the tax base, and in particular we do not have the specific fractions of liability due to certain types of properties (residential, industrial or agricultural). This is a problem, because of course the choice of a tax and relative tax burden may also depend on the characteristics of the tax base. Furthermore, for the main residence tax, while we observe both the statutory tax rate and the size of the allowance, we do not observe the distribution of the latter across resident owners, and are therefore unable to compute effective tax rates. To address these problems, we then decided to run regressions using as dependent variable alternatively the statutory main residence and the business property tax rate. The effective main

<sup>25</sup>We used a semi-logarithmic form because in many municipalities  $t_{it} = 0$  and we could not then apply logarithmic transformation with a reasonable interpretation in terms of elasticities



residence tax would clearly be more in line with the hypotheses of our model, but it is less precisely observed than the business tax rate (where allowances cannot be introduced).

### 5.1.2 Split sample

We begin by following Besley and Case (1995a) that suggested to analyze separately the sample according to incumbent status. Accordingly, we split our sample in two parts: the first is restricted to municipalities ruled by first term Mayors who decided to run again and won, the second to municipalities run by second terms Mayors. Model (28) is then estimated through first difference estimator, taking into account serial correlation in errors and removing individual-level effects<sup>26</sup>. Table 7 presents our results<sup>27</sup>. The evidence is clearly in accordance with our theory. The PIT surcharge has a negative impact on the property tax for first term Mayors who decided to run again and won, and a positive one for second term Mayors, controlling for year effects, municipal fixed effects and the other controls. More specifically, the coefficients on PIT surcharge in period 1998-2006 range from -0.023 (see table 7 column 1) to -0.024 (table 7 column 3). This last coefficient, significant at  $p < 0.1$  level, provides quite a strong support to our theory. Notice also, as expected, that the negative coefficients of the variable of interest for the restricted 1998-2003 period slightly increases along with statistical significance. As a further check we also rerun the same model for the extended sample of all incumbents who run again, without removing defeated Mayors. The coefficient of the PIT surcharge now loses statistical significance and also changes sign depending on the specification we use<sup>28</sup>. This is again in line with our expectations as it implies that the observed negative relationship between the PIT and the property tax tends to be robust only for incumbents who run again and won.

## 5.2 Term limit effects: robustness checks

In the preceding tests, the effect of unobservable time-varying trends is only captured by the inclusion of time dummies, whereas municipal fixed effects cover the heterogeneous time invariant factors that affect tax rate choices. But this may miss some important time varying effects which we now try to exploit. In particular, according to our theory, we should expect that only first term incumbents who are approaching re-election date will use the more intensely PIT surcharge to reduce the property rate, while they will not do so in the years preceding their second term expiring date. This suggests to contrast, using the term dummies, the tax behavior of first term candidates with the tax behavior of second term candidates in the years preceding the elections. We introduce here also the level of tax allowance for main residence property tax, treated as an exogenous variable. The only source of identification here is the differential effect of term limit, and the sample is restricted only to winning

<sup>26</sup>In this section, we of course drop the dummy variables  $D_{it}$  as we consider a split sample.

<sup>27</sup>All estimates have been replicated dropping abnormal observations detected through the formula  $x < F_{25} - 3IQR$  or  $x > F_{75} + 3IQR$ , where  $F_{25}$  and  $F_{75}$  are 25th and 75th percentiles,  $x$  the variable to be trimmed and IQR the interquartile range. Results turn out to be robust to such restrictions.

<sup>28</sup>Results available upon request by the authors.

candidates. We specify and test a modified version of model (28) using Fixed Effects estimator:

$$\log \tau_{it} = \beta t_{it} + \delta(t_{it} \times D_{it}) + \gamma \log x'_{it} + c_i + \epsilon_{it} \quad (29)$$

As a variation, we test also for a First Difference (FD) version of the same model, in order to control for the serial correlation in panel errors:

$$\Delta \log \tau_{it} = \beta \Delta t_{it} + \delta \Delta(t_{it} \times D_{it}) + \gamma \Delta \log x'_{it} + \Delta \epsilon_{it} \quad (30)$$

with  $\tau_{it}$  and  $t_{it}$  respectively property tax rate and pit surcharge rates as above.  $D$  is splitted into  $D_{it}^I$  and  $D_{it}^{II}$ , respectively first term dummy and binding term limit dummy.

Results of the estimations of the two models are collected in table 8. As expected, the negative adjustment of the property tax rate is higher near the re-election date for candidates who run again and win, while there is no such effect near the last year in charge for lame ducks. The effect of the PIT surcharge on the property tax turns out to be negative in all the estimations, but it is again more relevant when the dependent variable is the main residence property tax rate. More specifically, observe in column 1, where we collect the result of the FD version of the model with the main residence tax as dependent variable, that the effect of PIT surcharge interacted with re-election dummy is negative (-0.016) and significant, while the effect of the surcharge interacted with the expiring term election dummy is positive and not significant. In column 3, the same FD estimator is applied to the business property tax rate. Again  $(t_{it} \times D^I)$  has the expected, positive, sign, while the sign is reversed for the  $(t_{it} \times D^{II})$  variable, although both coefficients turn out to be not significant. The results for the FE estimator, reported in columns 2 for the main residence property tax and in column 4 for the business tax rate, show again the expected sign for  $(t_{it} \times D^I)$  although they are not significant.

### 5.3 Endogeneity issues

A potentially serious problem with the previous analysis is that the PIT surcharge is treated as exogenous, while we know this is not the case. We have to consider also endogeneity of municipal tax allowances levels for main residence tax rates. In this section, we try to cope with the endogeneity problem by using the System GMM estimation strategies proposed by Arellano and Bover (1995) (see also Blundell and Bond (1998)). In practice, as our panel data set suffered from lack of good exogenous candidates, we rely upon the lag structure of our dependent and independent variables to build a matrix  $Z$ <sup>29</sup> of suitable instruments to gain identification (and overidentification) of parameters of interest.

Our new model is summarized in the most general form in 31:

$$\log \tau_{it} = \sum_{j=1}^p \alpha_j \log \tau_{it-j} + (t_{it} \times D_{it}) \zeta + \log Y_{it} \delta + \log X'_{it} \beta + \log \Phi_{it} \gamma + \lambda_t + c_i + \epsilon_{it} \quad (31)$$

with  $i = 1, \dots, N$  and  $t = 1, \dots, T$  in (31).

<sup>29</sup>See Appendix 2 for a definition of this matrix.

Variables are specified as in (30), and we also add here municipal-specific time invariant effects ( $c_i$ ) and time-specific effects ( $\lambda_t$ ). We also introduce the lag of the dependent variable that we interpret here as a constraint faced by each municipality in taking the decision for each financial year and the level of tax allowance for main residence property tax. Table 10 presents our preferred estimations using as dependent variable the business and main residence property rate. Estimates of (31) via system GMM estimator include all explanatory variables entering without lags. We report also (table 9, column 1 to 4) the same specification used for system-GMM estimators using OLS and FE estimators to provide the lower and upper bound for the autoregressive coefficients of property tax rates (business and main residence rates)<sup>30</sup>. Our model takes as completely endogenous the lag of the dependent variable  $\tau_{it-j}$ , variable  $Y_{it}$  and tax allowances for main residence tax rates, while the electoral dummies interacted with PIT surcharge are considered as predetermined.<sup>31</sup>

We expect a significant and negative effect of PIT surcharge interacted with first term year dummy. The idea here is that in the year Mayors were elected for a second time, the PIT surcharge should have been larger, thus allowing for a larger reduction in the property tax. On the contrary, we do not expect a significant correlation of the PIT surcharge for the year in which Mayors were near to the expiring date of their second term. The empirical analysis supports these a-priori. We observe (table 10 column 3) that the coefficient for PIT surcharge rate interacted with first term dummy is -0.023, when dependent variable is main residence property tax rate and -0.018 for business property tax rate. The PIT surcharge rate interacted with second term dummy (the incoming expiring year of second term mandate) turns out instead to be not significant.

We also use the 2003 freeze in our estimations. Our a-priori is that in the sub period 1998-2003 the effect of the introduction of the new tax instrument on property tax rate would work more intensely. In our restricted sample model, the coefficients for our variable of interest do not show an increase in magnitude and the effect on business and main property rate is similar and less significant (columns 2 and 4 table 10). Note also that the test statistics for serial correlation (AR 2) and overidentifying restriction test (Sargan test) do not indicate serious problems of misspecification for all the four models estimated for business property tax rates, except for estimates in column 4, where second-order autocorrelation test presents a p-value of 0.093.

#### 5.4 Robustness tests: votes' margin and the 2004 freeze

Our empirical evidence so far thus tends to confirm the predictions concerning the tax rates. Two main factors however might affect these results. First, municipalities were constrained to use not more than 0,2 % rate per year of the PIT surcharge; this means that the impact of the reform was necessarily limited in 1999, the year where most elections took place. Second, as explained above (see table 6), as an effect of the 1993 electoral reform, most candidates in 1999

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<sup>30</sup>Notice that although the system GMM estimator is asymptotically more efficient, standard error estimations from the two-step covariance estimation tend to be severely downward biased. Hence we used the bias-correction method for finite sample covariance matrix derived by Windmeijer (2005) throughout all estimates.

<sup>31</sup>See, again, Appendix 2 for details.

were first term incumbents. This could also confound the effect of the interaction of the PIT surcharge with the Mayor's political status. In this section, as a further test of our theory, we then attempt a different empirical strategy. First, we exploit the margin of victory of running incumbents in the previous elections. We might expect that incumbents who had barely won against a challenger and decided to rerun for another term, would act more intensely on the PIT surcharge to reduce the property tax rate, as they were likely to be more severely contested at the ensuing elections. Accordingly, we then distinguish first term incumbents in respectively "safe" and "unsafe" Mayors, depending on if they had won the previous elections with a margin above (respectively, below) 1/3 of votes with respect to their main opponent<sup>32</sup>(see Table 11). Second, we focus on the 2004 elections only, where there were less first term incumbents, and where we could possibly observe a larger effect of the PIT surcharge on the property tax. The idea here is that unsafe Mayors would use the PIT surcharge to reduce the property tax rates not only during the electoral dates but also in the preceding years, so as to avoid the short-run effect of the legal constraint on the maximum yearly change allowed by the legislation.

Furthermore, recall that in 2003 the central government imposed an unexpected freeze on the PIT surcharge. This implies that municipalities in 2004 could no longer use the PIT surcharge or could only use it a constrained tax rate (0,1%). This should also take into account any possibly remaining endogeneity problems in our previous regressions. In fact, if all the bulk of the effect of PIT surcharge in 2004 year could be attributed to increasing pressure due to budgetary conditions, or institutional or demand driven pressures on expenditure decisions not fully captured by our time dummies or socio-economic controls, the 2004 unexpected shock, homogeneously spread throughout municipalities, would have been compensated by other sources of revenue as well. We should therefore observe a relevant and significant effect of the interaction of other local tax instruments with re-election dummies on property rates. If, viceversa, we observe this effect only with the PIT surcharge and only with unsafe Mayors running again, this implicitly supports our theory, namely that the PIT was used exactly because it was a less transparent instrument than other fiscal tools.

To check if this is the case, we then regress (per capita) total accrual tax revenue from the property tax in 2004<sup>33</sup>,  $R_i^r$ , against (per capita) total tax revenue from the Pit surcharge in the same year,  $Y_i^t$ , interacted with a dummy for rerunning safe and unsafe Mayors, and we then substitute  $Y_i^f$ , the (per capita) total tax revenue from alternative sources, to  $Y_i^t$ , to see if this makes a difference. More precisely, we propose and test the following model

$$\log R_i^r = \log(Y_i^k \times U_i)\zeta + U_i\delta + \log X_i'\beta + \epsilon_i \quad (32)$$

$$\log R_i^r = \log(Y_i^k \times S_i)\zeta + S_i\delta + \log X_i'\beta + \epsilon_i \quad (33)$$

where  $U$  (resp.  $S$ ) is the dummy for unsafe Mayors (resp. safe Mayors),

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<sup>32</sup>Results are robust to the choice of different thresholds.

<sup>33</sup>Only from 2006 onward we have data relative to different revenues stemming from ordinary and main residence property taxes.

$X'_i$  is our vector of control and  $k = t, f$ .<sup>34</sup> Results are reported in tables 12 and 13. In table 12, we presents the result for our 2004 cross section, where we estimate the effect of  $Y_i^t$  interacted with re-election dummies on  $R_i^r$ . As can be seen, the sign of our first term dummy interacted with Pit surcharge for unsafe incumbents ( $U \times Y_i^t$ ) is as expected negative (column 1), and the coefficient is both large -0.075 and statistically significant. On the contrary, the same interaction for safe incumbents ( $S \times R_i^f$ ) is negative (-0.061) and not significant (column 2). The dummy for second term Mayors (II term dummy) is always positive, although not significant. In table 13, we replicate the same exercise, using  $Y_i^f$ , the per capita tax revenue for other sources of revenue, in place of  $Y_i^t$ . As can be seen, now all interaction terms turn out to be not significant, while the dummy for second term incumbent is negative and significant.

## 5.5 Probability of winning and running again by incumbents

In this section, we finally test the remaining two predictions of our theory, that both the probability of winning and running again by incumbents should be larger after the tax reform. Of course, while the choice of the PIT surcharge is a direct responsibility of the incumbents, the probability of winning (or of running again) may depend by several other factors not considered in our theory. Thus, we expect somewhat less clear cut results for these predictions. Our empirical strategy to test them is to estimate separately the probability of running again and the probability of winning in each electoral round if the incumbent decides to run again, checking if in the years in which PIT surcharge was available this made a difference<sup>35</sup>.

We use data from the Interior Ministry database to construct a record relative to every single Mayor. We specify a pooled probit model of the usual form

$$\Pr [Y_{it} = 1 | \omega'_{it}, \delta'_t, \tau_{it}] = \Phi(\omega'_{it}\beta + \delta'_t\theta' + \tau_{it}\gamma) \quad (34)$$

if  $t > 1996$ .

where  $Y = 1$  if the Mayor runs again, given that he has the possibility to do it, and  $Y = 0$  if the Mayor does not rerun, conditional on the same possibility; below we repeat the same exercise, this time defining  $Y = 1$  if the mayor runs again and wins and  $Y = 0$  if the incumbent runs again and he is defeated.  $\tau_{it}$  is the main residence property tax rate and we expect this variable to have a (negative) impact on Mayors' decision to run for another term and run again and win. In  $\omega'_{it}$  we collect the vote share of incumbents and some proxies for the property tax base. We also add a dummy capturing the specific budgetary situation of those municipalities that, from 2001 onward, were constrained by compulsory balancing budgetary rules ("Patto di Stabilità"),

<sup>34</sup>We exploit here the fact that, due to time lags in collecting and checking fiscal records by the Ministry of Finance, the Pit revenue that is recorded in the 2004 accrual budget of Municipalities really refers to the decisions taken by Mayors in 2002 or 2003.

<sup>35</sup>There is already a quite large empirical literature which has addressed similar issues, but usually focussing on cross-sectional international data or US governors and senate elections data (see for example Besley and Case, 1995a; Brender, 2003; Besley, 2007). More limited is the analysis about incumbents re-election probability at local level in non-US countries (see Revelli, 2008; Sakurai and Menezes-Filho, 2008).

hence potentially influencing the choice of the property tax. Our parameters of interests are the years, and in particular the years 1999 and 2004 when most elections took place (see table 6), remembering that in 1999 the PIT surcharge was introduced and in 2003 frozen by the national government. In the equation above  $\theta'$  indicate the years<sup>36</sup>. As for the pooled probit equation (33),  $\Phi$  is the standard cumulative distribution function and the model is estimated assuming independent observations on the same units<sup>37</sup>.

The results of this first specification are collected in table 14 (all results are shown in terms of marginal probability effects computed at the regressor means). They show a positive effect of our year indicators on the probability of running again in the years after the PIT reform, although the coefficients are not statistically significant (except for the probit specification without incumbent vote shares in previous elections, column 1). Property tax rate is positively related to the probability of running again, although the coefficient turns also to be not significant. Since the property tax rate is endogenous to the decision of running again, we also estimate an instrumental variable probit (table 14, column 3-4), where we instrumented main residence property tax with a proxy of local determinants of tax rate (the percentage of holiday residences with respect to municipal housing stock), with the total value per capita of local property tax base in 1999<sup>38</sup> and demographic base. These variables are significantly related to the property tax rate but can be thought of as exogenous to the tax rate setting process of municipalities, as they are not easily manipulable by local Mayors. The property tax positive coefficient is increasing in the instrumental variable estimate (column 3), but not at a standard level of significance. There is some weak support for our model prediction, as in all estimates the 1999 year dummy effect is higher than 2004 year dummy. As a robustness check, we introduce also the incumbent vote shares in the previous elections, and the effect of 1999 reform remains higher than 2004 effect. Mayors age, as expected, turns out to be always negative and highly significant.

Results for the probability of winning are reported in table 15. Estimates in column 1 in table 15 show a positive trend of the year dummies, changing sign in 2006 election year, but again with no statistically significant coefficients. The property tax rate has the negative expected sign. In column 1 and 2 however we do not take into account potential endogeneity of property tax rate. In column 3 and 4, we use the same instrumental variable probit estimate we used in table 14 and test for year effect. We observe (column 1 and 3) a confirmation of the trend in the effect of year indicators on the probability of winning: we have an increase in 1999 and, after the freeze, in 2004, we observe a slight decrease. In this model, if we control for the effect of vote shares at the previous elections, the overall effect of 2004 year dummy slightly increases (column 2 and 4). The strong statistical relevance of incumbents' previous election vote shares point to the prevailing effect of first election popular consensus on subsequent electoral outcome for running Mayors. Our general conclusion is therefore that the data shows only limited support for the two remaining implications of the theory.

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<sup>36</sup>In table 13 and 14 below, we only show years indicators' for 1999, 2004 and 2006, in order to save space.

<sup>37</sup>Taking into account corrected standard errors for clustered observations and weighting according to unequal number of elections each year.

<sup>38</sup>A figure we derived from Anci, the main municipalities organization.

## 6 Conclusions

In this paper, we investigated the effects of an Italian reform on the financing of municipalities on tax behavior and local politicians turnover. The Italian reform allowed Mayors to partially substitute a more accountable source of tax revenue (the property tax) with a less transparent one (a surcharge on the personal income tax). Theoretical analysis suggests that this should give incompetent Mayors a less costly way to hide themselves, so allowing them to be more easily re-elected. An empirical analysis on Piedmont municipalities confirms these hypotheses; there is strong evidence that only Mayors that could be re-elected (and in particular, unsafe Mayors) used the income tax surcharge to reduce the property tax, and some weaker evidence that during the period in which the reform was enacted there was an increase in the probability of running again and winning by incumbents. In general terms, our results then suggest that the issue of accountability in local finance has to be taken seriously. It implies for instance that in determining the optimal financing structure for local governments, paramount attention should be given in providing local governments with financial tools which allowed for a clear accountability of governments to citizens. Our analysis focussed only on taxes, because this was the main content of the Italian reform, but clearly the argument is more general and involves other forms of financing, such as grants and debt. Further theoretical and empirical analyses along these lines would be very useful in providing a better understanding of these important policy issues.

## 7 Appendix 1

### 7.1 The problem with two tax tools

Consider the problem in equation (16). Let

$$F(\tau, t; s, T) = U(H(\tau)) - pH(\tau) + (1 - (T + t))L(T + t) + V(1 - L(T + t)) + E - \frac{s}{2}(1 - \tau H(\tau) - tL(T + t))^2$$

be the maximand of the local government. The two first order conditions can then be written

$$F_{\tau}(\tau, t; s, T) = -rH(\tau^*) + s(1 - \tau^*H(\tau^*) - t^*L(T + t^*))(H(\tau^*) + \tau^*H'(\tau^*)) = 0$$

$$F_t(\tau, t; s, T) = -L(T + t^*) + s(1 - \tau^*H(\tau^*) - t^*L(T + t^*))(L(T + t^*) + t^*L'(T + t^*)) = 0$$

#### 7.1.1 Second order conditions

The SOC conditions requires  $F_{\tau\tau}(\tau, t; s, T) < 0$ ,  $F_{tt}(\tau, t; s, T) < 0$ ,  $F_{\tau\tau}F_{tt} > (F_{t\tau})^2$ .

Computing:

$$F_{\tau\tau} = -sH(\tau^*)^2(1 - \varepsilon^h(\tau^*))^2 + H'(\tau^*)(se^* - r) + se^*(H'(\tau^*) + \tau^*H''(\tau^*))$$

but by the FOC  $(se^* - r) = se^*\varepsilon^h(\tau^*)$  implying

$$F_{\tau\tau} = -sH(\tau^*)^2(1 - \varepsilon^h(\tau^*))^2 + se^*(\varepsilon^h(\tau^*)H'(\tau^*) + H'(\tau^*) + \tau^*H''(\tau^*))$$

which can be written as

$$F_{\tau\tau} = H(\tau^*)(-sH(\tau^*))(1 - \varepsilon^h(\tau^*))^2 + se^*\frac{H'(\tau^*)}{H(\tau^*)}(\varepsilon^h(\tau^*) + 1 + \tau^*H''(\tau^*)/H'(\tau^*))$$

where  $\varepsilon_\tau^h(\tau^*) = -\frac{H'(\tau^*)}{H(\tau^*)}(\varepsilon^h(\tau^*) + 1 + \tau^*H''(\tau^*)/H'(\tau^*))$ . Hence,  $\varepsilon_\tau^h(\tau^*) \geq 0$  is again a sufficient condition for  $F_{\tau\tau} < 0$ . By the same token,

$$F_{tt} = -sL(\theta)(1 - \frac{t^*}{\theta}\varepsilon^l(\theta))^2 - \frac{se^*}{\theta^2}(T\varepsilon^l(\theta) + t\varepsilon_\theta^l(\theta))$$

thus,  $\varepsilon_\theta^l(\theta) \geq 0$  is again a sufficient condition for  $F_{tt} < 0$ . Now note,

$$F_{t\tau} = -sL(\theta)H(\tau)((1 - \frac{t^*}{\theta}\varepsilon^l(\theta))(1 - \varepsilon^h(\tau^*)) < 0$$

$$\text{Implying } (F_{t\tau})^2 = s^2L(\theta)^2H(\tau)^2((1 - \frac{t^*}{\theta}\varepsilon^l(\theta))^2(1 - \varepsilon^h(\tau^*))^2$$

Now notice that multiplying  $F_{tt}F_{\tau\tau}$  the first term coincides with  $(F_{t\tau})^2$  which then cancels out in the difference  $F_{\tau\tau}F_{tt} - (F_{t\tau})^2$ , leaving only positive terms. This shows that  $\varepsilon_\tau^h(\tau^*) \geq 0$ ,  $\varepsilon_\theta^l(\theta) \geq 0$  are sufficient conditions to guarantee the SOC.

### 7.1.2 Comparative statics

**Changes in s** Differentiating totally the FOC, we get:

$$F_{\tau\tau}d\tau + F_{\tau t}dt + F_{\tau s}ds = 0$$

$$F_{t\tau}d\tau + F_{tt}dt + F_{ts}ds = 0$$

forming the matrix and inverting we get:

$$\frac{d\tau}{ds} = -\frac{1}{\Delta}(F_{tt}F_{\tau s} - F_{\tau t}F_{ts})$$

$$\frac{dt}{ds} = -\frac{1}{\Delta}(F_{\tau\tau}F_{ts} - F_{\tau t}F_{\tau s})$$

where  $\Delta = F_{\tau\tau}F_{tt} - (F_{t\tau})^2 > 0$

$$F_{\tau s} = e^*H(1 - \varepsilon^h(\tau^*)) > 0;$$

$$F_{ts} = e^*L(1 - \frac{t^*}{\theta}\varepsilon^l(\theta)) > 0;$$

but the FOC implies  $r(1 - \frac{t^*}{\theta}\varepsilon^l(\theta)) = 1 - \varepsilon^h(\tau^*)$ . Dividing through  $F_{\tau s}/F_{ts} = rH/L$

$$\text{hence } \text{sign} \frac{d\tau}{ds} = -\text{sign}(F_{tt}\frac{rH}{L} - F_{\tau t}) \text{ and } \text{sign} \frac{dt}{ds} = -\text{sign}(F_{\tau\tau} - F_{\tau t}\frac{rH}{L})$$

$$F_{\tau\tau} - F_{\tau t}\frac{rH}{L} = H(\tau^*)(( -sH(\tau^*))(1 - \varepsilon^h(\tau^*))^2 - se^*\varepsilon_\tau^h(\tau^*)) + s(H(\tau))^2(1 - \varepsilon^h(\tau^*))^2 = -se^*H(\tau^*)\varepsilon_\tau^h(\tau^*).$$

Hence  $\varepsilon_\tau^h(\tau^*) > 0$  implies  $\frac{dt}{ds} > 0$ .



$$\begin{aligned}
F_{tt} \frac{rH}{L} - F_{t\tau} &= -srLH(1 - \frac{t^*}{\theta} \varepsilon^l(\theta))^2 - \frac{se^*}{\theta^2} rH(T\varepsilon^l(\theta) + t\varepsilon_\theta^l(\theta)) + sL(\theta)H(\tau)((1 - \frac{t^*}{\theta} \varepsilon^l(\theta))(1 - \varepsilon^h(\tau^*))) = \\
&= -\frac{se^*}{\theta^2} rH(T\varepsilon^l(\theta) + t\varepsilon_\theta^l(\theta)).
\end{aligned}$$

Hence  $\varepsilon_\theta^l(\theta) > 0$  implies  $\frac{d\tau}{ds} > 0$ .

We can then conclude that  $\varepsilon_\tau^h(\tau^*) > 0$  and  $\varepsilon_\theta^l(\theta) > 0$  guarantee both the SOC and  $\frac{d\tau}{ds} > 0$  and  $\frac{dt}{ds} > 0$ . Furthermore, as at the equilibrium, both elasticities are strictly smaller than one, this finally implies by the government's budget constraint  $\frac{de}{ds} < 0$ .

## 7.2 Lemma

Rewriting, condition (\*) can also be written as

$$u(\tau^*(\underline{s}, \bar{T}), t^*(\underline{s}, \bar{T}), \bar{T}) - u(\tau^*(\underline{s}, \underline{T}), t^*(\underline{s}, \underline{T}), \underline{T}) + \frac{\bar{s}}{2}(e^*(\underline{s}, \underline{T})^2 - (\bar{e})^2) > 0 \quad (35)$$

$$= u(\tau^*(\underline{s}, \bar{T}), t^*(\underline{s}, \bar{T}), \bar{T}) - u(\tau^*(\underline{s}, \underline{T}), t^*(\underline{s}, \underline{T}), \underline{T}) + \frac{\bar{s}}{2}((e^*(\underline{s}, \underline{T}) + (\bar{e}))(e^*(\underline{s}, \underline{T}) - (\bar{e}))) > 0 \quad (36)$$

note that

$$e^*(\underline{s}, \underline{T}) - \bar{e} = e^*(\underline{s}, \underline{T}) - e(\underline{s}, \bar{T}) + (\bar{T} - \underline{T})L(\bar{T} + t(\underline{s}, \bar{T})) \quad (37)$$

applying a FO Taylor approximation:

$$e^*(\underline{s}, \underline{T}) - e(\underline{s}, \bar{T}) \approx tL'(\bar{T} + t(\underline{s}, \bar{T}))\Delta T \quad (38)$$

where  $\Delta T = \bar{T} - \underline{T} > 0$ . It follows;

$$e^*(\underline{s}, \underline{T}) - \bar{e} \approx (L(\bar{T} + t(\underline{s}, \bar{T})) + tL'(\bar{T} + t(\underline{s}, \bar{T})))\Delta T = \bar{L}(1 - \frac{\bar{t}}{\theta} \varepsilon^l(\bar{\theta}))\Delta T > 0 \quad (39)$$

where

$$\bar{L} = L(\bar{T} + t(\underline{s}, \bar{T})), \bar{t} = t(\underline{s}, \bar{T}) \quad (40)$$

$$\bar{\theta} = \bar{T} + t(\underline{s}, \bar{T}) \quad (41)$$

Similarly, invoking the FOC for government maximization:

$$u(\tau^*(\underline{s}, \bar{T}), t^*(\underline{s}, \bar{T}), \bar{T}) - u(\tau^*(\underline{s}, \underline{T}), t^*(\underline{s}, \underline{T}), \underline{T}) \approx -\bar{L}\Delta T \quad (42)$$

Note further by the FOC for government maximization

$$-\bar{L} = -\underline{s}e(\bar{T}, \underline{s})\bar{L}\left(1 - \frac{\bar{t}}{\bar{\theta}}\varepsilon^l(\bar{\theta})\right) \quad (43)$$

substituting we finally get:

$$\Delta w_2(\underline{T}) - \Delta \tilde{w}_2(\bar{T}; \underline{T}) \approx \frac{1}{2}\Delta T\bar{L}\left(1 - \frac{\bar{t}}{\bar{\theta}}\varepsilon^l(\bar{\theta})\right)(\bar{s}(e(\underline{s}, \underline{T}) + (\tilde{e})) - \underline{s}2e(\underline{s}, \bar{T})) \quad (44)$$

now note that

$$2e(\underline{s}, \bar{T}) > e(\underline{s}, \underline{T}) + \tilde{e} \quad (45)$$

and recall that  $\bar{s} > \underline{s}$ . The sign of (\*) is then generally uncertain. In particular, (\*) is violated if  $\bar{s} \leq s^*$  and (\*) is satisfied if  $\bar{s} > s^*$ , where  $s^* = \underline{s} \frac{2e(\underline{s}, \bar{T})}{e(\underline{s}, \underline{T}) + \tilde{e}}$ . QED

## 7.3 Proposition 2

### 7.3.1 Benchmark

Consider the case where consumers, contrary to the assumption into the text, can perfectly observe the tax rate set by the central government. Repeating the analysis of the previous section, it is then clear that the incompetent Mayor in the first period has only two possible strategies to play. He might either play his preferred strategy, sets  $\tau^*(\bar{s}, T), t^*(\bar{s}, T), e^*(\bar{s}, T)$  in the first period and accepts defeat at the elections. Or he can mimic the competent type, plays  $\tau^*(\underline{s}, T), t^*(\underline{s}, T)$ , selects  $e$  appropriately so as to guarantee the unit level of services, and hopes this will result in a re-election for him. Repeating again the analysis of section 2, it is clear that by playing the mimicking strategy the incompetent Mayor suffers a loss in the first period given by:

$$-\Delta w_2(T) = u(\tau^*(\underline{s}, T), t^*(\underline{s}, T), T) - \frac{\bar{s}}{2}(e^*(\underline{s}, T))^2 - w(T, \bar{s}) < 0 \quad (46)$$

and he obtains a potential advantage in the second one, if he is elected, given by:

$$\xi(w(T, \bar{s})) + E \quad (47)$$

where  $\xi$  is the expectation operator and where expectations are here taken with respect to the probability that  $T$  be high or low in the second period. The incompetent Mayor will play the mimicking strategy if

$$n_2\delta \geq \frac{\Delta w_2(T)}{\xi(w(\bar{s}, T)) + E} \equiv k_2(T) \quad (48)$$

Where again  $n_2$  is the expected probability of being elected if playing the mimicking strategy for the incompetent government and  $\delta$  is the discount factor. Repeating the analysis of the previous section, we can again conclude that in a fully pooling equilibrium where incompetent Mayor are known to play the mimicking strategy,  $n_2 = 1$ .

### 7.3.2 Proof of proposition 2

By the benchmark analysis above, we know that if  $\delta \geq k_2(\bar{T})$  and the national government selects  $\bar{T}$  in the first period, there exists a fully pooling equilibrium in pure strategies, where the incompetent Mayor just replicates in the first period the choices of the competent Mayor for  $T = \bar{T}$ . Notice that this equilibrium is robust to all possible deviations.  $\delta \geq k_2(\bar{T})$  guarantees that the incompetent Mayor is better off by playing the fully pooling strategy rather than selecting his preferred strategy, as this would lead to sure defeat at the elections, and  $\delta \geq k_2(\bar{T})$  guarantees that his first period losses from playing the fully pooling strategy are more than compensated by the re-election. When  $T = \bar{T}$  the fully pooling strategy also dominates the partial pooling strategy, because whatever the beliefs of the consumer upon observing a deviation to  $\underline{\theta} = \underline{T} + t(\underline{s}, \underline{T})$  and  $\underline{\tau} = \tau(\underline{s}, \underline{T})$  from the fully pooling equilibrium, this deviation could not possibly give the incompetent Mayor a better chance of elections and furthermore by deviating to the partial pooling strategy he would incur a larger loss in the first period. If instead the central government sets  $T = \underline{T}$ , we know from the analysis in the text that providing that condition (\*) is satisfied and  $\delta \geq k_3(\bar{T})$ , there exists a partial pooling equilibrium where the incompetent Mayor plays  $(\bar{\theta}, \bar{\tau})$  in the first period and it is then re-elected for sure. Finally, we also derived in the benchmark case a fully pooling equilibrium for the case when  $T = \underline{T}$  and  $\delta \geq k_2(\underline{T})$ . However, providing that condition (\*) is satisfied, it is not clear if this equilibrium is robust to a deviation to the partial pooling strategy, where the incompetent Mayor plays  $(\bar{\theta}, \bar{\tau})$  instead. When more than a perfect Bayesian equilibrium is an effect, the rational consumer may be confused on which equilibrium strategies are effectively being played (see Bordignon and Minelli, 2001). If by observing  $(\bar{\theta}, \bar{\tau})$  in the first period, the consumer believes that either the partial pooling equilibrium at  $(\bar{\theta}, \bar{\tau})$  is played or the fully pooling equilibrium at  $(\bar{\theta}, \bar{\tau})$  is played, he would then rationally re-elect the incumbent Mayor. But then, as by condition (\*) the first period losses under the partial pooling equilibrium are lower than under the full pooling equilibrium when  $T = \underline{T}$ , the incompetent Mayor would now have a profitable deviation which would destroy the fully pooling equilibrium at  $T = \underline{T}$ . Finally note that condition (\*) implies that  $k_2(\underline{T}) > k_3(\bar{T})$ ; hence, for  $k_2(\underline{T}) > \delta \geq k_3(\bar{T})$ , there exists no full pooling strategy at  $T = \underline{T}$  while it does exist a partial pooling equilibrium. QED

## 8 Appendix 2

In the GMM-SYS estimation of model (31) we use as instruments for first differences equation the following variables (strictly exogenous):  $\Delta \log(D_{it})$ ,  $\Delta \log(X'_{it})$ , and differenced year dummies. For the same first differences equation we use the following endogenous variables. Lagged level up to t-2 of:  $\Delta \log(\tau_{it-1})$ ,  $\Delta(D \times t_{it})$ ,  $\Delta(t_{it})$ ,  $\Delta(Y_{it})$  and differenced main residence tax allowance. Instruments for levels equation are the following (strictly exogenous):  $\log(D_{it})$ ,  $\log(X'_{it})$  and year dummies. For the same levels equation we use the following endogenous variables: the difference of  $\log(\tau_{it-1})$ ,  $(D \times t_{it})$ ,  $(t_{it})$ ,  $(Y_{it})$  and level of main residence tax allowance. Matrix of instruments  $Z$  composed of the above described variables has been collapsed to save in the dimension of

instruments matrix. All estimates have been performed considering  $Y_{it}$ ,  $t_{it}$  and tax allowances as completely endogenous and  $t_{it} \times D_{it}$  as predetermined.

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Table 7: Property tax settings: FD estimates

	Main residence Property rate 1998-2006		Main residence Property rate 1998-2003	
	Mayors can run	Mayors cannot run	Mayors can run	Mayors cannot run
Pit surcharge	-0.023* (-2.03)	-0.009 (-1.07)	-0.024* (-2.14)	-0.009 (-1.05)
Main resid. tax allow.	0.142* (2.29)	0.121* (2.32)	0.146* (2.17)	0.126* (2.33)
	*** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$			
No. obs.	2518	4161	2083	3457
Serial corr. test	888.9	611.9	700.4	780.5
$R^2$	0.043	0.040	0.050	0.043

Note: All Var. in log except pit surcharge. Year dummies and a constant included

Coeff. for density, elderly and younger people,

rigid exp. index, grants per capita, income per capita

not reported to save space; stat. in brackets.

Cluster-robust standard errors used in estimates

Table 8: Property tax setting: FD and FE estimates  
 Main residence Property rate 1998-2006 Business Property rate 1998-2006

	FD	FE	FD	FE
Pit surcharge	-0.003 (-0.47)	0.009 (0.85)	0.028* (3.00)	0.009 (0.74)
Pit × I term dummy ( $D^I$ )	-0.016* (-2.54)	-0.009 (-0.77)	-0.007 (-0.85)	-0.014 (-1.00)
Pit × II term dummy ( $D^{II}$ )	0.003 (0.69)	-0.001 (-0.18)	0.005 (0.82)	0.005 (0.63)
Main resid. tax allow.	0.078 (1.61)	0.073 (1.69)	0.071* (2.69)	0.041 (1.30)
Grants per capita	-0.002 (-1.20)	-0.007* (-2.06)	0.013 (0.68)	0.001 (0.20)
Income per capita	-0.007 (-0.91)	-0.018 (-1.32)	-0.020 (-1.85)	-0.028 (-1.67)
** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$				
No. obs.	8949	10407	9015	10441
F test	10.01	10.50	49.58	52.88
$R^2$	0.03	-	0.09	-
Serial correlation(a)	0.000	-	0.000	-

Note: All Var. in log except pit surcharge. Year dummies and a constant included

Coeff. for density, elderly and younger people,

tourist presence not reported to save space

t stat. in brackets.(a) p-value from Wooldridge serial correlation test for panel data.

$H_0$  = Absence of serial correlation in panels.

Cluster-robust standard errors used in estimates

Table 9: Property tax setting: OLS and FE estimates

	Business Property rate		Main residence Property rate	
	1998-2006	1998-2003	1998-2006	1998-2003
Property tax (business)	0.908***	0.529***		
(t-1)	(152.25)	(41.16)		
Property tax (main)			0.945***	0.617***
(t-1)			(196.19)	(49.06)
Grants per capita	0.003*	0.002	0.000	-0.004*
(t)	(2.05)	(1.03)	(0.36)	(-1.97)
Income per capita	0.005	-0.017	-0.009**	-0.003
(t)	(1.50)	(-1.61)	(-3.24)	(-0.30)
I term dummy	-0.009***	-0.007**	-0.003	-0.006**
(t)	(-3.46)	(-2.63)	(-1.78)	(-2.87)
II term dummy	-0.008**	-0.008**	-0.003	-0.006**
(t)	(-2.61)	(-2.76)	(-1.11)	(-2.76)
Pit × II term dummy	0.004	0.003	-0.000	0.003
(t)	(0.55)	(0.38)	(-0.06)	(0.53)
Pit × I term dummy	-0.007	-0.003	-0.016*	-0.005
(t)	(-0.80)	(-0.33)	(-2.48)	(-0.76)
Pit surcharge	0.003	0.011	0.006*	0.015*
(t)	(0.87)	(1.37)	(2.14)	(2.27)
*** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$				
No. obs.	9416	9416	9265	9265
F test	2171.95	252.31	2631.25	182.51
$r^2$	0.85	-	0.89	-

Note: All Var. in log except pit surcharge. Year dummies and a constant included

Coeff. for density, elderly and younger people,

main resid. tax allow. not reported to save space.

t stat. in brackets. Cluster-robust standard errors used in estimates.



Table 10: Property tax setting: System GMM estimates

	Business Property rate		Main residence Property rate	
	1998-2006	1998-2003	1998-2006	1998-2003
Property tax (business)	0.772***	0.812***		
(t-1)	(29.18)	(25.84)		
Property tax (main)			0.943***	0.958***
(t-1)			(35.83)	(19.18)
Grants per capita	0.005	0.004	-0.000	0.000
(t)	(0.99)	(0.56)	(-0.04)	(0.07)
I term dummy	-0.006*	-0.009**	-0.001	-0.003
(t)	(-2.21)	(-2.68)	(-0.63)	(-0.91)
II term dummy	-0.010**	-0.006	-0.004	0.004
(t)	(-3.16)	(-1.01)	(-1.91)	(0.62)
Pit × II term dummy	0.007	0.009	0.005	-0.001
(t)	(0.88)	(0.37)	(0.82)	(-0.06)
Pit × I term dummy	-0.018	-0.018	-0.023**	-0.021
(t)	(-1.77)	(-0.79)	(-3.25)	(-1.41)
Pit surcharge	0.026*	0.019	0.005	0.001
(t)	(2.23)	(1.41)	(0.98)	(0.03)
Other revenues per capita	0.023***	0.021**	0.012***	0.009**
(t)	(3.89)	(2.97)	(3.73)	(3.02)
*** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$				
No. obs.	9334	7015	9265	6946
Ar(2)	0.218	0.148	0.223	0.093
Sargan test(a)	0.326	0.439	0.193	0.255
N. Instr.(b)	51	39	51	39

Note: All Var. in log except pit surcharge. Year dummies and a constant included

Coeff. for density, elderly and younger people,

main resid. tax allow. not reported to save space.

t stat. in brackets

Table 11: First term mayors statistics

	Number of safe(a) FT	Number of unsafe(b) FT mayors	Number of FT(c) mayors	Number of ST mayors	Number of elections
1999	316	344	660	84	961
2004	91	135	226	604	943

(a)  $>1/3$  margin with respect to challenger  
in previous elections

(b)  $<1/3$  margin with respect to challenger  
in previous elections

(c) we report only the number of FT winners  
of whom we could compute previous electoral margin

Table 12: Property tax revenues per capita: 2004 impact of Pit surcharge rev.

	OLS(1)	OLS(2)	OLS(3)
II term dummy	0.031 (0.72)	0.031 (0.74)	0.029 (0.64)
U	0.181 (1.86)		0.179 (1.81)
$U \times Y_i^t$	-0.075** (-2.70)		-0.076** (-2.71)
S		0.138 (0.98)	0.137 (0.97)
$S \times Y_i^t$		-0.061 (-1.49)	-0.062 (-1.51)
** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$			
Observations	1201	1201	1201
$R^2$	0.31	0.31	0.32

Note: All Var. in log except pit surcharge. A constant included.  
 Coeff. for density, elderly and younger people, pop. level,  
 main resid. tax allow., income per capita not reported  
 to save space. t stat. in brackets.  
 Cluster-robust standard errors used in estimates.

Table 13: Property tax revenues per capita: 2004 impact of other tax rev.

	OLS(1)	OLS(2)	OLS(3)
PI term dummy	-0.072* (-2.45)	-0.079** (-2.85)	-0.076* (-2.43)
U	-0.371 (-0.89)		-0.365 (-0.86)
$U \times Y_i^f$	0.076 (0.90)		0.074 (0.87)
S		0.125 (0.26)	0.089 (0.18)
$S \times Y_i^f$		-0.028 (-0.30)	-0.021 (-0.22)
** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$			
Observations	1196	1196	1196
$R^2$	0.37	0.38	0.38

Note: All Var. in log except pit surcharge. A constant included.

Coeff. for density, elderly and younger people, pop. level,  
main resid. tax allow., income per capita not reported  
to save space. t stat. in brackets.

Cluster-robust standard errors used in estimates.

Table 14: Probit estimates : probability of running again.

	Probit(a)	Probit(b)	IV probit(c)	IV probit(d)
year1999	0.185* (2.04)	0.179 (1.66)	0.187 (1.87)	0.178 (1.55)
year2004	0.088 (1.16)	0.104 (1.18)	0.088 (1.17)	0.116 (1.15)
year2006	0.102 (1.51)	0.112 (1.49)	0.102 (1.28)	0.164 (1.53)
Property tax (main)	0.010 (0.59)	0.001 (0.09)	0.011 (0.59)	-0.007 (0.30)
Mayor's age	-0.003** (-3.05)	-0.004*** (-4.35)	-0.003** (-3.08)	-0.004** (-3.24)
Inc.% votes (prev. el.)		0.002 (0.94)		0.0005 (0.90)
*** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$				
Observations	1701	1433	1701	1433
p-value exogeneity test ( $\chi^2$ )			0.918	0.890
Log pseudolikelihood	-786.95	-641.75	-153650	-139072.1
(a)-(d) A constant and other year dummies, domestic stability pact dummy coeff. not included to save space. (c) and (d) Instruments used for prop. tax rate: property tax base dimension in 1999, percentage of holiday houses, population level. t stat. in brackets. Coeff. are marginal probability effects computed at the regressor means. Clustered-robust standard errors used in estimates.				

Table 15: Probit estimates : probability of winning.

	Probit(a)	Probit(b)	IV probit(c)	IV probit(d)
year1999	0.047 (0.43)	0.057 (0.59)	0.051 (0.48)	0.062 (0.58)
year2004	0.021 (0.22)	0.066 (0.80)	0.029 (1.28)	0.065 (0.90)
year2006	-0.010 (-0.14)	-0.004 (0.02)	-0.018 (-0.17)	-0.007 (1.43)
Property tax (main)	-0.026 (-1.24)	-0.023 (-1.34)	0.034 (0.27)	0.004 (0.71)
Mayor's age	-0.005*** (-5.14)	-0.004*** (-4.00)	-0.005** (-3.05)	-0.004** (-3.25)
Inc.% votes prev. el.		0.002*** (4.36)		0.002** (4.01)
*** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$				
Observations	1348	1154	1348	1154
p-value exogeneity test ( $\chi^2$ )			0.246	0.621
Log pseudolikelihood	-547.49	-418.75	-1288.10	-107532.8
(a)-(d) A constant and other year dummies, domestic stability pact dummy coeff. not included to save space. (c) and (d) Instruments used for prop. tax rate: property tax base dimension in 1999, percentage of holiday houses, population level t stat. in brackets. Clustered-robust standard errors used in estimates. Coeff. are marginal probability effects computed at the regressor means.				

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