LAND USE AND ITALIAN LOCAL GOVERNMENT TAXATION: ENVIRONMENTAL PROTECTION OR FUND RISING PURPOSES?

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1. The choice of land use

Municipalities usually have the competence of setting taxes for land use such as tax on housing, building fees, charges for the use of public land, fees for industrial activities. From this point of view, in many countries, such tax instruments are the main source of tax revenue of municipalities. From environmental point of view, public officials can impose property tax in a Pigouvian way in order to raise the costs of environment and decreases land use consumption, correcting negative externalities due to excessive land use, for the benefit of environmental use of land. However, when these environmental positive externalities are ignored by public officials, vacant land is quickly developed.

In the last two decades many Italian municipalities have been characterized by an excessive urban expansion at detriment of farmland and environmental protection (see Bianchi and Zanchini, 2011). Italian municipalities have consumed land during the past decades by means of an excessive issuance of building permits. They are criticized to consume land only to 'fill the coffers' (Pileri, 2009), not caring enough of environment safeguard and the citizens' quality life.

In fact, Italian local government have experienced a contraction in financial resources, such as reduction in state transfers, stringency of the domestic stability pact (DSP), abolition of the '*Imposta Comunale sugli Immobili*' (ICI) tax rate on the home of primary residence in 2008. This may explain why Italian mayors could have been tempted to relax land use regulation by releasing a greater number of building permits for new constructions in order to increase tax base (firms and residents) to finance a growing demand of a wide range of local services.

In a recent paper, Ermini et al. (2012) examine land use regulation and taxation as substitute local governments policies to increase tax revenue. They propose a simple intertemporal model assuming that local government maximizes its own revenues in order to obtain the optimal level of tax rate and the number of land use permissions. Two different uses of land are considered in the theoretical model: environmental and human activities uses of land. If citizens consider environment

and human use of land substitute, an increase in tax rate produces a loss in total tax revenue for local government due to a decrease in human land use. However, this loss is counterbalanced by an higher share of land devoted to environmental protection due to a lower issuance of land use permissions. In equilibrium, the optimal number of land use permissions decreases together with total tax revenue. By contrast, if environment and human uses of land are complementary, an increase in tax rate produces a higher level of total tax revenue for local government. This implies a higher land consumption for human activities by means of a larger number of land uses permissions at detriment of environmental protection. In equilibrium, the optimal building permission increases with total tax revenue.

Building on the model of Ermini et al. (2012), in this paper we provide an estimation of the impact of land tax revenue on land use permissions on a panel of Italian municipalities from 1999 to 2006 to establish if local government push towards an over consumption of land resources aiming at increasing revenue, or if it uses taxes in order to regulate the use of land.

The paper is articulated as follows. Section 2 develops the empirical analysis describing data, variables and econometric approach. Estimation results are illustrated in section 3. Section 4 concludes.

2. Empirical model and econometric approach

In this section we analyse a local council's propensity to issue building permits. The number of permits released at local level is a proxy for the consumption of land.

We focus on possible relationships among building permits releases and local council financial sources of revenue. We first consider revenue from taxes and excise duties levied by local councils that are broad-based on real estate and consumption of land. Specifically, we consider ICI (*Imposta Comunale sugli Immobili*) tax revenue per capita which is a property tax on house and buildings and it is a proxy for revenue from land consumption for residential use and building occupation. We then consider revenue per capita from TARSU (*Tassa sui Rifiuti Solidi Urbani*), the tax on waste that is computed according to the area of commercial and housing space occupied. Finally, we include per capita value of TOSAP, where TOSAP (*Tassa sull'Occupazione di spazi e aree pubbliche*) is the tax on the occupation of public spaces and areas.

Instead of financing by means of burdens on the consumption of land, a council may choose to accrue resources by strategic decisions about autonomous taxes and own revenue sources that are not land based. We may expect that a local council

reduces its propensity to land consumption when it is able to increase revenue from other sources. This signals a certain degree of substitutability between funding proposal and environmental protection objectives. We examine two sources of revenue not land based. First, a widely used instrument of revenue raising at local level is the additional levy on personal income tax, where the tax rate is appointed at local level within a range defined by national law. This alternative source of funding has gained a growing importance for local government from its introduction in 1998. Second, as an additional external source of financing for local governments, we consider the availability of grants from national level of government.

Beside tax impact, we further examine the possible correlation between the release of building permits and local government land planning activity by analysing whether the council has adopted a city construction programme and an environmental and energy plan. The more pervasive is the legislation on land consumption and on land sustainability, the less liberal is the construction activity within a jurisdiction. We expect these variables to impact negatively on the number of building permits released.

In accordance to the above discussion, the basic relationship we want to estimate can be specified by the following equation:

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\begin{aligned}
BP_{i,t} = {} & \alpha + \beta_1 ln(ICIpc)_{i,t} + \beta_2 ln(TARSUpc)_{i,t} + \beta_3 ln(TOSAPpc)_{i,t} + \\
& + \beta_4 ln(GRANTSshare)_{i,t} + \beta_5 ln(ADDLEVYshare)_{i,t} + \\
& + \beta_6 ln(BUILDPLAN)_{i,t} + \beta_7 ln(ENVIRPLAN)_{i,t} + \\
& + \beta_8 X_{i,t} + \varphi_t + \upsilon_{it}
\end{aligned}
\tag{1}
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where *BP* is the number of building permits released by a local council *i* at year *t*. *ICIpc*, *TARSUpc* and *TOSAPpc* are per capita revenue tax from ICI tax on property, the TARSU tax on waste and the TOSAP tax on the occupation of public spaces and area, respectively. *GRANTSshare* is the share of state grants on total local government revenue. *ADDLEVY share* is the share of revenue from the additional levy on personal income tax on total local government revenue. *GRANTSshare* and *ADDLEVYshare* are computed in order to assess the relevance of local government alternative sources of funding other than leveraging on land use since they evaluate the intensity of the leverage on autonomous financing with regard to total revenue collected. *BUILDPLAN* and *ENVIRPLAN* are dummy variables that take value 1 if the council adopted a building programme and energy and environmental programme, respectively; they assume value 0 otherwise. It follows a set of local council geographical and socio-economic control variables that are collected in the matrix *X* and that can influence the demand and the amount

Table 1 – *Descriptive and summary statistics of variables.*

Variables	Description and source	Obs.	Mean	St. Dev.	Source
BP	Building permits	21904	2990.59	15836.73	MI
ICIpc	Ici revenue per capita	21904	4.79	0.70	MI
TARSUpc	TARSU revenue tax on waste	21904	4.06	0.74	MI
TOSAPpc	TOSAP revenue tax on occupation of public spaces and area	21904	1.22	0.94	MI
ADDLEVY share	Share of revenue from the additional levy on personal income tax on total local government revenue	10916	3.06	0.70	MI
GRANTSshare	Share of state grants on total local government revenue	21904	-2.11	1.09	MI
INCTAXpc	Personal income tax base per capita	21904	1.91	0.44	MF
POPDENS	Population density	21904	4.61	1.33	ISTAT
POP	Population	21904	7.65	1.30	ISTAT
AREA	Area	21904	3.04	1.00	ISTAT
BUILDPLAN	Council adopting a building programme (dummy: 1-yes, 0-no)	21904	0.34	0.47	MI
ENV IRPLAN	Council adopting a energy and environmental programme (dummy: 1-yes, 0-no)	21904	0.02	0.15	MI
SPECIALREG	Italian autonomous regions with special statute (dummy: 1-yes, 0-no)	21904	0.09	0.29	ISTAT
GEOG_AREA	Dummies for Macro Geographical area	21904	2.64	1.06	ISTAT
ALTIMETRY	Dummies for Altimetry degree of council	21904	2.85	1.53	ISTAT

Legend. *ISTAT: Istituto Nazionale di Statistica; MF: Ministero delle Finanze; MI: Ministero dell'Interno.*

of land consumption. Description and summary statistics of these and the previous variables are listed in table 1.

Data are collected over the period 1999-2006 for 8076 Italian local councils, almost the whole of this level of government in Italy. However, data needed a careful cleansing up. Afterwards, we remain with observations on about 4300 local governments.

The dependent variable *BP* presents a highly skewed distribution with the unconditional mean much lower than its variance (see table 1). It also presents a large number of council-year observations with zero counts (almost 14% of observations). Some of these zero are expected to be certain zero assumed some councils never to have opportunities for release building permits (for example, their territory may be in natural reserve or constrained by building restrictions) or, given that to declare building permits in '*Certificati di Bilancio*' is not an obliged activity, they do not report any data.

To deal with excessive zero in the dependent variable, an accurate methodology is the zero inflated negative binomial model, hereafter denoted as the ZINB model (see Cameron and Trivedi, 1998 for a further insight). By the ZINB model we first

account for the excessive zeros (the inflate model) by predicting memberships in two unobserved latent dichotomous groups- one that allows for positive counts, the other one does not- on the basis of predictors specified in the model and then we predict frequencies of counts (the count model) for only those in the not always zero group which is a continuous outcome. Accordingly, this methodology permits to simultaneity predict whether or not building permits release occurs and, given that the action occurs, to predict the frequency of occurrence. We model the inflation equation, that is the probability of release at least one building permit, as function of geographical and socio-demographic characteristics, economic resources of the councils (*INCTAXpc* and *GRANTSshare*) and institutional belonging (*SPECIALREG*). Conditional on having released at least one building permit, equation 1 describes the count model of land permits released by councils.

3. Results

In table 2 we present results of the ZINB count model estimation procedure; for the sake of brevity, we do not report estimates of the inflate equation.[1] All models include year dummies. Standard errors are clustered at local government level.

Focusing in column 1 on our variables of interest, we observe that all kinds of land taxes - that is, *ICIpc*, *TARSUpc* and *TOSAPpc* - reveal a positive correlation with the number of released land permits. In column 3 we include *GRANTSshare*. It emerges that higher state grants financing significantly decreases the number of permits released, suggesting that larger state transfers are a relevant disincentive to consume land from municipalities. At the same time, we observe that the correlations among different kinds of land taxes and number of permits released remain almost unchanged and statistically significant. Finally, in column 6 we augment our model to test the impact of additional source of autonomous financial resource, that is *ADDLEVYshare*. This variable is available for a restricted number of councils. Thus, with regard to a smaller sample of observations, we observe that this variable does not significantly affect the number of permits released while the pattern of previous estimates still holds even if the coefficient of state grant is not statistically significant. Throughout all model specifications and in line with Glaser and Ward (2009) evidence, we observe that local governments that have adopted a building programme and energy and environmental programme reduce the number of land permits releases; however, the significance of these coefficient vary with model specification. As to the control variables, local council population size and

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[1] Accurate details are available from authors on request.

density show a positive and negative, respectively, correlation with the number of land permits released. Finally, autonomous regions presents a negative correlation with land permits.

Table 2 – *ZINB estimates – Count Model of determinants of Building permits release.*

	Dependent variable: number of land permits released					
	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff.	s.e.	Coeff.	s.e.	Coeff.	s.e.
ICIpc	0.283***	0.018	0.271***	0.018	0.297***	0.025
TARSUpc	0.062***	0.012	0.064***	0.012	0.041***	0.014
TOSAPpc	0.057***	0.009	0.056***	0.008	0.048***	0.011
GRANTSshare			-0.027***	0.008	-0.016	0.012
ADDLEVYshare					0.012	0.016
INCTAXpc	-0.062**	0.033	-0.072**	0.033	-0.024	0.050
POPDENS	-0.156***	0.011	-0.158***	0.011	-0.182***	0.015
POP	0.978***	0.011	0.976***	0.011	1.004***	0.016
BUILDPLAN	-0.050***	0.019	-0.048**	0.019	-0.032	0.028
ENV IRPLAN	-0.013	0.042	-0.014	0.043	-0.091*	0.052
SPECIALREG	-0.093***	0.028	-0.138***	0.030	-0.117**	0.055
Lnalpha	-0.978	0.100	-0.979	0.100	-0.992	0.147
Alpha	0.376	0.038	0.376	0.038	0.371	0.055
-ln L	161681.5		161672.2		-79885.43	
Obs.	21904		21904		10916	

*Note: All regressions include controls for macro geographical area, altimetry degree, time effect and constant. *, **, *** denotes significant at 1%, 5% and 10%, respectively.*

To sum up, our general findings show that land related taxes are relevant predictors of land use. Local councils that receive higher amount of resources from land taxes release building permits significantly more than those receiving lower tax funding. This evidence is consistent with the assumption of complementary between environment and human use of land described in Ermini et al. (2012). Taxes are not used to regulate the use of land but, on the contrary, the complementary assumption allow councils to increase their tax revenue with no regards to a possible overconsumption of land and environment.

4. Concluding comments

Environmental protection is a task in most local governments' agenda and actually they have several instruments to ensure this priority. Recent literature

suggest to couple the traditional command and control instruments with price ones. The main idea behind this suggestion is to use price or taxes in a Pigouvian way, in order to raise the cost of the environment, hence to decreases its consumption. However, municipalities experienced a growing shortage of funding over time and they have pushed to rely on environmental taxation in order to make money. A negative effect of the budget needs of local governments could be to associate environmental taxation with a weaker control on environmental uses, since higher environmental consumption leads to higher tax revenues.

Using data on Italian local governments, our results show that municipalities are more concerned about funds raising, rather than environmental preservation. Indeed, taxes are not used to prevent the consumption of scarce resource, such as land, but in order to fulfil local budget targets.

Therefore, even if the European Union stresses the role of price instruments (European Environment Agency, 2006) in order to provide environmental protection, this paper suggests to be cautious on the effectiveness of such instruments. Since citizens consider income and environmental quality not substitutable goods, command and control still remains a more reliable strategy when environmental aims are to be pursued.

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SUMMARY

Land use and Italian local government taxation: environmental protection or fund raising purposes?

Property taxation can be used in a Pigouvian way to raise the costs of environment and decrease land use consumption for the benefit of environmental protection. However, in presence of a growing shortage of funding over time, local governments can use property taxation in order to 'fill the coffers' rather than to pursue aims of environmental safeguard. A negative effect on the budget side could be associated with a weaker control on land use regulation from local governments, since higher environmental consumption leads to higher tax revenues. In a theoretical paper, Ermini et al. (2012) show that a positive (negative) relationship between tax revenue and the number of land use permissions can emerge when there is complementariety (substitutability) between environmental and human uses of land. We test this relationship on a panel of Italian municipalities from 1999 to 2006. Our results show a positive and significant correlation between property tax revenue and the issuance of land use permits, suggesting the prevalence of the complementariety relationship. This result implies that Italian municipalities are more concerned about funds raising rather than environment preservation.

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