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LOBBYING, POLITICAL COMPETITION, AND LOCAL LAND SUPPLY: RECENT EVIDENCE FROM SPAIN [*]

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ABSTRACT: We analyze whether local land supply is influenced by the degree of political competition, and interpret the findings as being indicative of the influence wielded by land development lobbies. We use a new database including both political and land supply data for more than 2,000 Spanish municipalities for the period 2003-2007. In Spain, land use policies are largely a local responsibility with municipalities having periodically to pass comprehensive land use plans. The main policy variable in these plans, and the one analyzed here, is the amount of land classified for potential development. We measure local political competition as the margin of victory of the incumbent government. We instrument this variable using the number of votes obtained by parties represented in local government when standing at the first national legislative elections following the re-establishment of democracy, and the number of votes they actually obtained regionally at the national legislative elections. The results indicate that stiffer political competition does indeed reduce the amount of new land designated for development. This effect is found to be most marked in suburbs, in towns with a high percent of commuters and homeowners, and in municipalities governed by the left.

JEL Codes: H7, Q15, R52

Keywords: Land use regulations, urban growth controls, political economy.

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1. Introduction

The steeply rising housing prices witnessed during the last decade were mainly attributable to demand pressures (e.g., low interest rates, population growth), some of which were common to many places. However, the extent to which one such demand shock translates into a price increase would appear to be mediated by the housing supply (Glaeser and Ward, 2006). In turn, recent research clearly indicates that land supply is the main determinant of housing supply, and that as well as being influenced by geographical constraints (e.g. topography, see Saiz, 2010) the former can also be affected by land use regulations. Urban growth boundaries restrict the amount of land available for development and, more generally, zoning ordinances limit the amount of land for specific uses, and the implementation of these regulations imposes different kinds of costs on developers. A growing body of empirical research shows that these land use regulations account for a sizeable proportion of housing prices (Glaeser *et al*., 2005a), a finding that is equally true of urban growth boundaries (Hannah *et al.* 1993), which is the regulation that most resembles those examined in our case study.

One limitation of these attempts to evaluate the impact of land use regulations is that they usually fail to take into account problems of endogeneity. The difficulty faced in tackling this, however, is that there is very little information available on how land use regulation decisions are taken. To overcome this would require identifying the institutions that actually make these decisions and the main actors controlling the process. The classical view sees homeowners as key players in the political process. The fact that in many areas of the U.S. the median voter is a homeowner, and homeowners supposedly oppose growth, would account for the restrictions placed on land supply (Fischel, 1985). Yet, the empirical evidence in favor of this hypothesis is scarce (Dhering *et al.*, 2008; Hilber and Robert-Nicoud, 2009), leading a number of authors to examine another "suspect" that might be capable of influencing the political process, namely owners of undeveloped land and/or developers. Both Glaeser *et al.* (2005b) and Hilber and Robert-Nicoud (2009) believe them to form an organized lobby, prepared to offer bribes to local politicians in exchange either for a building license (the first paper) or for a more general reduction in regulatory stringency (the second)[1]. However, in both papers, residents are also considered as having a role to play in lobbying governments (seeking greater regulation), with the implicit assumption that they are able to organize themselves despite the great numbers involved. Glaeser *et al.* (2005b) justify their assumption by providing evidence of the increasing cohesion of green and anti-growth coalitions in the U.S. over the last few decades. While this should not be disregarded, here we

[1] See also the classical work by Molotch (1976), for a discussion of the various groups that might have a stake on a city's growth policy. There are a few other papers that analyze land use regulations from a political economy perspective but that do not address the role of developers lobbies directly (see, e.g., Calabrese et al., 2007, and Ortalo-Magne and Prat, 2007).

focus directly on the main instrument resident voters have for influencing the regulatory decisions taken by local governments, namely their capacity to throw the incumbent out of office if he or she provides regulations that do not coincide with their own. We believe that this approach offers considerable potential for explaining differences in regulatory intensity across jurisdictions, especially in Spain (our case study), where land use regulations are the responsibility of local governments, which operate as small parliamentary democracies, with many additional responsibilities aside from regulating land use, and where the procedures for formulating and (especially) implementing land policies do not come under close voter scrutiny. In such a situation, the degree of political competition (measured, as is the case elsewhere, by an incumbent's margin of victory) determines the extent to which a politician is able to pass the regulation sought by the developers or is forced to respond to voters' interests.

Thus, the purpose of this paper is to determine whether the degree of political competition has a bearing on local land supply. To do so, we develop a simple theoretical model in which local politicians choose the amount of land for development (i.e. the local growth boundary) so as to ensure their own re-election and to raise revenue from the bribes paid by the lobby of land developers. Our modeling strategy follows the Grossman and Helpman (1994) lobbying model, as adopted also by Hilbert and Robert-Nicoud (2009), but simplified so as to allow for the inclusion of only one lobby (that of the land developers). This model has been used elsewhere to analyze policy decisions, albeit in other settings (e.g. Fredriksson, 1997, and Damania *et al*., 2003), and also to study the effect of political competition on lobbying intensity and policy setting (Wilson and Damania, 2005). The paper is also related to the more general literature on the impact of political competition on accountability and rent extraction (e.g. Besley and Case, 1995; Persson and Tabellini, 2000). Empirical papers estimating the impact of political competition on a range of policy variables include Case (2001), Johansson (2003), Solé-Ollé (2006), Besley *et al*. (2006), Svaleryd and Vlachos (2009) and Fiva (2009).

Our model predicts that stiff political competition leads to a reduction in the amount of new land made available for development by a local government. We test this hypothesis with a new database including both political and land supply data for more than 2,000 Spanish municipalities for the period 2003-2007. Indeed, Spain constitutes a good testing ground for our hypothesis, as land use policies are basically a local responsibility, with municipalities having periodically to pass comprehensive land use plans. The main policy variable in these plans, and the one analyzed here, is the amount of land classified for potential development. Furthermore, during this period, land development and land supply increased greatly in Spain (European Environmental Agency, 2006; Ministerio de Fomento,

2006), at times despite public opinion, reflecting real concerns that local governments are overly influenced by the interests of land developers (Martin Mateo, 2007; Fundación Alternativas, 2007).

Very few papers, it should be stressed, seek to offer empirical explanations as to how land use regulations are enacted, and the evidence remains somewhat limited. Most undertake interregional analyses (Carruthers, 2003; Carruthers and Ulfarsson, 2002; Hilber and Robert-Nicoud, 2009; Saiz, 2010) and, as a result, encounter difficulties when matching land use measures to the political jurisdictions empowered with their introduction. Others draw on local data, but either disregard the political factors or are unable to obtain any evidence regarding their relevance (Bates and Santerre, 1994 and 2001; Evenson and Wheaton, 2003). Often the problem is that the papers employ a regulatory index that is available for a single cross-section of towns, which makes it difficult to determine which specific (past) government was responsible for a particular policy. By contrast, the policy variable adopted here - the amount of new land assigned for potential development during a term-of-office - can easily be matched to the local government that took the decision (and, therefore, with its political traits, e.g. the level of political competition it faced at that time).

Our identification strategy relies on the use of instruments for the vote margin. Our first instrument is constructed using the number of votes obtained by the current incumbent party/parties at a given election sometime in the past (i.e. the first national legislative elections following the re-establishment of democracy, held in Spain in 1977). The second instrument is constructed using the actual number of votes obtained by the party/parties at the regional level in the closest national legislative elections. Our results indicate that stiffer political competition does indeed reduce the amount of new land assigned for development, and that this effect is quantitatively meaningful. The effect was found to be most marked in suburbs, in towns with a high percent of commuters and homeowners, and in municipalities governed by the left. On the basis of these findings we conclude that different actors have varying degrees of influence on local regulations: developers acquire more influence when the political competition in a jurisdiction is low, while homeowners are more influential when the opposite case holds, and they have more to lose (e.g. in suburbs).

The rest of this paper is organized as follows. In the next section we present a simple theoretical model from which we generate our empirical prediction. In section 3 we describe our empirical strategy: the estimated equation, the data and variables, and the identification strategy. Section 4 presents the results and section 5 concludes.

2. Theoretical framework

In this section we present a simple theoretical framework from which we derive an empirical equation that relates the degree of political competition with the main aspect of local land policy in which we are interested, i.e. the amount of new land that a local government puts in the market during a given term-of-office.

The economic side of our model is a simplified version of the urban growth boundary model (see, for example, Brueckner, 1990, 1995 & 1999), amended in a number of minor aspects so as to better characterize the land supply decision of towns (as opposed to those of the metropolitan areas) and to allow resident homeowners to influence land supply decisions through the ballot box. The political side of the model considers that local politicians face a trade-off between providing the land policies demanded by resident homeowners, who can throw them out of office, and taking bribes from a lobby of organized land developers. We follow Grossman & Helpman (1994) in modeling the lobbying game.

Basic structure. We analyze the case of a small town whose land policies have no effect on any other community. We are interested in determining how the local government decides on how much new land should be assigned for development, while taking into account the interests of voters and the land developers' lobby, and given forecasts of future demand for locating into the community.

There are two periods, 0 and 1; in period 0, the local government takes a decision regarding how much land to put on the market for period 1, on the basis of the amount of land assigned for development but remaining vacant in period 0 and the expected demand in period 1. In period 0, each town is occupied solely by immobile homeowners, who are, therefore, the only group allowed to vote in local elections. The land area under the jurisdiction of the town can be classified into: (i) built-up land, occupied by homeowners' houses, (ii) developable land, which is available for the building of new homes that might in the future be occupied by mobile renters, and (iii) land actually classified as non-developable but whose status could change as a result of a local government decision. We assume a positive amount of developable land remaining vacant in period 0; this might be due, for example, to the fact that past land supply decisions were based on long-horizon forecasts (see section 3.1 to understand why this might be the case in Spain) or to past forecasting errors (i.e. expected demand pressures vanishing during the bust), and not necessarily to an explicit decision to leave land supply unconstrained. Be that as it may, the crucial point in deciding whether or not to expand the supply of developable land is the increase in demand forecast for period 1; if this is greater than the current amount of developable land standing vacant then there will be pressure to expand land supply.

Built-up land is owned by resident homeowners while the remaining portion of land is owned by just a small number of agents that may or may not be residents but who, in any case, have a negligible (direct) impact on results at the ballot box. Their ability to influence policy derives from their capacity to effectively lobby local politicians. For simplicity, we shall refer to these agents as the 'developer lobby', although we do not in fact draw any distinction between developers and the owners of undeveloped land. Renters play no role in the political process, although they do influence policy-making through their impact on the demand for a particular location.

Homeowners' utility. In period 0, the town has H_0 resident homeowners. They settled in the town at some time in the past, locating in a neighborhood where building a house was cheaper, and now they do not want to move to another town, because of removal costs or their attachment to their home, or to a different neighborhood of the same town, since it is assumed that a town's amenities can be enjoyed independently of specific location. We assume that a homeowner consumes one unit of land, so $H_0 = \overline{X}_0$, $\overline{X}_0$ being the amount of built-up land in period 0.

The expected utility of homeowners in period 1, V_1, is equal to their expected private consumption level, $E(c_1)$, plus the utility provided by any amenities specific to a location, a, less a "disamenity" effect attributable to the size of the town's population, N_1, plus the utility provided by the amount of open land available in the community ($L - \tilde{X}_1$):

$$V_1 = E(c_1) + a - \beta N_1 + \gamma (L - \tilde{X}_1) \qquad (1)$$

Where L is the land area under the town's jurisdiction and $\tilde{X}_1$ is the amount of land made available for development. Population in period 1 includes both the long-standing resident homeowners, H_0, and the new renting residents, R_1. We also assume that these renters consume just one unit of land so $N_1 = H_0 + R_1 = \overline{X}_0 + (\overline{X}_1 - \overline{X}_0) = \overline{X}_1$. The parameter β measures the disutility caused by adding an additional resident to the community[2]. The parameter γ captures an additional population externality which is derived from the loss of open space (see Brueckner, 2000). We also assume that homeowners only own one unit of land (i.e. that occupied by their home), the remaining land (that made available for development to house renters and the land which remains undeveloped) is owned by the developer lobby. Given this assumption, the budget constraint of a homeowner is just $E(c_1) = E(y_1)$, where $E(y_1)$ is the expected income for period 1, which we consider independently of location. Homeowners do not appear as rent payers, rather they are treated as renters who pay the rent to themselves. The utility function (1) can be restated as:

[2] This population externality is central to some growth control models found in the literature (Brueckner, 1999) and could be due, for example, to the effect new residents have on local budgets.

$$V_1 = E(d_1) - \delta\tilde{X}_1 \tag{2}$$

where $E(d_1)=E(y_1) + (a+\gamma L)$ is just the expected demand for locating in the town in period 1, and $\delta=(\beta+\gamma)$ is the overall population externality. And, given that both income and amenities are exogenous, the marginal impact of $\tilde{X}_1$ on homeowners' utility is just:

$$\frac{\partial \mathrm{V}_1}{\partial \tilde{X}_1} = -\delta \tag{3}$$

Developer lobby's profits. Developers seek to maximize their profits, which are dependent on the number of new residents entering the community. Our assumption is that these new residents come from a class of mobile renters, with the same utility function as that of homeowners (expression 1). Renters are fully mobile and on arrival locate in neighborhoods not yet occupied by homeowners as these districts have the highest building costs. Full mobility implies that they will locate in the town only if they can obtain the utility level attainable elsewhere, which we set to zero for simplicity. The budget constraint of a mobile renter will be:

$$E(y_1) = E(c_1) + r_1 \tag{4}$$

where r_1 is the rent per unit of land. By equating (1) to the prevailing utility level (i.e. to zero) we find the expression for $E(c_1)$, and after substitution in (4), and recalling that $N_1 = \overline{X}_1$, we obtain the following expression for the unit land rent:

$$r_1 = E(d_1) - \delta\tilde{X}_1 \tag{5}$$

Developers will expand the community, by providing houses for the mobile renters, if the unit land rent in (5) is higher than the corresponding development costs, which include the opportunity cost of the land being put to other uses (e.g. agriculture), which we set to zero for simplicity, plus the construction costs per unit of land, which are assumed to rise with distance from the place where homeowners chose to locate in the past: τX_1. According to Epple *et al*. (1988), this might be attributable to the decline in quality of terrain as the community expands away from the nucleus (e.g. hilly plots, lack of water resources, poor soil quality, and distance from main infrastructure). Developers, however, would like to develop the town so as to maximize profits, Π, which can be expressed as the integral of the profit function (i.e., rents as in expression 5 above minus the development costs) over the range of land owned by the 'developer lobby' (i.e., from $\overline{X}_0$ to $\tilde{X}_1$):

$$\Pi = \int_{\overline{X}_0}^{\tilde{X}_1} \left(r_1 - \tau X_1\right) \mathrm{d}X = \int_{\overline{X}_0}^{\tilde{X}_1} \left(E(d_1) - \delta\tilde{X}_1 - \tau X_1\right) \mathrm{d}X \tag{6}$$

The marginal impact of $\tilde{X}_1$ on the developer lobby's profits is just:

$$\frac{\partial \Pi}{\partial \tilde{X}_1} = -\delta(\tilde{X}_1 - \overline{X}_0) + E(d_1) - (\delta + \tau)\tilde{X}_1 \quad (7)$$

This expression states that allowing for more development results in a reduction of the developer lobby's profits, since this depresses the land rents of already developed or developable land (i.e. the term $-\delta(\tilde{X}_1 - \overline{X}_0)$), but at the same time increases their profits, since rents can be obtained from additional development (i.e. the term $E(d_1) - (\delta + \tau)\tilde{X}_1$).

Voting. Homeowners will vote for the incumbent if the increase in utility during the term $\Delta V_1 = V_1 - V_0$, weighted by the probability that they are informed about the consequences of the policy θ, plus the average popularity of the incumbent at this election, η, is higher than their reservation utility level σ_i. This condition can be written as:

$$\theta \Delta V_1 + \eta \geq \sigma_i \quad (8)$$

We assume that the average popularity of the incumbent party η is distributed uniformly on the support $[-1/2\psi, 1/2\psi]$. The higher the value of ψ, the higher the density of swing voters (i.e. voters that are indifferent as to whether they support the incumbent or the challenger, and so who are more sensitive to the utility gain derived from policy) and the more competitive is the election. The reservation utility σ_i is assumed to have a zero mean and to be uniformly distributed on the support [-1/2,1/2]. Given these assumptions, the probability of the incumbent's re-election becomes a smooth function of policy, $\tilde{X}_1$, and can be written as:

$$p = \lambda - \delta\theta\psi\, \tilde{X}_1 \quad (9)$$

where $\lambda = 1/2 + V_0$. Expression (9) states that the probability of the incumbent's being re-elected will fall as the amount of new land assigned for development increases (thus provoking a utility loss for resident homeowners), and that this effect will be more marked as the externality parameter δ rises, the awareness among voters concerning the consequences of this policy, θ, increases, and the political competition becomes stronger, as measured by the ψ parameter.

Lobbying. Following Grossman and Helpman (1994), we assume that the owners of undeveloped land form a lobby and offer the incumbent bribes in exchange for an increase in the amount of developable land ($\tilde{X}_1$), which should satisfy the following conditions:

$$\tilde{X}_1 = \text{argmax}\, S(\tilde{X}_1) + p\rho T \quad (10a)$$

$$\tilde{X}_1 = \text{argmax}\ (\Pi(\tilde{X}_1) - S(\tilde{X}_1)) + (S(\tilde{X}_1) + p\rho T) \quad (10b)$$

$$\Delta\tilde{X}_1 \geq 0 \quad (10c)$$

Expression (10a) states that the incumbent aims to maximize the sum of bribes obtained in the present plus the discounted value (ρ is the discount factor) of future exogenous rents T

weighted by the probability of reelection *p*. Expression (10b) states that the incumbent should also maximize the sum of the payoff of politicians and the lobby. Expression (10c) states that decisions regarding the amount of land assigned for development are irreversible, so developable land can increase from one period to the next or remain the same, but never decrease (see section 3.1 for an explanation of why this is the case in Spain).

The FOC of (10a) and (10b) with respect to $\tilde{X}_1$ are:

$$\frac{\partial S(\tilde{X}_1)}{\partial \tilde{X}_1} + \rho T \frac{\partial p}{\partial \mathrm{V}_1} \frac{\partial \mathrm{V}_1}{\partial \tilde{X}_1} = 0 \tag{11a}$$

$$\frac{\partial \Pi(\tilde{X}_1)}{\partial \tilde{X}_1} - \frac{\partial S(\tilde{X}_1)}{\partial \tilde{X}_1} + \frac{\partial S(\tilde{X}_1)}{\partial \tilde{X}_1} + \rho T \frac{\partial p}{\partial \mathrm{V}_1} \frac{\partial \mathrm{V}_1}{\partial \tilde{X}_1} = 0 \tag{11b}$$

Substituting (11a) in (11b), we obtain:

$$\frac{\partial \Pi(\tilde{X}_1)}{\partial \tilde{X}_1} = \frac{\partial S(\tilde{X}_1)}{\partial \tilde{X}_1} \tag{12}$$

This expression reflects the local truthfulness of the bribe scheme (see Grossman and Helpman, 1994). Substituting (12) into (11a) we have:

$$\frac{\partial \Pi(\tilde{X}_1)}{\partial \tilde{X}_1} + \rho T \frac{\partial p}{\partial \mathrm{V}_1} \frac{\partial \mathrm{V}_1}{\partial \tilde{X}_1} = 0 \tag{13}$$

Now, substituting expressions (3) and (7) into (13) and operating, we are able to obtain the following expression for the equilibrium value of $\tilde{X}_1$:

$$\tilde{X}_1 = \frac{1}{2\delta + \tau}\left[-\delta\theta\rho T\psi + \delta\overline{X}_0 + E(d_1)\right] \tag{14}$$

Subtracting $\tilde{X}_0$ from both sides, noting that – given our assumption of non-negative vacant land at moment zero – the size of the built up area at time zero should be equal to the market size of the community (i.e. $\overline{X}_0 = d_0 / \delta + \tau$)[3], assuming that exogenous rents are proportional to population (i.e. $T=\mu \overline{X}_0$)[4], dividing both sides of (14) by $\overline{X}_0$, and operating, we obtain an expression of the amount of new land for development during the term, expressed as a proportion of the starting size of the town:

$$\Delta\tilde{x}_1 = \alpha_1\psi + \alpha_2\nu_0 + \alpha_3 E\left(\Delta d_1 / d_0\right) \tag{15}$$

[3] To obtain the market size we need simply to equate expression (5) with the development cost function τX_1.

[4] Local politicians are able to earn higher wages and enjoy better opportunities for promotion (running for higher office) in larger municipalities. Of course, it is debatable whether this effect is captured by a linear relationship with town size. The alternative of working with non-relative variables is also problematic, since if *T* grows with the size of the town, then the coefficient of the electoral competition variable will be influenced by the size-distribution of the sample of municipalities used. The empirical results ultimately suggest that this specification works quite well (see section 4).

Where $\Delta\tilde{x}_1 = (\tilde{X}_1 - \tilde{X}_0)/\overline{X}_0$ is the amount of new land put in the market (i.e. allowed to be developed) by the local government in period 1 as a proportion of the size of the built-up area in period 0, $\nu_0 = (\tilde{X}_1 - \overline{X}_0)/\overline{X}_0$ is the amount of vacant land at the beginning of the period also as a proportion of the previous built-up area, and $E(\Delta d_1 / d_0)$ is the expected growth rate in demand for locating in the town. The coefficient $\alpha_1 = -\delta\theta\rho\mu/(2\delta + \tau)$ measures the effect of political competition on the provision of developable land. Higher levels of political competition (higher proportion of swing voters, ψ) reduce the amount of new land made available for development, so that the policy is closer to that preferred by the voters and more distant from that sought by the lobby. This moderating effect of political competition on policies is found in most theoretical models that analyze the effects of political competition on policy formation (e.g. Grossman and Helpman, 1996, and Wilson and Damania, 2005)[5,6].

The model also predicts the situations in which this competition mechanism can be expected to be strongest. Note from expression (15) the effect of political competition becomes more marked: (i) as the disamenity effect of growth, δ, rises (ii) the awareness of voters about this policy, θ, increases (iii) the time horizon of the politician, ρ, is extended and (iv) as rents with town size grow more steeply, as measured by μ. This provides additional empirical predictions for our study. For instance, if we were able to split the sample by using a proxy variable for the disamenity effect of growth, we would see whether the effect of competition is stronger or not in the sample of towns deemed to be more anti-growth.

Equation (15) is also quite precise regarding the way in which control variables should enter the model and how they should be interpreted. Note for instance that both the vacant land and demand pressure forecasts enter the model additively, with no interaction with the degree of political competition. The vacant land coefficient, α_2 in expression (15), should in theory be equal to –1, indicating that vacant land and new land for development should be perfect substitutes[7]. The coefficient $\alpha_3 = \delta + \tau / 2\delta + \tau$ measures the effect of the demand increase on the provision of developable land. Note, that this effect increases as the disamenity effect of growth, δ, falls. For instance, when δ = 0, $\alpha_3 = 1$ and the demand increase is fully absorbed by an increase in developable land. Note also that in this case

[5] This result is robust to the way in which lobby contributions are modeled. For instance, Grossman and Helpman (1996) show that this main result also holds when contributions are channeled to finance campaigns and as such are used to buy the votes of a class of uninformed voters. Grossman and Helpman (1996) note (p.276) that the equilibrium policies of their 1996 model incorporating two-party competition and lobbying through campaign contributions satisfy the same conditions as the objective function of their 1994 paper, which is the one used to specify our model (expressions 10a and 10b).

[6] Political agency models also predict that increasing political competition helps reduce rent extraction (e.g. Besley *et al*. 2006, and Svaleryd and Vlachos, 2009).

[7] However, there are reasons as to why we should not expect this constraint to hold exactly for the data. It could be the case, for example, that the relationship between both variables is nonlinear. For example, if costs have to be incurred in passing a new plan, the government might choose not to introduce it despite the fall in vacant land (and thus they will choose not to put more land in the market) if the amount of vacant land is sufficiently high.

$\alpha_1 = 0$. This means that when δ =0 local politicians simply follow the market. Of course, since they probably make mistakes in forecasting demand pressures, the amount of land assigned for development might not always coincide with the amount demanded.

3. Empirical analysis

3.1. Spanish institutions and the housing cycle

The framework introduced above is tested with data from Spain's local governments. In order to determine the extent to which the theory matches reality we need a good understanding of the workings of both local politics and land regulation in Spain. Thus, to facilitate our understanding of how land supply interacts with demand pressures, we also explain briefly how these two variables have evolved in the country over the last few decades.

Local politics. Municipalities are the main tier of local government in Spain[8]. There are nearly 8,000 local government authorities, most of them quite small (i.e. 90% with fewer than 5,000 inhabitants). Since 1979, municipal councils have been elected governments, with a variable number of members (depending on population size) chosen using a proportional system. The mayor is then elected by a majority of council members (see Colomer, 1995a, for a detailed description of the local political system in Spain). The councils operate as small representative democracies, and have to reach a majority vote in order to introduce the initiatives and regulations proposed by the mayor, who acts as the agenda-setter. The discipline enforced by Spain's parties means that the chances of amending the mayor's proposals are quite low when the mayor's party or coalition controls a majority of the seats. Direct democracy mechanisms are not used and participatory channels are quite limited. This means that a resident's ability to influence policy has traditionally been limited to their decision at the ballot box and, more recently, to their ability to mobilize a group to fight for a particular issue (e.g. with demonstrations or through the media).

Furthermore, the main parties compete for posts on the council and for a member to be elected mayor on the basis of a wide range of issues. Land use regulation is a key municipal responsibility, but not the only one, as the council is also responsible for the provision of various public services and the collection of a number of local taxes. This means that voters make their decision at the ballot box in line with a party's land policy proposals and other commitments made in its manifesto or on the basis of personal ideological attachments. It is in such a setting that we believe the degree of political competition will have the most impact on policy. And, furthermore, there is evidence that the results of the municipal elections are

[8]Spain also has 50 provinces that serve as a higher tier of local government but which have very limited responsibilities, and none regarding land policies, and 17 regional governments that are major suppliers of welfare state type services (health, education, welfare assistance) and which have some (secondary) responsibilities regarding land policies (see below).

influenced by entirely local concerns (such as land regulation) as well as by the regional/national popularity of the incumbent party/parties at the time of the election (see Bosch and Solé-Ollé, 2007). Local elections in Spain can to some extent be seen as by-elections for regional and general elections. Typically, after the municipal elections, the national parties and the media interpret the results as a 'grand opinion poll' of their future chances of winning elections at higher tiers. This correlation between the aggregate popularity of a party and the fate of an incumbent of this party at a local election is a key idea in the construction of the instruments we use below.

Land regulation. Land use regulations in Spain adhere to an extremely interventionist and highly rigid system (Riera *et al.*, 1991, 2000). A key characteristic is that, although an individual might own the land, the government is empowered to control and implement all processes of urban development. Landowners are not permitted to develop their land without the prior agreement of the local administration. It is not simply that they need a building license (which is in most cases automatically granted): before reaching this step, the government must have declared the land 'developable' and defined most precisely the conditions for such development. The main tool employed by the government for doing this is its urban plan. Town planning in Spain is essentially therefore a municipal responsibility, but as there are more than 8,000 municipalities nationwide, the system is highly fragmented (as in the US). However, the powers are partly shared with regional governments. Thus while the municipalities define the plan and control its implementation, the regional government must first accept the plan and ensure that all legal regulations are adhered to. Other responsibilities of the regional government include the design of supra-municipal plans and the declaration of certain areas as protected zones. Yet, in practice, the use of regional power to restrict local land use policies has been quite infrequent (Riera, 2000).

Municipalities draw up a 'General Plan', which provides a three-way land classification: *built-up land*, *developable land* (the areas of the community where future development is allowed), and *non-developable land* (the rest of the territory - agrarian and other uses, where the development process is strictly prohibited, at least until a new plan is accepted). The existence of a 'development border', a line between plots of land on which developers are allowed to build and plots where development is banned, is a key feature of Spain's land regulation system. In periods of high demand this border creates a rent differential which might fuel the bribes developers are willing to pay to local politicians in exchange for shifting this border to their advantage. This mechanism is well represented by the theoretical model presented in the previous section. A further feature of this border is that once it has been fixed it is very difficult to remove. The reason for this is that the establishment of the border creates certain rights for the landowners, and the only way to change these would be for the

government to acquire the land, a transaction that is highly infrequent in Spain. This means that while the amount of developable land will either increase from one period to the next or remain unaltered, it will not decrease, as is confirmed by our data.

Logically, the 'General Plan' includes very detailed regulations regarding many other aspects: land zoning (residential, commercial, industrial), the maximum floor-to-area ratio for each plot, the reservation of land for streets, green spaces and public facilities, etc. While it would be of great interest to analyze these other regulatory dimensions (after all, a developer stands to make more profit not only by building more house but also by building constructions with more floors), there are no data available to measure them. It should be stressed, however, that most development in Spain in these years has been really quite sparse[9], and that many of the recent stories about the influence wielded by the developer lobbies refer to their obtaining huge amounts of land for development (see, e.g., Martin Mateo, 2007).

In theory, the 'General Plan' has a duration of eight years, but the land classification can be quite readily modified by a majority vote in the municipal council. The amendment plan, known as a 'Partial Plan', is also a legally binding document. A number of participation and transparency requirements apply to facilitate scrutiny by the residents, who can seek to change the document if they so wish. These requirements are stricter in the case of the initial introduction of the 'General Plan', but here the transparency of the system is very much dependent on the will of local politicians (and this is also probably influenced by the degree of political competition they face). To implement the plan politicians can resort to a variety of means to introduce the desired amendments, without these changes having to come under much scrutiny from residents or the media. This is the case, for example, of the contractual arrangements made between local governments and developers, which are permitted under Spanish legislation. Such contracts might modify the urban status of a land plot, its floor-to-area ratio, or renegotiate the terms of payment between developers and the city council. In fact, a recent report identified these contracts as the main means for facilitating the disproportionate influence enjoyed today by developer lobbies (see Fundación Alternativas, 2007).

In short, the system of land use regulation in Spain is characterized by its high degree of interventionism and its extremely discretionary nature. Although based on a detailed plan, in practice there are various avenues open to local politicians seeking to introduce change. And although, in theory, the plan is subject to public scrutiny (yet just how effective this process is, is highly questionable), levels of transparency remain fairly low when the plan is being drafted and (more specifically) as it is being implemented. The profits of land developers,

[9] This is what data from the *Corine Land Cover* project suggest (Ministerio de Fomento, 2006, see also Hortas and Solé-Ollé, 2010).

therefore, depend on many largely discretionary political decisions – the primary one being the fixing of the 'development border', the line separating land on which development is allowed from that where it is prohibited – and this provides strong incentives for this lobby to offer bribes to politicians.

Housing cycle. Figure 1 shows the evolution in Spain's housing market since 1965. The dotted line represents the % growth in the housing stock, computed using data from IVIE (2005). Five different periods are evident: boom up until 1974, period of sustained bust following the first oil crisis in 1974 until 1985, short boom period up to 1991, short bust until 1995, and finally the long boom period from that year until its abrupt curtailment in 2007 (not shown on graph). The similarities between the periods of bust in the housing market (1991-95 and 1974-85), and those between the boom periods (1969-74 and 1995-2007) are exploited when we come to select our instruments (see next section).

[Figure 1 about here]

The bold line represents the growth in urban land (built-up plus developable) as a percentage of the previous built-up land available in a municipality. This variable is the one we adopt in our empirical analysis (more details in the next section) for measuring the amount of new land local governments assign for development each year. Unfortunately, this information has only been available since 1990. Note that the graph shows that the supply of new developable land fell during the 1991-95 bust and continued to fall during the early stages of the boom (1995-99), perhaps reflecting the fact that there was still a lot of vacant land available or because local politicians were slow to adapt to the new situation within the housing market. Urban land supply started to grow again in 1996 and grew continuously throughout the period 1996-2006. These growth rates were especially high at the end of this period, outstripping the growth rates in housing stock. The variable, however, plummeted in 2007 anticipating the future fall in housing construction (not shown on graph). In general, the graph suggests that local politicians do indeed respond to demand pressures when determining the amount of urban land to supply, but that they also make forecasting mistakes, e.g. supplying too much land when the housing market is at the end of a boom.

3.2 Empirical approach

The equation we run to estimate the effect of political competition on land supply is based on expression (8), and can be written as:

$$\%\Delta Urban\ Land_{i,t4\text{-}t0} = \alpha_1 \%Vote\ Margin_{i,t1} + \alpha_2 \%Vacant\ Land_{i,t0} + \alpha_3 Z_{i,t0} + \Sigma_k \alpha_{4,k} f_k + \alpha_5 W_{i,t0} + \varepsilon_{i,t} \quad (16)$$

where the empirical counterpart of $\Delta\tilde{x}_1$ is precisely the additional amount of new land assigned for development during the term-of-office, computed as a ratio over the previous

built-up land area (%Δ*Urban Land*), and political competition is measured by the incumbent's margin of vote at the following election (%*Vote Margin*). We provide more details as to why we adopt these variables and how we compute them below.

In the equation we control for the following variables (see data sources in Table 1):

(i) The previous % of land assigned for development which remains vacant at the beginning of the period as a proportion of previous built-up land (%*Vacant Land*), as our theoretically-derived equation suggests. It is necessary to control for this variable because if there remains a lot of land for building on there will be no immediate need to alter regulations assigning more land for development. Similarly, if there is no vacant land at all, there will be considerable pressure to release more land for development in order to accommodate possible future demand pressures.

(ii) A basic set of control variables $Z_{i,t\text{-}4}$, measuring the main traits that account for recent urban growth in Spain, and which include the *Urban*, *Suburb* and *Beach* dummies[10]. The European Environmental Agency (2006) notes that most of the recent housing growth in Spain has been concentrated in these places, so we expect them to capture a large share of the spatial variation in the increase forecast in housing demand (i.e. $E(\Delta d_1/d_0)$). The set also includes the land area under the jurisdiction of the municipality, $Land\ area_{i,t\text{-}4,}$ since this represents an obvious constraint on urban growth and accounts for a considerable proportion of urban land growth in the period.

(iii) A full set of local area dummies f_k, including both *provincial* fixed effects and *urban area* fixed effects. These effects are included because the size of the 'demand increase' (i.e. $E(\Delta d_1/d_0)$) depends to a great extent on certain geographical traits (e.g. the weather, proximity to the coast, regional regulatory framework, industry mix, major infrastructure such as ports or airports) which are common to municipalities located near to each other. We use 50 provincial and 109 urban area dummies. Spanish provinces are geographical units, whose primary purpose is to serve as electoral districts for national and regional elections. Urban areas are as defined by the AUDES project, and have been drawn up using sophisticated geographical criteria (see Table 1). The effects of the urban area and province can be introduced simultaneously in the equation; in this case, the provincial dummies control for the similarities between the municipalities located in the non-urban portion of a province. In any case, as is verified in the results section below, the provincial dummies are never jointly statistically

[10] We also ran the equation with a more detailed typology in which we differentiated between big and small urban areas (*Urban* × *Big*, *Suburb* × *Big*, *Urban* × *Small*, *Suburb* × *Small*), taking into account the distance from the central city (*Suburb* × *Distance*), and using a tourist resort dummy in addition to the beach variable (*Tourism*). These results are not shown here since they do not add enhance the model's explanatory capacity very much.

significant, while the urban dummies are, and provide a good explanation for variations in local land.

(iv) A set of additional control variables, *W*, measuring either the size of the demand increase (i.e. $E(\Delta d_1/d_0)$) or the 'disamentity effects of growth' (i.e. δ). This set includes: (a) Exogenous measures of local demographic and employment shocks: % *aged* 25-40, which measures the number of potential new families at the beginning of the period, % *immigrants* (i.e. those arrived during the period, expressed as % of residents at the beginning of the period)[11], % *employed in industry*, and % *employed in the top*-5 *industries* in the region (see Glaeser *et al*., 1992; Moretti, 2010); (b) Variables that account for the amenity and productivity factors deemed important for location decisions (i.e. an *amenity index,* a measure of *road accessibility*, and the land area of the municipality)[12]; (c) Variables more closely related to a resident's preferences for development (i.e. to δ), but also arguably correlated to 'demand pressures' (i.e. % *commuters*, % *home-owners*, *left* government, % *graduate*, % *unemployed*, *population size* and *per capita income*).

Some of the variables in this group are cited in the literature discussing preferences for growth controls. This is the case of % *homeowners*, a group who supposedly prefer less development than is the case of renters, who also suffer the population externality but who have to pay the higher rents caused by the restricted supply of land (Fischel, 1985; Brueckner, 1999). Higher income communities supposedly oppose development too, as more affluent residents will seek to keep the poor from moving into town (Mieszkowski and Mills, 1993; Downs, 1999). Some authors also suggest that places with higher proportions of commuters prefer less development, their residents not being concerned with this question as they work elsewhere (Fischel, 1985). However, these variables also probably correlate with 'demand pressures' and so it would be very difficult to interpret the results as being indicative that these theoretical predictions are fulfilled. Thus, we shall abstain from doing this, and use these variables for the same purpose as the others in this group: namely to determine how stable the estimates are when controlling for a full list of possible determinants of local land supply. The lack of stability of the estimates in the OLS case will be proof of serious omitted variable bias, while stability of the IV

[11] To avoid concerns of endogeneity, this variable is computed as the sum of the growth rate of new immigrants arriving from different countries to the province multiplied by the share of each country in the municipality's immigration figures at the beginning of the period (see Saiz, 2007).

[12] We might have measured 'demand pressures' more directly. For example, the equation could have incorporated growth in population, employment or in income. However, the chances are high that these variables are endogenous: a higher supply of land facilitates population, employment and income growth.

estimates will offer additional evidence as to the validity of our instruments (see next section).

However, in order to obtain evidence as to the role of these preference variables, and in order to acquire additional validation for our model, we also estimate equation (16) for several sub-samples. Recall that the coefficient of the electoral competition variable ψ in expression (15) is $\alpha_1 = -\delta\theta\rho\mu/(2\delta+\tau)$. This suggests that the effect of political competition becomes more marked as the 'disamenity effect of growth' δ increases. To analyze this possibility, we divide the sample according to the values of those variables that the theory tells us should be correlated with δ:

(i) We repeat the estimation for the *Suburb*, *City*, *Non-urban* and *Beach* sub-samples. Fischel (1985) suggests that development will be more constrained by regulations in the suburbs than in other places, because residents there are less concerned with employment opportunities (since they work outside the town). Our data on the % *commuters* allows us to analyze this effect directly by dividing the sample into towns with high and low values of this variable. We include *Beach* cities as a separate category in our analysis, given that growth has concentrated there in the Spanish case and that, on occasions, the debate regarding the need to limit development is particularly intense in such places, involving as it does controversial questions related to the convenience or otherwise of preserving environmentally valuable areas (e.g. wild beaches, see European Environmental Agency, 2006).

(ii) We also estimate the equation for samples of high and low % *homeowners*, which is another variable identified in the literature acting as a possible restraint on development. In our model, homeowners are interested in restraining development in order to avoid the population externality, while renters (although they also suffer this externality) do not want to pay the higher rents that the lower supply of land would result in.

(iii) We provide results for the sub-samples of towns ruled by *Left* vs. *Right* governments. Governments with an ideology that is left of center - at least in Spain - can be expected to show greater concern for the environment and to favor compact development, thus tending to place more restrictions on the supply of land. This suggests that the δ coefficient will be higher in such cases and so we would expect a more marked response by the left to a change in the margin of the vote[13].

As we show in the empirical section below, the division of the sample has no marked effects on either the explanatory capacity of the model or the validity of the instruments. However,

[13] Furthermore, presenting the results separately for left and right governments is fairly standard practice in the literature (see Svaleryd and Vlachos, 2009, and Fiva, 2009).

these results should be interpreted with care, since they only inform us about the sensitivity of each variable and the measure of political competition, yet our analysis still does not reveal anything about the overall effect of these variables on land supply[14].

3.3. Sample and data

Sample. Equation (16) is estimated using data from a sample of 2,034 Spanish municipalities for the period 2003-07, which covers exactly one term-of-office. Although our land use data (i.e., built-up land area, developable land, vacant land, non-developable land) are available on a yearly basis, we have decided to analyze the full period as a cross-section only. The dependent variable is, therefore, the increase in developable land between 2003 and 2007, and the control variables refer to the year 2003 or earlier (most being taken from the 2001 Census). There are several reasons for this choice. First, the main variable of interest, %*Vote margin*, can only be measured once, which is when an election takes place. This means that there is no real statistical gain to be made in using yearly data. Second, the dependent variable does not change every year; developable land only changes when a new urban plan is passed, and this is a fairly rare occurrence, happening more frequently when the real estate sector is booming. The % of municipalities presenting positive increases in the amount of developable land is around 20%. This number is around 75% during the full 2003-07 term-of-office. Thus, by aggregating the data over the term we reduce the number of censored observations considerably in our sample.

The eventual sample of 2,034 municipalities can be explained by data availability. In Spain, there are around 8,000 municipalities, but most of them are very small. The database providing information on land use categories covers the whole of Spain, but most of the other databases used are restricted to municipalities with over 1,000 inhabitants, which means the smallest municipalities have been eliminated from our sample. We have also eliminated from our sample those municipalities for which we either lacked political data or for which the data was not reliable. Eventually, we were restricted to a sample of 2,034 municipalities. We believe this sample to be representative of the full population because by far the vast majority of large municipalities (those with more than 5,000 residents) are included. Furthermore, we ran a number of checks on the smaller municipalities and found that the average values for many of the variables (those for which we have values for the full population) do not differ greatly from the overall average.

[14] For example, although we include the *Left* dummy as a control variable in the equation, the results derived from it will not be entirely reliable, since it is almost certainly correlated with many other factors. Proper identification of the effect of ideology on land supply would require a different method (e.g. 'regression discontinuity' as in Ferreira and Gyourko 2009). Here, we cannot claim to be doing this, rather we seek to show whether the sensitivity of land policy to political competition differs between governments controlled by parties of differing ideology.

The period analyzed is also a highly interesting one because, as discussed at the outset to this paper, urban expansion was very high with the boom in real estate recording peak figures during these years. Note that the prediction made by our model regarding the effect of political competition only holds in periods when demand pressures are expected to be high[15]. If demand pressures are low, the vacant land is able to accommodate them and new land assigned for development is zero, regardless of the levels of political competition. The period 1996-2002, which covers the first stages of the boom, would also have made an interesting study but, unfortunately, we do not have information for many of the variables in these years.

[Table 1 about here]

Land use data. The data used to measure the amount of developable land are taken from the Spanish property assessment agency and are derived as a by-product of the assessment process that this agency undertakes on all properties in the country. Although the values of properties are only reassessed from time to time, up-dates in the traits of each property (and, hence, its classification as developed, developable but vacant, or non-developable) is conducted yearly. The variable used to measure developable land has been constructed as the summation of built-up and vacant land areas. This is the only statistical source of data covering the whole of Spain that can be used to measure the land use category of undeveloped land plots. For example, the very rich data provided by the Corine Land Cover project (Ministerio de Fomento, 2006) could not be used in our case because it only measures what can be seen (already developed land) but not what has been approved by the local government but does not yet physically exist (land allowed to be developed). Recall that we believe the variable we use to be the most interesting because it reflects the main land use decision taken by local governments.

% *Vote margin*. The proportion of swing voters ψ is usually proxied in the literature by the incumbent's vote margin (Case, 2001; Johansson, 2003; Solé-Ollé, 2006; Besley *et al*., 2006; Svaleryd and Vlachos, 2009; Fiva, 2009). The intuition behind this is that, if the vote density function is single-peaked and symmetric, then increasing the margin of the vote always means a decrease in the density of votes (i.e. in the proportion of swing voters). In real settings, however, this might only hold approximately, meaning that the measure is prone to measurement error. This explains why some authors have proposed estimating the vote density function for each of the jurisdictions using survey data and then computing the density at the cut-point (see, e.g., Dahlberg and Johansson, 2002). One problem with this approach is that the data needed to estimate a different vote density function for each

[15] Remember that $\Delta \tilde{x}_1 \geq 0$ and that for $\Delta \tilde{x}_1$ to be positive (see expression 15) the size of the expected demand increase should exceed a certain threshold: $E(\Delta d_1/d_0) > -(\alpha_1/\alpha_3)\Psi - (\alpha_2/\alpha_3)\nu_0$.

jurisdiction are rarely available, and certainly not in a database containing more than 2,000 municipalities. At this point, it is interesting to note that Svaleryd and Vlachos (2009) find similar results regarding the impact of political competition on political rents in Sweden when using either of the two measures: vote margin or estimated cut-point density (using the previous estimates by Dahlberg and Johansson, 2002). A final consideration is that the measurement error problem could be attenuated by the use of Instrumental Variables methods, which only a few of the above cited papers apply (Svaleryd and Vlachos, 2009; Fiva, 2009).

Another important point involves deciding which election to use to compute the %*Vote margin*, the previous election (Case, 1999; Johansson, 2003; Solé-Ollé, 2006; Besley *et al*., 2006) or the upcoming one (Svaleryd and Vlachos, 2009; Fiva, 2009). Although the use of the %*Vote margin* in the previous election is usually intended to minimize endogeneity problems, some authors have suggested that this might not be the case (Larcinese *et al*., 2006). An example should serve to illustrate the possible bias generated by the use of this variable. Imagine voters vote prospectively, taking into account parties' positions regarding future development plans. If voters dislike development (as has been hypothesized in our theoretical model), then a more expansive plan will result in the incumbent losing some votes. If politicians remain true to their promises, then they will implement the plan once in office. This means that vote outcomes in *t*-4 are affected by developments in *t/t*-4 because more development occurs when the incumbent promises to undertake it, and these promises will have some effect on the vote. Another problem with using previous election results is that they might not actually be very informative in situations of vote volatility, since incumbents will probably have the forthcoming elections in mind when introducing the plan.

Using the margin of the vote recorded in the upcoming elections might increase the informational content of the variable but it is also likely to generate endogeneity problems. If expanding the amount of developable land has an adverse impact on future votes, then the OLS estimates of vote margin will be clearly biased to zero. Therefore, the only way to overcome this problem is to find a good instrument for the vote margin. Given our confidence in our instruments, we have decided to follow Fiva (2009) and Svaleryd and Vlachos (2009) and use the vote margin in the upcoming local elections (those of 2007) and estimate the equation by instrumental variables. The margin of the vote has been computed as the absolute value of the difference between the % of votes of the party/parties in local government and 50%. However, knowing that we might have opted for another solution, in the robustness checks we also discuss how the results of the estimation are affected when using the lagged vote margin. In the end, we find that both variables yield similar results, once they have been properly instrumented.

3.4 Econometrics

The two main econometric problems that need to be dealt with in the estimation of equation (16) are the endogeneity of the %*Vote margin* and the fact that, in a non-negligible proportion of municipalities, developable land has not grown during the period analyzed.

Instruments. The instruments for the %*Vote margin* should be both relevant (i.e. able to explain a considerable proportion of variation in the %*Vote margin*) and exogenous (i.e., correlated with the increase in developable land only through its effects on the %*Vote margin*). We use two instruments that we believe to fulfill both conditions. The first, % *historical margin*, is a vote margin computed using an incumbent's votes at the 2007 local elections as predicted by the votes obtained by the same party or coalition in the 1977 national legislative elections. To create this instrument, first, we compute the local incumbent's municipal vote share at the 1977 national elections, which we refer to as the % *historical vote* share (see Table 1 for details). Second, we estimate a bivariate relationship between the incumbent's vote share at the 2007 local elections (% *municipal vote* share) and the % *historical vote* share. Figure 1 shows this bivariate relationship; the OLS estimates are presented at the bottom of the figure. Third, we use this regression to compute a predicted vote share for the 2007 local elections, and the % *historical margin* instrument is then the absolute value of the difference between this fitted vote figure and 50%.

[Figures 2 and 3 about here]

This instrument is similar to that adopted by Svaleryd and Vlachos (2009) for the Swedish case and should be interpreted as the hypothetical % vote margin that the incumbent party/parties in the local government at the 2007 elections would face if their votes depended only on ideological considerations, which historically can be considered as being quite stable. As shown at the bottom of Figure 2, persistent partisanship can account for the geographically distinct patterns of voting in Spain, reflecting in all likelihood differences in cultural and historical experiences across the country. This persistence in the ideological vote would seem to be considerable. For example, it is a documented fact that the provinces in which the left won more votes at the first democratic elections held in 1977 were those in which the left-wing coalition was most successful in the elections held prior to Franco's dictatorship, in the 1930s[16]. Note, however, that we are using the results of the national legislative elections in 1977 to forecast those of the municipal elections in 2007. But even in this case the correlation is quite high[17], due to the fact that in Spain municipal elections work

[16] For example, the coefficient of correlation between the left vote share at the 1977 and 1936 national legislative elections at the provincial level is 0.699 (p-value=0.006). The correlation between the left vote shares at the 2008 and 1977 national legislative elections is slightly lower, but still statistically significant: 0.531 (p-value=0.041) (data from Carreras *et al.,* 2005 and the Ministerio del Interior, *www.elecciones.mir.es*).
[17] In this case, the correlation coefficient is 0.494 with a p-value of 0.049.

partly as by-elections for the forthcoming national elections (held two years later)[18]. So, it seems that our instrument based on the historical partisan vote could serve to forecast actual vote margins. In the results section we present a first-stage regression to test the strength of the instrument more formally.

But can this instrument be considered exogenous? For this to be the case, Cov(%*historical margin*, ε) should be zero. The main threat to this assumption is the fact that it is very difficult, as we explained above, to control for the increase in demand (i.e. $E(\Delta d_1/d_0)$). Despite all our efforts, the error term might still be picking some omitted demand pressures. Our instrument could not be considered appropriate if these demand pressures were correlated over time (i.e. if the municipalities booming in the last decade were also those booming in the 70s) and, simultaneously, political competition was low in these municipalities at that time. Let us examine the first of these two conditions. Since the housing market differed markedly in the two time periods, enjoying a boom in 2004-07 and suffering a bust in 1974-77 (see section 3.1), it is quite plausible that the correlation in demand pressures across Spain between the two periods is not very high. The reason for this might be that there are some places (e.g. coastal municipalities) that will tend only to show a higher (relative) growth in construction during boom periods. This is ultimately testable: the correlation between provincial housing stock growth (the same variable as that used in section 3.1 and Figure 1) in the two periods of the analysis is just 0.174 (p-value=0.217), and the correlation between boom and bust periods in the 70s and in the 90s is also low and not statistically significant[19]. These numbers contrast with the correlation between the periods of boom, the coefficients now being high and statistically significant[20]. So, we are able to argue that our instrument is exogenous because the housing market conditions in the two periods are very different, while at the same time (as we have explained below) there is some correlation in voting patterns. Let us now turn to examine the second condition. We expect that this too should be close to zero. The reason is that the causal relationship identified by our theoretical model - increasing land supply with the incumbent's rising vote share - should not be present in 1977. Note that this election was the first to be held in Spain after the reestablishment of democracy. At that moment, voters tended to vote according to how they believed the democratic transition should be handled, either by breaking completely with the old system (i.e., rejecting the monarchy) or by reaching an agreement with the elite members of the old system (e.g. Colomer, 1995b). Right-wing parties with a national electoral base

[18] The correlation between vote shares in these two consecutive elections is very high (the coefficient of correlation between left votes shares in the 2007 municipal 2008 is 0.701(p-value=0.006).

[19] The correlation coefficients between periods are: 1969-74 & 1974-77: 0.151 (p-value=0.281), 2004-07 & 1991-95: 0.174 (p-value=0.217).

[20] In this case the correlation coefficients between periods are: 2004-07 & 2000-04: 0.541 (p-value=0.000), 2004-07 & 1969-74: 0.456 (p-value=0.000).

favored a smooth transition, while left-wing and right-wing regionalist parties were, to varying degrees, more in favor of the other solution. Moreover, local governments at that time remained administrative agencies of the central government and local mayors were appointed officials (the first democratic local elections were not held until 1979), so policy decisions (including those concerning land use regulations) were not decided locally. However, it might be that despite there being no causal relationship between the two variables, they were correlated empirically (e.g. if places experiencing less growth at that time were also less competitive politically). To verify this possibility we have correlated the provincial left vote share and provincial vote margin in 1977 with housing growth in 1974-77. These correlations are found to be very small and non-significant, suggesting that political traits were not correlated with demand pressures circa 1977[21].

The second instrument is a vote margin computed using the incumbents' votes at the 2007 local elections as predicted by the votes obtained by the same (or similar) party at the national legislative elections of 2008 at the provincial level. To create this instrument we compute the vote share that the local incumbent's party/parties would obtain at the national legislative elections of 2008 if the vote share of each party was the same as that obtained at the provincial level, referred to as the % *provincial vote* share. Again, we run a regression between the % *municipal vote* share and the % *provincial vote* share, and we use this regression to compute a predicted vote share for the 2007 local elections. Finally, we compute the predicted vote margin as the absolute value of the difference between 50% and the fitted vote figure.

A similar strategy is also used both by Fiva (2009) and Svaleryd and Vlachos (2009). The idea underlying this instrument is that the vote at the local election is partly determined by local considerations and partly by voters' ideological preferences for a given party. There is evidence that this is indeed the case in many countries and especially in Spain (Bosch and Solé-Ollé, 2007), where the results of local elections are used to test the real strength of the incumbent and the opposition at higher tiers of office. We have already shown how similar these two electoral results are. What then about exogeneity? To fulfill this requirement, demand increases at the municipal level should not be correlated with increases at the provincial level. Although many empirical analyses have shown that housing construction is spatially correlated, they also show that this correlation shows spatial decay (Can, 1992). So, it is not clear that this correlation will make itself apparent when considering a regional level of aggregation. In order to check if this is or not a problem in our case, we have computed Moran's I (Moran, 1950) for the % increase in built-up area at the municipal level during the

[21]These two correlation coefficients are 0.045 (p-value=0.720) and -0.056 (p-value= 0.691).

period of analysis using several weights matrices: (i) first order contiguity, defined as being closer than 20 Km, (ii) second order contiguity, between 20 and 40 Km, (iii) third order contiguity, between 40 and 60 Km, (iv) fourth order contiguity, more than 60 Km, (v) first order contiguity, defined as belonging to the same province, (vi) second order contiguity defined as belonging to adjacent provinces, (vii) first order contiguity, defined as belonging to the same urban area, and (viii) second order contiguity defined as belonging to the province but not to the same urban area. The analysis suggests that spatial correlation in housing construction occurs mainly at close distances and within urban areas, but not between municipalities belonging to the same political unit (province) but to a different economic one (urban area)[22]. So, we have decided to compute our instrument using the aggregate provincial electoral results and discuss in the robustness checks the results when using only the vote numbers of municipalities in the province but in a different urban area.

Censoring. The other problem we need to deal with is the fact that our dependent variable is censored. In 545 municipalities (out of 2,034) the local government did not increase the amount of developable land during the 2003-07 term-of-office. To deal with this problem we estimate an IV-*Tobit* model, which simultaneously takes into account the censoring and the endogeneity problems. This censoring also suggests that it might be of some interest to analyze separately the discrete decision to undertake or not a reform of the urban plan. With this purpose in mind, we also estimate an IV-*Probit* model, where the dependent variable is the dummy variable $l(\Delta Urban\ Land_{i,t/t-4} > 0)$, which is equal to 1 if there has been a positive increase in the amount of urban land and 0 otherwise.

4. Results

Tables 2 to 6 show the results of the estimation of expression (15). Tables 2 and 3 show the Ordinary Least Squares (OLS) and Instrumental Variables (IV) estimates. Column (i) in each table shows the results when controlling for the amount of vacant land only. Column (ii) adds the basic set of demand controls (i.e. *Urban*, *Suburb* and *Beach* dummies, and *Land area*). Columns (iii) and (iv) add the provincial and urban area fixed effects to the equation, respectively, and column (v) extends the control set to include variables that proxy demand pressures and/or the disamenity effects of growth (i.e., % *employed in industry*, % *employed in the top-5 industries*, *amenity index, road accessibility*, *land area*, % *commuters*, % *homeowners*, *left*, % *graduate*, % *unemployed*, *population size* and *per capita income*). The remaining columns show the results obtained with combinations of the above controls. Table 4 shows the results when taking into account the censoring of the dependent variable. We

[22] Moran's I (and p-value) for these eight cases are: (i) 0.407, (ii) 0.170, (iii) 0.062, (iv) 0.020, (v) 0.072, (vi) 0.001, (vii) 0.134, and (viii) 0.034.

estimate a Tobit and a Probit equation, both by Maximum Likelihood (columns (i) and (ii)) and by IV (columns (iii) and (iv)). The Tobit includes the complete set of controls, but not the provincial and urban area fixed effects (since they where not statistically significant in this case), and the Probit includes all the controls plus the urban area fixed effects. Table 5 presents the results of several robustness checks. Finally, Table 6 estimates the equation for several sub-samples to determine whether the effect of political competition is higher or not in municipalities where the disamenity effects of growth are supposedly stronger. We present results by: type of municipality (*Suburb*, *City*, *Non-Urban & Beach* dummies, see Table 1), % *commuters* (high and low) and % *homeowners* (high and low), and ideology (*Left*, *Right*).

OLS *results.* The first column in Table 1 shows a positive and statistically significant effect of local political competition on the amount of land that local governments put in the market (i.e., declare as developable) during a term-of-office. The point estimate suggests that increasing the margin of victory by 1% (i.e., moving from 50% to 51% of the vote) would have led to a growth in developable land of 0.929% points during the period 2003-07 (when compared to the previous area of built up land in the town). Thus, an increase of one standard deviation in the vote margin (8.22%) would have resulted in a 7% increase in the standard deviation of the increase in developable land. However, the results obtained when including the various control groups cast some doubts on the validity of this conclusion. Point estimates fall by half when we include the basic set of controls and by two thirds when we include the fixed effects (provincial or urban area) or the additional controls. In three instances: with provincial dummies, with additional controls, or simultaneously with both at the same time, the coefficient is not statistically significant or it is significant solely at the 10% level. It is true, however, that provincial dummies (columns (iii), (vi) and (viii)) are not statistically significant and that additional controls are significant but both the p-values and explanatory capacity (in terms of R^2) are quite low[23]. Additionally (but for reasons of space not included in the table), a few of the coefficients of these additional controls are statistically significant individually, albeit at the 90% level[24]. Ultimately, the instability of the coefficients suggests that OLS are affected by omitted variable bias, a result that seems plausible given the difficulty of measuring demand shocks appropriately.

[Insert Table 2]

[23] Note that the main controls (%*Vacant land, Land area*, and *Urban*, *Suburb* and *Beach* dummies) explain a sizeable proportion of the variation in the increase in developable land, with the R^2 jumping from 10% to around 40%; the inclusion of urban area dummies adds a further 4%.

[24] % *commuters* and % *homeowners* are statistically significant at the 90% level and display a negative sign, which is consistent with the interpretation of these variables as proxying the disamenity effects of growth. However, as explained in section 4.2, given the difficulty of disentangling these effects from demand pressures, any attempt at interpreting these results would be inappropriate. The remaining variables are not statistically significant individually, although appropriate F-tests rule out (just) their elimination from the equation. Complete results are available upon request.

Moreover, the addition of different types of controls does not seem to lead to a reduction in the magnitude of the other type of bias, namely that derived from the endogeneity of the margin of the vote. If the increase in developable land has such a detrimental impact on voting prospects (as expression (9) suggests), then we should expect the OLS coefficients to be biased towards zero, the true coefficients being higher than those reported in Table 1. Note that the addition of controls reduces the size of the OLS coefficient, suggesting an upward bias, which does not therefore help to reduce the (hypothetical) endogeneity bias.

IV *results.* Table 3 shows the IV estimates of the same equations. The instruments used here are as described in section 4.2: % *historical vote margin* and % *provincial vote margin*. The top panel shows the first-stage results. Note that both instruments have a positive and significant effect on the % Vote margin. The bottom of the panel includes the partial F-statistic and the Craig-Donald minimum eigenvalue F-statistic for the first stage. The first statistic presents a value that is much higher than ten, which is the 'rule-of-thumb' used in the literature (Staiger and Stock, 1997)[25], suggesting that the instruments are able to explain a sizeable portion of the variation in the margin of the vote. A more precise test is the Craig-Donald F-statistic, which in any case corroborates the validity of the instrument, since the statistic is in all cases much higher than the values tabulated at a 5% maximal IV relative bias (Stock and Yogo, 2002). This result holds for all the specifications, and is therefore robust to the inclusion of the different sets of controls, including provincial and urban area fixed effects. Note also that both instruments are relevant in all equations, so our conclusions are not driven by just one of them.

[Insert Table 3]

The bottom panel shows the second stage results. The Hansen-J test, at the bottom of the panel, suggests that the instruments are uncorrelated with the error term, with p-values ranging from 0.3 to 0.7, and which are high enough for us to be confident of the power of this test. As for the results, two findings are worth highlighting. First, the vote margin coefficient is now around 2%, which means that the estimated effect of political competition on the provision of developable land is twice that of the largest OLS estimates reported in Table 1: an increase in one standard deviation in the vote margin generates an increase in the amount of developable land of around 17% of the standard deviation in the growth of developable land during the period analyzed. Second, the estimated coefficient is fairly stable across specifications, not being greatly affected by the inclusion of the different sets of controls.

[25] To take into account the fact that one of the instruments (provincial vote margin) draws on data aggregated at the provincial level (i.e., the provincial vote shares of the different parties), albeit combined with the actual composition of the local government, we cluster standard errors at the provincial level, a fact that is also taken into account in the computation of the first-stage F-statistics.

This constitutes an additional check on the validity of the instruments (see Altonji *et al*., 2005, and Dahlberg *et al*., 2008). Finally, it could be instructive to compare the magnitude of the OLS and IV results. Note that the IV results suggest that, the OLS coefficients are downward biased. This is consistent with our theory, which assumes that land development detracts votes.

Tobit & Probit results. One possible problem of the results presented up to this juncture is that they do not take into account the censored nature of the dependent variable. Approximately a quarter of the municipalities in our sample did not increase the amount of developable land made available during the period analyzed. In these cases the dependent variable is just zero. To deal with this problem we estimate a Tobit model both by Maximum Likelihood (ML), to deal specifically with the zero-censoring problem, and by Instrumental Variables to take into account the endogeneity of the vote margin variable. We also analyze by means of a Probit the decision to amend the plan, increasing the amount of developable land; the dependent variable is a dummy equal to one if the increase in developable land is positive and zero if not.

[Insert Table 4]

The first two columns in Table 3 show the Tobit results when including both the basic and the additional sets of controls. Neither the provincial nor the urban area dummies are included, since they are not jointly significant. The vote margin coefficients are statistically significant at the 99% level in both cases, Tobit-ML and IV-Tobit, and are higher than their OLS and IV counterparts, as expected. Columns (iii) and (iv) show the Probit results when including all the controls plus the urban area dummies. In both cases, Probit and IV-Probit, the vote margin is statistically significant at the 99% level. Also here, the IV coefficient is higher than that of the standard Probit. We can conclude, therefore, that stiffer electoral competition reduces the probability that a local government will undertake a reform of the plan and thereby increase the amount of developable land[26].

Robustness checks. Table 5 presents the results obtained when estimating the urban land growth equation with different instruments and when adopting a different method for computing our political competition variable. The first two columns present the results obtained when using just one instrument, either the historical or the provincial. The IV results remain basically unaltered. The provincial is not as strong as the historical instrument (although it also passes the weak instrument tests) and the estimated coefficients are almost

[26] It is worth noting that, contrary to results with the other specifications, here most of the additional control variables are statistically significant. Specifically, increasing % *commuters* and % *homeowners* has a negative and statistically significant effect (at the 95% level) on the probability of modifying the plan. Nevertheless, the any interpretation of these results is, as in the previous cases, hindered by the difficulty of controlling for demand shocks. Complete results are available upon request.

identical, suggesting that both instruments are indeed exogenous. The following two columns replace the provincial instrument with a similar instrument that uses the votes obtained in the municipalities of the province but not in the same urban area. Remember that there was some concern about the possibility that housing construction was spatially correlated; we argued that this spatial correlation would be stronger at short distances (i.e. within the same urban area) and that, given the greater size of the province it might well be the case that this problem does not emerge when using provincial voting numbers. The results presented in Table 5 suggest that this might indeed be the case since they are virtually the same in both instances. The last four columns repeat the analysis but replacing the vote margin computed on the basis of the 2007 local election results with a lagged vote margin, computed using the 2003 results. The OLS results are now much higher (the corresponding coefficient in Table 2 was 0.331), but the IV results, using the two instruments together or separately, are quite similar, with the point estimates also being quite close to two. These results, together with that of Hansen's J test, suggest that the instruments are exogenous. Note, however, that in this case the instruments have problems in passing the weak instrument tests (at least at the level of stringency set previously) and that the estimates are also less precise. Overall, the lagged definition of the vote margin also seems to work well: the OLS bias seems to be lower, and with our instruments, while results are not as good as before, they do not differ dramatically.

[Insert Table 5]

Heterogeneous effects. Table 6 explores the effect of electoral competition in various sub-samples of municipalities in order to determine whether this effect is indeed stronger in municipalities where the disamenity effects of growth - the δ coefficient - are stronger. Recall that this parameter is part of the α_1 parameter corresponding to the swing voter variable ψ in expression (8). Although some variables proxying these disamenity effects have already been included as controls in the equation, we argue that any interpretation of these results is not straightforward. It is more promising to see if the vote margin coefficient as estimated by IV (which can be consistently estimated) is indeed higher in samples where the δ coefficient is expected to be higher. With this purpose in mind, we divided the sample into the following subsamples: (i) Urban type (*Suburb*, *City*, *Non-urban* and *Beach*), (iii) Preference-for-growth variables: % *commuters*, % *homeowners*, (iv) Ideology of the incumbent (*Left, Right*).

[Insert Table 6]

Part (i) of Table 4 reports the results by urban type. The results suggest that a higher vote margin has a stronger impact on growth in *Suburbs* than in *Non-urban* communities, and that the lowest impact is on the growth in central *Cities*. These results are consistent with predictions made by Fischel (1985) which consider that people in the suburbs (a high proportion of whom are commuters) do not care about the positive consequences of growth

(e.g., more employment opportunities), something which is not true in either central cities or non-urban communities, which operate as more self-contained economies. There is some evidence, therefore, to suggest that differences in the degree of political competition have more pronounced effects in suburban areas, which ultimately means that urban growth has a more marked impact on the utility of their residents. The last case of part (i) shows the results for beach communities, with a coefficient that is fairly similar to that obtained for the full sample.

Part (ii) of Table 5 reports the results of the sub-samples with high and low % *commuters* and high and low % *homeowners*. A town is considered to have a high % of commuters if this variable is higher than the median, while it is considered to have a low % of homeowners (i.e., a high % of renters) if the variable is in the lowest quartile[27]. In both cases, we expect the response to political competition to be stronger in the high % cases. This is because homeowners supposedly dislike growth more than renters (that suffer the disamenity created by new residents as homeowners, but who have to pay the additional rents caused by a restriction in land supply, see Brueckner, 1995) and commuters supposedly dislike growth more than people working in the same community (because they also value the better employment opportunities associated with growth, see Fischel, 1985). The results in Table 5 show that this is indeed the case, with the effect of political competition on land supply in commuter towns being nearly four times that recorded in towns with fewer commuters, while the effect in towns with many homeowners is 50% higher than in that recorded in other places.

Part (iii) of Table 5 reports the effect when the sample is split by political ideology into towns on the left and right of the political spectrum (see Table 1). In Spain, parties on the political left typically attach greater weight to environmental issues (and thus are considered 'greener') than those to the right, a situation that is exacerbated in Spain by the fact that true 'green' parties are marginal to the Spanish political system. Urban plans tend to be considered 'greener' if they limit the consumption of open land. 'Compact development' - as opposed to urban sprawl - and 'smart growth' are terms with a clear association with Spain's left-of-centre parties. So, if local governments on the political left prefer less expansive land policies than those promoted by the right, we can also expect an increase in the margin of the vote to have a more marked effect in towns governed by the left. The results of Part (iii) in Table 5 show that this is indeed the case, the vote margin coefficient being nearly two times higher for governments on the political left.

[27] These rules have been chosen because, while the distribution of %commuters is quite symmetrical, that of % renters is asymmetrical with a very long right tail (i.e., most Spanish municipalities have a low % of renters and only a few have a very high %).

5. Conclusion

We have analyzed whether the degree of political competition can influence the decision of local government authorities in Spain to assign more (or less) land for development. Our findings show that during the 2003-07 term-of-office, coinciding with the peak in the country's last housing boom, the influence was indeed marked. Our IV estimates suggest that an increase of one standard deviation in the % *Vote margin* caused the amount of developable land to grow by around 17% of its standard deviation, which is a non-negligible number. In addition, we have shown that the impact of political competition is even more marked in municipalities where residents supposedly do not have any interest in development, as is the case of the suburbs or areas with a high percentage of commuters, where the above numbers are 29% and 45%, respectively.

We interpret these results to show that the different views regarding which groups have most influence on local land use policies (homeowners, renters, owners of undeveloped land or developers) are compatible. Towns with many commuters and homeowners introduce much more restrictive land policies when political competition is high than when it is low. This classical view is, however, compatible with developers lobbying politicians in order to obtain more expansive land policies, a situation that occurs when political competition is sufficiently low. The theoretical model presented allows for these two possibilities: depending on the degree of political competition resident voters or developers will tend to dominate the political process. However, in a significant number of Spanish municipalities, the degree of political competition is quite low, giving rise to the serious risk that local governments can be captured by developer lobbies.

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Table 1:
Definitions and sources of the variables

	Definition	*Sources*
% Δ*Urban land*	[(Built-up land + Vacant land in 2007) – (Built-up + Vacant land in 2003) / Built up land in 2003] × 100	DCG, Dirección General del Catastro (2007): "Estadísticas sobre ordenanzas fiscales del Impuesto sobre Bienes Inmuebles. Metodología empleada", http://www. catastro.meh.es / esp/estadisticas1. asp#menu1. (Built-up land = 'superficie edificada', Vacant land = superficie de solares)
% Vacant land	[Vacant land in 2003) / Built up land in 2003] × 100	
land area	[Total land area under the jurisdiction of the municipality / Built-up land 2003] × 100	INE (www.ine.es) & DCG, Dirección General del Catastro (2007)
% Vote margin	[abs(0.5 – vote share parties in the local gov. 2003-07) in the 07 local elections] × 100	
% Vote margin$_{t-4}$	[abs(0.5 – vote share parties in the local gov. 2003-07) in the 03 local elections] × 100	
% Historical margin	[abs(0.5 – predicted vote share parties in the local gov. 2003-07) in the 07 local elections] × 100	Ministerio del Interior, *Base Histórica de Resultados Electorales, http://www. elecciones.mir.es/MIR/jsp /resultados index.htm.* & El País (2003): 'Anuario Estadístico'
% Provincial margin	Predicted vote share, either of: f(vote share same party/parties obtained in the 1977 national legislative elections) f(vote share same party/parties obtained in the 2008 national legislative elections at the provincial level)	
Urban	Dummy = 1 if municipality belongs to an urban area	AUDES project, 109 urban areas defined using aerial photographs on the basis of geographical continuity (see www. audes.es),
Suburb	Dummy = 1 if municipality belongs to an urban area but is not the central city	
% *aged* 25-40	[Residents aged 25 to 40 in 2001/ Resident population in 2001] × 100	
% *immigrants*	[Immigrants by nationality in 2001 × Regional growth rate by nationality 2003-07/ Resident population in 2001] × 100	INE (www.ine.es), 2001 Census of Population
% *employed in industry*	[Employed in industry in 2001/ Employment 2001] × 100	
% *employed in the top-5 industries*	[Employed in the 5-fastest growing industries in the country during 2003-07 as of 2001/ Employment 2001] × 100	Social Security Register Employment Database
amenity index	[Houses with problems related to: noise, dirtiness, crime, pollution, or lack of green space, as of 2001/ Houses in 2001] × 100	INE (www.ine.es), 2001 Census of Buildings
road accessibility	[Houses with poor accessibility to roads, as of 2001/ Houses in 2001] × 100	
% *commuters*	[Commuters in 2001/ Resident population in 2001] × 100	
% *homeowners*	[Houses occupied by owner in 2001/ Houses in 2001] × 100	
% *graduate*	[Residents with a higher education degree in 2001/ Resident population in 2001] × 100	INE (www.ine.es), 2001 Census of Population & 'Estadística de Variaciones Residenciales' (several years)
% *unemployed*	[Residents which were unemployed in 2001/ Resident population in 2001] × 100	
population size	Resident population in 2001	La Caixa (2001): 'Anuario Económico de España'
per capita income	Personal income / Resident population	
left	Dummy = 1 if the mayor belongs to a left party during the 2003-07 term. Parties on the left are: PSOE, PCE, IC and several left regionalist parties	El País (2003): 'Anuario Estadístico'

Table 2: OLS *estimates of the effects of political competition* (*%Vote margin*) *on land supply.*
%Δ Urban land as dependent variable:. Sample: 2034 *Spanish municipalities during the term-of-office* 2003-2007.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
% Vote margin	0.918 (4.14)***	0.507 (3.42)***	0.320 (1.59)	0.331 (3.22)***	0.301 (1.68)*	0.328 (2.98)***	0.330 (2.76)***	0.298 (1.62)	0.332 (2.34)***
% Vacant land	--.--	-0.678 (-4.86)***	-0.713 (-5.64)***	-0.680 (-4.91)***	-0.718 (-13.85)***	-0.654 (-4.45)***	-0.698 (-4.32)***	-0.703 (-13.44)***	-0.676 (-4.21)***
Urban	--.--	8.455 (2.57)**	3.859 (1.41)	--.--	2.321 (2.55)**	--.--	--.--	2.112 (1.45)	--.--
Suburb	--.--	9.711 (2.45)***	8.764 (2.33)**	17.045 (2.59)***	7.481 (1.89)*	12.223 (2.67)***	8.911 (2.47)***	7.541 (1.91)*	9.213 (2.03)**
Beach	--.--	13.383 (2.84)***	10.764 (1.92)*	12.068 (2.62)***	10.930 (2.45)***	10.177 (2.59)***	10.003 (2.28)**	10.256 (2.74)***	10.112 (2.22)**
Land area	--.--	0.078 (5.67)***	0.077 (5.78)***	0.078 (5.76)***	0.077 (9.62)***	0.079 (5.99)***	0.079 (7.38)***	0.075 (9.33)***	0.079 (7.00)***
R2	0.150	0.401	0.410	0.438	0.418	0.411	0.450	0.432	0.452
F-stat. (*All variables*)	10.64 [0.000]	58.94 [0.000]	15.75 [0.000]	19.66 [0.000]	20.22 [0.000]	18.33 [0.000]	28.05 [0.000]	22.36 [0.000]	30.44 [0.000]
F-stat. (*Provincial dummies*)	--.--	--.--	1.11 [0.287]	--.--	--.--	0.38 [0.912]	--.--	1.32 [0.155]	0.32 [0.999]
F-stat. (*Urban area dummies*)	--.--	--.--	--.--	3.79 [0.001]	--.--	3.58 [0.002]	3.58 [0.002]	--.--	3.65 [0.001]
F-stat. (*Additional controls*)	--.--	5.04 [0.001]	--.--	--.--	2.08 [0.044]	--.--	1.57 [0.101]	2.00 [0.042]	1.66 [0.091]
Main controls	NO	YES	YES	YES	YES	YES	YES	YES	YES
Provincial dummies	NO	NO	YES	NO	NO	YES	NO	YES	YES
Urban area dummies	NO	NO	NO	YES	NO	YES	YES	NO	YES
Additional controls	NO	NO	NO	NO	YES	NO	YES	YES	YES

Notes: (1) *%Δ Urban land* = percentage increase in urban land area / developed land). (2) t-statistics in parenthesis; p-values in brackets; ***, ** & * = statistically significant at the 99, 95 and 90% levels. (3) Robust standard errors. (4) Additional controls include: *% employed in industry*, *% employed in the top-5 industries*, *amenity index, road accessibility*, *land area*, *% commuters*, *% homeowners*, *left*, *% graduate*, *% unemployed*, *population size* and *per capita income*; see Table 1 for the definition and sources of the variables. (5) *F-stat*. (*all variables*) = test of joint statistical significance of all variables; *F-stat*. (*Provincial dummies*) = test of statistical significance of the provincial dummy set, *F-stat*. (*Urban area dummies*) = test of statistical significance of the urban area dummy set; *F-stat*. (*additional controls*) = test of statistical significance of the additional control variables.

Table 3: Table 4: IV *estimates of the effects of political competition* (%*Vote margin*) *on land supply. Sample*: 2034 *Spanish municipalities* 2003-2007.

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
(a) *First-stage results* (% *Vote margin as dependent variable*)									
% Historical vote margin	0.681***	0.642***	0.660***	0.671***	0.728***	0.644***	0.655***	0.692***	0.703***
	(4.91)	(5.22)	(4.22)	(4.66)	(4.56)	(4.70)	(4.76)	(4.48)	(4.33)
% Provincial vote margin	0.322***	0.354***	0.319***	0.346***	0.303***	0.290***	0.314***	0.277***	0.286***
	(2.57)	(2.87)	(2.55)	(2.63)	(2.50)	(2.68)	(2.77)	(2.39)	(2.45)
R2	0.300	0.351	0.347	0.420	0.418	0.415	0.425	0.402	0.432
Partial F-stat (1st *stage*)	50.10	66.98	33.74	28.23	25.51	27.33	28.45	25.30	26.09
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Craig-Donald F-stat	45.34♣	54.08♣	32.67♣	25.44♣	26.78♣	28.33♣	27.47♣	29.42♣	26.19♣
(b) *Second-stage results* (%Δ *Urban land as dependent variable*)									
% Vote margin	2.231***	2.108***	1.939**	2.109***	1.975**	2.043***	2.154***	1.926**	2.137***
	(4.78)	(3.68)	(1.99)	(3.68)	(2.10)	(3.55)	(3.31)	(2.03)	(3.26)
% Vacant land	--.--	-0.727***	-0.713***	-0.727***	-0.719***	-0.705***	-0.734***	-0.712***	-0.732***
		(-5.56)	(-5.64)	(-5.56)	(-5.39)	(-5.42)	(-5.62)	(-5.01)	(-5.25)
Urban	--.--	4.901	3.859	--.--	4.111	--.--	--.--	3.872	--.--
		(0.94)	(1.41)		(1.44)			(1.22)	
Suburb	--.--	11.567***	8.764***	11.567***	7.362**	8.121**	10.219***	7.672**	10.328***
		(2.30)	(2.33)	(2.30)	(2.00)	(2.01)	(2.55)	(2.00)	(2.35)
Beach	--.--	9.653**	10.764*	9.653**	10.428**	10.666**	9.773**	10.086*	9.605**
		(2.13)	(1.92)	(2.13)	(2.18)	(1.98)	(2.08)	(1.77)	(2.10)
Land area	--.--	0.077***	0.077***	0.077***	0.078***	0.078***	0.079***	0.073***	0.075***
		(5.78)	(5.78)	(5.78)	(5.76)	(5.65)	(5.45)	(5.62)	(5.49)
R2	0.226	0.351	0.347	0.420	0.418	0.409	0.415	0.418	0.408
Hansen's J	0.249	1.398	1.399	0.904	0.164	0.920	0.918	1.335	0.911
	[0.610]	[0.407]	[0.409]	[0.342]	[0.685]	[0.333]	[0.330]	[0.398]	[0.339]
Main controls	NO	YES	YES	YES	YES	YES	YES	YES	YES
Provincial dummies	NO	NO	YES	NO	NO	YES	NO	YES	YES
Urban area dummies	NO	NO	NO	YES	NO	YES	YES	NO	YES
Additional controls	NO	NO	NO	NO	YES	NO	YES	YES	YES

Notes: (1) *F-stat* (1st *stage*): partial F-statistic of the excluded instruments in the first-stage regression. (2) Craig-Donald F-statistic to test for weak instruments; ♣ = statistic exceeds Stock and Yogo's weak ID tests critical values at 5% maximal IV relative bias (see Stock and Yogo, 2002); (3) Excluded instruments: % *historical vote margin* (computed with municipal data of the 1977 national legislative elections) and % *provincial vote margin* (computed with provincial data of the 2008 national legislative elections). (4) *Hansen's J*: overidentification statistic.

Table 4:
Tobit & Probit estimates of the effects of political competition
(*%Vote margin*) *on land supply.* %Δ *Urban land as dependent variable:*
Sample: 2034 *Spanish municipalities during the term-of-office* 2003-2007.

	(i) Tobit	(ii) IV-Tobit	(iii) Probit	(iv) IV-Probit
% Vote margin	0.522 (2.51)***	2.600 (2.08)***	0.007 (2.79)***	0.024 (4.75)***
% Vacant land	-0.727 (-5.94)***	-0.719 (-5.85)***	-0.002 (-2.23)**	-0.002 (-2.35)***
Urban	1.571 (1.00)	2.031 (1.211)	--.--	--.--
Suburb	31.527 (3.32)***	22.412 (3.04)***	0.511 (5.97)***	0.312 (4.24)***
Beach	25.700 (2.29)***	22.938 (2.26)***	0.262 (2.55)***	0.303 (3.12)***
Land area	0.088 (5.88)***	0.088 (6.32)***	0.0002 (2.71)***	0.0002 (2.68)***
F-stat. or χ2-*stat* (*all variables*)	18.07 [0.000]	11.27 [0.000]	69.24 [0.000]	180.33 [0.000]
F-stat. or χ2-*stat* (*Urban area dummies*)	1.12 [0.277]	1.00 [0.256]	57.47 [0.000]	30.22 [0.000]
F-stat. or χ2-*stat* (*added controls*)	4.49 [0.001]	5.21 [0.000]	40.36 [0.000]	45.98 [0.000]
Provincial dummies	NO	NO	NO	NO
Urban area dummies	NO	NO	YES	YES
Additional controls	YES	YES	YES	YES

Notes: (1) See Table 1. (2) Number of censored observations is 545 (out of 2034). (3)IV-Tobit & IV-Probit models estimated by Maximum Likelihood.

Table 5: *Robustness checks on the estimates of the effects of political competition* (*%Vote margin*) *on land supply. Sample*: 2034 *Spanish municipalities* 2003-2007.

	(i) *Just one instrument*		(ii) *Rest-of-province instrument*			(iii) *Lagged vote margin*		
	IV with *% historical*	IV with *% provincial*	IV- *two instruments*	IV with *% rest-of-province*	OLS	IV- *two instruments*	IV with *% historical*	IV with *% provincial*
% Vote margin	2.124 (3.55)***	2.004 (2.23)**	2.100 (3.44)***	1.966 (2.68)***	0.799 (2.23)**	1.876 (1.68)*	1.885 (2.23)**	1.764 (1.55)
Partial F-stat (1st *stage*)	30.34 [0.000]	15.66 [0.000]	25.30 [0.000]	14.55 [0.000]	--.--	12.82 [0.000]	10.55 [0.000]	8.33 [0.000]
Craig-Donald F-stat	33.67♣	18.22♣	23.42♣	18.33♣	--.--	18.03	19.38	14.33
Hansen's J	--.--	--.--	1.235 [0.403]	--.--	--.--	0.888 [0.350]	--.--	--.--

Notes: (1) See Table 2 to 4. (2) Main control and urban area dummies included in all equations. (3) Lagged vote margin (% *Vote margin*$_{t-4}$) computed with the votes the party/parties in the local government during 2003-07 obtained in the 2003 local elections. (4) % *rest-of-province margin* computed with the votes the party of the local incumbent obtained in the municipalities belonging to the province but not to the same urban area.

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Table 6: *Sub-sample* IV *estimates of the effects of political competition* (%*Vote margin*) *on land supply.* %Δ *Urban land as dependent variable: Sample*: 2034 *Spanish municipalities during the term-of-office* 2003-2007.

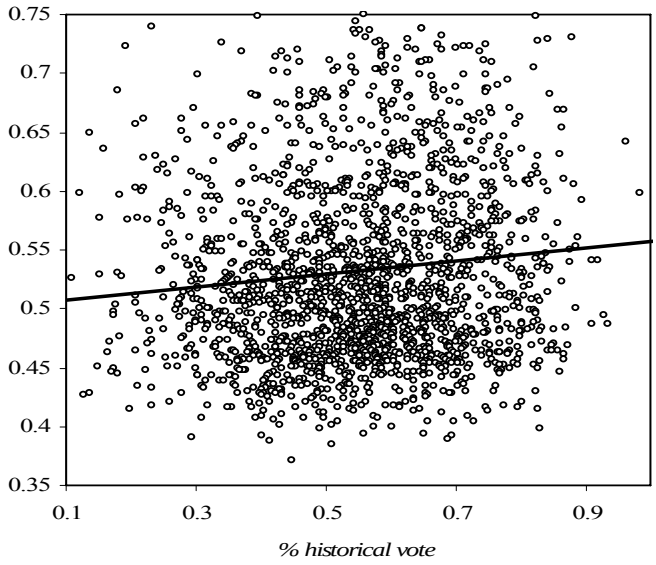
	% Vote margin	R2	*F-stat.* (*all vars*)	*F-stat* (1st *stage*)	*Hansen's J*
(i) *By urban type*					
Suburb (N=633)	3.729** (2.08)	0.356	24.77 [0.000]	19.67 [0.000]	0.163 [0.680]
City (N=108)	1.083*** (2.94)	0.666	23.48 [0.000]	21.89 [0.000]	0.078 [0.779]
Non-urban (N=1293)	1.873*** (4.07)	0.450	50.77 [0.000]	36.61 [0.000]	1.272 [0.259]
Beach (N=217)	2.313** (2.21)	0.418	24.19 [0.000]	15.68 [0.000]	2.589 [0.108]
(ii) *By preference-for-growth proxies*					
High % commuters (N=1017)	5.731*** (2.33)	0.368	23.40 [0.000]	19.2 [0.000]	0.033 [0.856]
Low % commuters (N=1017)	1.551* (1.76)	0.420	24.37 [0.000]	14.33 [0.000]	0.026 [0.860]
High % homeowners (N=1183)	2.501*** (3.33)	0.347	21.09 [0.000]	30.23 [0.000]	0.033 [0.856]
Low % homeowners (N=453)	1.711*** (2.78)	0.446	40.55 [0.000]	21.67 [0.000]	0.026 [0.860]
(iii) *By ideology*					
Left (N=847)	2.297*** (2.56)	0.262	39.02 [0.000]	15.66 [0.000]	0.027 [0.868]
Right (N=789)	1.414*** (2.41)	0.502	20.16 [0.000]	23.11 [0.000]	0.146 [0.702]

Notes: (1) See Table 2. (2) All equations include the basic control variables: *Vacant land, Land area*, & *Urban, Suburb, Beach* & *Urban area* dummies when appropriate.

Figure 1:
The Spanish construction cycle: *Housing stock growth, 1965-2007, & urban land area growth, 1991-2007.*

Notes: (1) *Housing stock growth* = % growth of the residential housing construction stock, computed as the ratio between yearly real investment in housing and the real money value of the previous year's housing stock; data from IVIE (2005); shown on the left axis; (2) Urban land growth: Growth of urban land area (Growth in built-up + Vacant developable land), as a percentage of previous year's built-up land area; data from 'Dirección General del Catastro' (several years); shown on the right axis.

Figure 2:
% incumbent's vote share at the local elections
(% local vote) against % incumbent's historical vote share

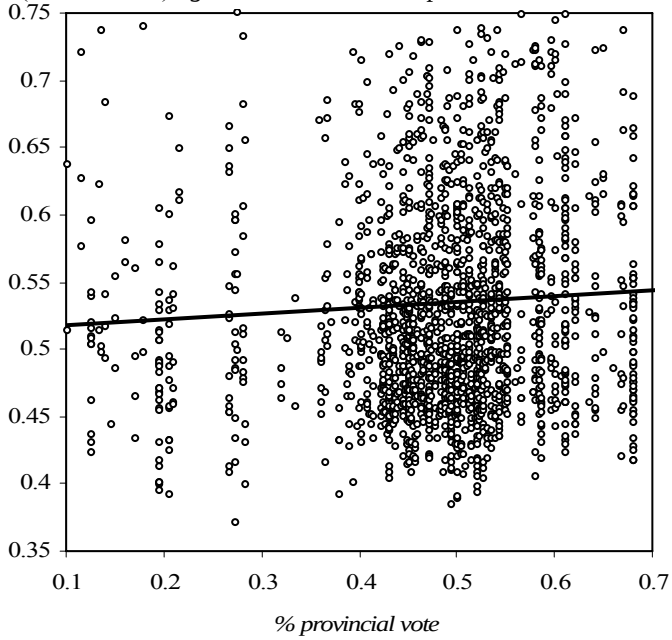


Notes: (1) % *local vote* = % vote share at the 2007 local elections of the party/parties in the local government during the previous term of office (2003-07); (2) % *historical vote* = % vote share at the 1977 general elections of the party/parties in the local government during the 2003-07 term of office. (3) Bold line is the regression line:

$$\%\ local\ vote = \underset{(76.21)^{***}}{0.48} + \underset{(4.41)^{***}}{0.06} \times \%\ historical\ vote$$

F(1,2034) = 19.47 (0.00), Standard errors clustered at the provincial level. N = 2034.

Figure 3:
% incumbent's vote share at the local elections
(% local vote) against % incumbent's provincial vote share



Notes: (1) % *local vote* = % vote share at the 2007 local elections of the party/parties in the local government during the previous term of office (2003-07); (2) % *provincial vote* = % provincial vote share at the 2008 general elections of the party/parties in the local government during the 2003-07 term of office. (3) Dotted line indicates the 50% vote share; Bold line is the regression line:

$$\%\ local\ vote = \underset{(57.23)^{***}}{0.51} + \underset{(3.38)^{***}}{0.04} \times \%\ provincial\ vote$$

F(1,2034) = 20.55 (0.00); t-statistics in parenthesis; ***,** & *= statistically significant at the 99, 95 and 90 % levels; standard errors clustered at the provincial level. N = 2034.

2009

2009/1. Rork, J.C.; Wagner, G.A.: "Reciprocity and competition: is there a connection?"
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2010

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