Economic and political determinants of urban expansion: exploring the local connection

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ABSTRACT:

We examine the economic and political determinants of decisions taken by local governments regarding the amount of new land to be assigned for development. The analysis draws on a massive database, which includes more than 2,000 Spanish municipalities during the 1999-2003 term-of-office. The increase in developable land in this period is explained using a wide set of variables that capture the specific traits of each municipality in 1999. The variables were selected following a review of recommendations made in the literature on urban growth controls and by taking into account other factors that might be considered specific to Spain. Our results show that urban expansion is influenced by a variety of factors. Thus, the communities found to be expanding most: (i) are rich, (ii) have more new housing purchasers, (iii) are in a weak financial position, (iv) are controlled by parties to the right of the political spectrum, (iv) have a low electoral turnout and local government bodies that do not face serious electoral competition, and (v) have more land but a lower proportion of environmentally valuable land.

JEL codes: H7, Q15, R52

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1.- Introduction

Over the last two decades Spain has witnessed a striking increase in the proportion of its developed land. According to data provided by the aerial photographs of the *Corine Land Cover* project (Ministerio de Fomento, 2006), between 1987 and 2000, the artificial land area grew by 29.5%, roughly one third of its overall historical record. This growth, however, is unevenly distributed across the country, being especially intense in urban areas (e.g., Madrid, which grew by 50% during this period) and tourist zones along the Mediterranean coast (e.g., Murcia, Valencia and the Balearic Islands grew by 60, 50 and 40%, respectively). Most of this development took the form of low density urban growth (up by 30% during the period) and scattered growth (up by 26%), while the area undergoing compact development increased by a meager 4.1%[1].

Many of the journalists, academics and politicians that have addressed this issue in Spain consider this growth to be excessive (e.g., Martin Mateo, 2007). High urban growth and its sprawling nature are blamed for congestion and pollution, for raising the costs of public services (Hortas and Solé-Ollé, 2007) and for bringing about the loss of open spaces (García and Riera, 2003; European Environmental Agency, 2006). At the same time, others, unsurprisingly, deem this growth to be low and claim that, despite the expansion, housing prices rose rapidly from the mid 90s, causing a housing affordability problem. Any attempt at resolving this controversy, however, lies beyond the scope of this paper. Our aim, here, is simply to provide an initial exploratory analysis of the causes of this process of urban expansion. Clearly the main factor in Spain since the mid 90s has been the growth in demand for both residential and holiday homes. This rise in demand has many explanations, ranging from high population and income growth, to low interest rates and the surge in foreign investment.

But besides these extremely general factors, Spanish commentators have also identified a number of other influences that are specific to a region, or even a municipality. The first influence noted is the high degree of government fragmentation, which means that the main land-use regulatory responsibilities in Spain are in the hands of more than 9,000 municipalities[2]. These bodies are perceived to care only about local interests, paying scant regard for the protection of regional or national public goods such as the protection of environmentally-

[1] The data available for the period 1999-2003, taken from the Dirección General del Catastro (see section 4 for details) and used in our empirical analysis, suggest that the intensity of the phenomenon in recent years is even stronger, with built-up and developable land area growing by 11.4% and 11.7% respectively in a four-year period.

[2] In fact, these powers are shared with regional governments. The latter can declare certain areas as protected zones, and are responsible for passing general regulatory framework laws and for approving municipal land-use plans. Municipalities have, however, a large margin of maneuver in urban growth decision-making (see, e.g., Riera et al., 1991 for a description of land-use regulation in Spain).

valuable open-spaces[3]. A second influence is related to the system used to finance Spanish municipalities (Fundación Alternativas, 2007, cap. 4). This relies heavily on revenues related to development and includes the *property tax*, the *tax on building activities*, the *tax on land transactions*, and the obligation that developers are under to give a portion of newly-developed land to the municipality. It has been argued that some short-sighted municipalities choose to ignore the future costs of development, preferring to see new development solely as a 'revenue-machine'[4]. A third influence is related to the corruption present in the conversion of land from a rural to urban use. Since urban boundaries in Spain are only updated from time to time, a surge in demand generates a huge price differential at the fringe, thereby creating the rent needed to fuel the bribes paid by developers to local politicians[5].

However, while all the municipalities (at least those in one region) operate within the same financial and regulatory framework and face similar demand pressures, not all are equally likely to expand the amount of developable land. It is precisely these different local responses that this paper seeks to understand. Here, we shall not limit ourselves to examining the narrow range of local explanations outlined above (i.e., local finances and politics), but rather we intend to analyze the theory of growth controls (see section 2) so as to provide additional hypotheses for testing. This focus on local explanations is quite novel in the literature. Most empirical analyses that seek to explain urban expansion in the US use data aggregated at the metropolitan area level and focus, therefore, on inter-regional variation in urban growth patterns (e.g., Carruthers, 2003; Carruthers and Ulfarsson, 2002; Burchfield et al., 2006). However, as stated above, we are interested in understanding the causes underlying the decision to put more developable land on the market, which in the case of Spain is a decision mainly taken by the municipalities. An inter-regional analysis would hinder any attempts at monitoring the effect of specific municipal traits on urban growth.

However, only a few papers - most of which it must be said are interested in explaining differences in land use regulation practices across US local governments than in determining growth outcomes - have recently started to conduct intra-regional analyses (e.g., Bates and Santerre, 1994; Brueckner, 1998; Evenson and Wheaton, 2003; Evenson, 2003; and Glaeser

[3]The opinion that Spanish municipalities are overgrazing the commons has been made known by several journalists. For example, Enrique Gil Calvo described Spanish urbanism as a 'tragedy of the commons' (Hardin 1968); see the article "El mal de Marbella" (*El País*, 24/04/2006).

[4] In a recent editorial, a Spanish newspaper described this very situation: "the municipalities, indebted and without the necessary flow of income from their own revenues, see in land development their main and most tempting source of finance" (*El País*, 6/10/2006).

[5] The 2006 report conducted in Spain by Transparency International states that one of the main corruption problems in Spain occurs at the local level and is related to land-use regulation. The report states that "the higher levels of corruption are found in local governments" and are mainly caused by thier "ability to change the land-use status".

and Ward, 2006). Thus, our paper resembles these quite closely, as we also focus on land use decisions made by local governments. The papers by Evenson (2003) and Evenson and Wheaton (2003) are perhaps most similar to ours, since their aim is to explain intra-regional differences in the amount of protected land area - the diametrically opposite variable to the one which we analyze here i.e. the amount of land assigned for development. The main distinction that can be drawn with these two papers, however, is that, instead of analyzing the absolute amount of developable land that each municipality has in a given year, we focus on the amount of land that each local government added to the stock of developable land during a term-of-office. By relating the growth in developable land to the initial traits of each municipality we are able to attenuate the endogeneity problems which plague cross-sectional analyses and, at the same time, we can concentrate on the real decision taken by local governments (i.e., the passing of a new land regulation allowing a certain amount of new land to be developed). Our procedure will allow us to disentangle these municipal-specific factors from area-wide influences. With this purpose in mind, we divide Spain into a number of areas and introduce a fixed effect into the equation for each of them, so we are in fact analyzing urban expansion of municipalities relative to that of the area where they belong.

In undertaking our analysis we use data concerning the amount of developable land provided by the Spanish national property assessment agency (*Dirección General del Catastro*, Ministry of Economics and Finance). We believe that this variable captures more than adequately the change in the regulatory status of municipal land and, therefore, it is appropriate for our analysis. We focus on the new land assigned for development during 1999-2003, which covers one term-of-office for the Spanish municipalities. The explanatory variables are measured for the first year in the period, i.e. 1999. The paper is organized as follows. The second section provides a basic theoretical framework within which we are then able to develop the various hypotheses we seek to test. In the third section, we perform the empirical analysis, present the equation, discuss the econometrics, and describe the specific variables used. The results are presented in the fourth section. The last section provides the main conclusions of the paper.

2.- Theoretical framework

The purpose of the paper is to analyze decisions taken by municipalities concerning the amount of ‘developable land’, leaving to one side all other regulations included within planning documents. This approach has two main advantages; first, in practical terms, this is what in fact we are able to measure for all Spanish municipalities; second, in theoretical

terms, a number of papers have previously been published that model local decision-making regarding 'growth controls' and 'urban growth boundaries', the terms used to refer to the amount of developable land. In this section we review this body of literature so that we might derive several theoretically-founded hypotheses related to urban expansion. The impact of 'urban growth controls' can be analyzed using the standard urban model developed by Alonso (1964), Muth (1967), Mills (1972) and Wheaton (1974). The papers by Brueckner (1990 and 1995) and Brueckner and Lai (1996) model growth controls using this approach. In this section we will use a simplified version of the model (Brueckner, 1999) to derive our testable hypotheses.

The rest of the section is organized as follows. First, we present the basic version of the model, which assumes that growth controls are chosen solely to reflect the interests of landowners. Second, we present additional results obtained when renters and owners of undeveloped land are allowed to play some role in the political process. Third, we discuss the effects of introducing open space benefits and of allowing these benefits to spill over community boundaries.

2.1.- *Basic model: when landowners dominate the political process*

The basic version of the model works as follows. We have an area labeled k which has n_k communities. Each community i is populated by mobile renters who commute to work in the central part of the community, where they are able to obtain a wage premium w_i while incurring time and money costs that increase with distance l from their place of residence to the center, and which are given by $t_k l$. We also assume that t_k is the same in all communities, which is appropriate here as we cannot measure this variable at the municipality level. Renters consume land, the amount of which is fixed at one unit per household, and a private good, denoted c_i. The utility of each resident also depends on amenities, a_i, and on the population size of the community, N_i: $u_i = c_i + a_i - \beta_i N_i$ where β_i is an externality parameter, reflecting the impact of new residents. We also allow this to differ across communities. It is also assumed that the land under the jurisdiction of the community (both developed and undeveloped) is owned by absentee landowners. The budget constraint of a renter household living at a distance l from the city center is $c_i + r = w_i - t_k l$, where r is the rent per unit of land. Rearranging this equation we obtain the bid-rent function $r = w_i - t_k l - c_i$. This bid-rent function is downward-sloping, indicating that rents are higher the closer you move towards the center.

Consider now the growth control decision of a controlling city i assuming that the remaining n_k-1 cities of the urban area are passive. In this case, the equilibrium conditions are:

$$l_i + (n_k - 1)l_k = \tilde{N}_k \tag{1}$$

$$c_i + a_i - \beta_i N_i = c_k + a_k - \beta_k N_k \tag{2}$$

$$w_k - t_k l_k - c_k = 0 \tag{3}$$

Where l_i and l_k are the spatial sizes chosen by the controlling city and by the (identical) passive cities. The first condition says that the total renter population $\tilde{N}_k$ must live in one of the n_k communities. The second says that utility must be the same in the controlling city as it is in its passive counterpart, and the third condition says that boundary rent must be zero in passive cities. Solving the system (1)-(3) we can obtain the expressions for c_i and c_k as a function of l_i. These expressions (which are omitted here for reasons of space) tell us that consumption falls in both communities as l_i is reduced. This is a direct consequence of the higher land rents in both communities. The utility of the renter is also affected negatively by a reduction in l_i. However, total land rent in the community increases as l_i is reduced because although there is a loss of rental income at the edge of the city (less land is developed), there is a gain in interior rents owing to an increase in the level of the land-rent function. Total land rent is maximized when these two effects are equal. This growth control model therefore depicts a conflict of interests between landowners and renters: the first group demanding less development and the second demanding more. The solution obtained depends on which group is assumed to have more political power. Traditionally, it has been more common to maintain the assumption that landowners dominate the political process (see, e.g., Brueckner, 1999 and Brueckner and Lai, 1996), with the boundaries being chosen in their best interests. In this case, the government is assumed to maximize total land rent, which can be expressed as:

$$V_i = \int_0^{l_i} (w_i - t_k l - c_i)\mathrm{d}l \tag{4}$$

The derivative of this expression with respect to the boundary l_i is:

$$\frac{\partial V_i}{\partial l_i} = \underbrace{w_i - t_k l_i - c_i}_{\text{boundary rents}} - \underbrace{\int_0^{l_i} \frac{\partial c_i}{\partial l_i}\mathrm{d}l}_{\text{interior rents}} \tag{5}$$

Where the first part of the expression is the gain in boundary rents derived from the increase in the amount of developed land, and the second part is the loss in rental income due to a reduction in the level of the land-rent function. Now, substituting the expressions for c_i and $\partial c_i/\partial l_i$ and setting the results so that they are equal to zero, we obtain the following expression for the spatial size of the community:

$$l_i = \frac{(w_i + a_i) - (w_k - a_k) + \varphi_k \tilde{N}_k}{2(\beta_i + \varphi_k) + t_k} \qquad \text{where} \quad \varphi_k = \frac{\beta_k + t_k}{n_k - 1} \tag{6}$$

Expression (6) says that urban expansion depends on influences that are specific to each community (indexed by *i*), since urban expansion will be higher: the greater the wage premium and/or the level of community amenities ($\partial l_i / \partial w_i > 0$ and $\partial l_i / \partial a_i > 0$), and the lower the disamenity effects created by the new residents ($\partial l_i / \partial \beta_i < 0$). Urban expansion also depends on area-wide influences (indexed by *k*), since it will be higher: the lower the wage premium and/or the level of amenities in the other communities ($\partial l_i / \partial w_k < 0$ and $\partial l_i / \partial a_k < 0$), the higher (the lower) the population and number of municipalities ($\partial l_i / \partial \tilde{N}_k > 0$ and $\partial l_i / \partial n_k < 0$), the higher the disamenity effects of additional residents in other places ($\partial l_i / \partial \beta_k > 0$), and the higher travel costs in the area ($\partial l_i / \partial t_k > 0$). As explained above, we will not focus on these inter-regional differences. However, in order to obtain unbiased estimates of their effects we will control for all the area-wide influences by including area fixed effects in the equation.

2.2.- *Homeowners vs renters and land developers*

The model presented in the previous section assumes that absentee landowners control the political process. It is interesting to note that, as Brueckner and Lai (1996) show, homeowners (who are residents in the community) would still have more incentives to restrain growth than renters, although fewer than the absentee landowners. Therefore, we can naturally extend the same hypotheses developed above to a model that assumes that homeowners control the political process, i.e., the so-called 'homeowner-voter' hypothesis, proposed by Fischel (1990). However, in practice, it is not entirely clear that homeowners have such great political weight, for several reasons. First, although it is clear that the median voter is a homeowner in most cases, each individual renter may have more influence if the correct model focus on swing voters or on interest group lobbying, as Hilber and Robert-Nicoud (2006 and 2007) suggest. Second, in practice, renters may constitute a larger group than is typically assumed, since there may be a group of relatively immobile new buyers that are also affected negatively by rising rents.

The way for a renter's influence to be taken into account in the urban growth model (see, e.g., Brueckner, 1999) is to assume that the local government maximizes a weighted sum of renter utility and land values, with weights λ_i and $(1 - \lambda_i)$, respectively[6]. In this case (omitting again the algebra for reasons of space), the spatial size of the city is:

[6] Our model does not explicitly model the political economy of urban growth boundaries. However, it allows for an interpretation of which groups might have some power to influence this outcome and, therefore it helps in identifying the main political forces that should be taken into account in the

$$l_i = \frac{(w_i + a_i) - (w_k - a_k) + \varphi_k(\lambda_k/(1-\lambda_k)) + \varphi_k \tilde{N}_k}{2(\beta_i + \varphi_k) + t_k} \quad (7)$$

Expression (7) says that, in addition to the factors identified above, urban expansion will also be higher, the greater the political weight of renters in a municipality ($\partial l_i / \partial \lambda_i > 0$). The political weight given to renters will depend both on their number and on the political clout of a renter relative to that of a homeowner.

The evidence regarding the 'homeowner hypothesis' is scarce even in the US. Some authors argue that this is because traditional analyses considered the owners of land as a monolithic block, ignoring the differences between owners of developed land (i.e., homeowners) and owners of undeveloped land or land developers (Hilber and Robert-Nicoud, 2006 and 2007). However, as these authors also note, land rent maximization gives some political weight to owners of undeveloped land, since relative group power is proportional to the stake of the group in terms of rents. These authors suggest that this is consistent with modeling political power through the use of a lobbying model à la Grossman and Helpman (1994). We believe, however, that in many instances the owners of undeveloped land might have more power than is actually suggested by their share in total land rents. Note that, given that undeveloped land property tends to be highly concentrated, land developers may be a rather small group. In line with Olson's (1971) thinking, they might find it easier (compared to the homeowners) to organize themselves into group to lobby the local planner[7].

In the context of the present model, a simple way to account for this possibility is to assume that the local government gives a weight of one to the gain in rental income at the city boundary when more land is developed (which benefits land developers), and a weight of $0 < \eta_i < 1$ to the loss in rental income due to a reduction in the level of the land-rent function (which benefits homeowners), thereby increasing the 'relative' power of land developers. So we simply multiply the second term in (5) by that η_i parameter and operate as before to obtain the spatial size of the city:

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empirical analysis. There is a remarkable scarcity of political economy models of land-use regulations, exceptions being the papers by Glaeser et al. (2005) and Hilber and Robert-Nicoud (2007), which focus on the effects on regulatory intensity instead than on the amount of developable land. However, the predictions of these models regarding the effect of the different groups have the same flavor than ours.

[7] Of course, the fact that such a small group of people is able to influence disproportionately local government decisions suggest the possibility of corruption. It should be clear, however, that we are not able to measure corruption in our empirical exercise, but only urban expansion, which might have involved or not bribing by developers to politicians. There are some recent papers on local government corruption (e.g., Henderson and Kuncoro, 2004, Bertrand and Kramarz, 2007, Ferraz and Finan, 2007) but few of them deal with corruption in land-use regulations (see, e.g., Glaeser et al. 2005).

$$l_i = \frac{(w_i + a_i) - (w_k - a_k) + \varphi_k \tilde{N}_k}{(1+\eta_i)(\beta_i + \varphi_k) + t_k} \tag{8}$$

Note that when η_i=1 (i.e., both groups have the same weight), expressions (8) and (6) are identical, but that when $\eta_i < 1$ (i.e., land developers have more political clout) the spatial size of the city is bigger than suggested in (6). When only land developers count (η_i=0), it can be shown that the spatial size of the city is equal to the market size, which could be obtained by equating the bid-rent function to agricultural rents, assumed as being zero. Thus, our equation will include proxies for the political clout of owners of undeveloped land.

2.3.- *Open space benefits and interjurisdictional spillovers*

Let's assume now that the residents in one community also derive benefits from open space[8]. These benefits are modeled in a very simple manner, assuming that they are equal to $\gamma_i(\ell_i - l_i)$, where ℓ_i is total land area under the jurisdiction of the local government, $(\ell_i - l_i)$ is the amount of open space, and γ_i is the value of open space, which might differ from one community to another. Let's assume that the resident in one community also derives utility from open space in the rest of the area, $n_k(\ell_k - l_k)$, but that the utility provided by one unit of regional open space is only $\theta\gamma_k$, with $0 \le \theta \le 1$. The utility of the mobile renter is now $u_i = c_i + a_i - \beta_i N_i + \gamma_i(\ell_i - l_i) + \theta\gamma_k n_k(\ell_k - l_k)$. Maximizing total land value we obtain:

$$l_i = \frac{(w_i + a_i) - (w_k - a_k) + (1-\theta)(\gamma_i \ell_i - \gamma_k \ell_k) + \varphi_k^{'} \tilde{N}_k}{2(\beta_i + (1-\theta)\gamma_i + \varphi_k^{'}) + t_k} \quad \text{where} \quad \varphi_k^{'} = \frac{\beta_k + (1-\theta)\gamma_k + t_k}{n_k - 1} \tag{9}$$

The effect of total land area on the community is positive ($\partial l_i / \partial \ell_i > 0$), meaning that the effect of open space is similar to that of any other amenity: if people value it, there will be more pressure to develop. The total land area of the community does not have any effect on urban expansion when open space is a purely regional public good (i.e., $\theta = 1$). Note also that an increase in the degree of publicness of open space θ (assuming symmetry in the endowment and value of open space) increases the spatial size of the city since it makes no sense to care more about open space in the community than in the rest of the urban area. The effect of an increase in the value of open space ($\partial l_i / \partial \gamma_i$) is, however, less clear, since it has an effect on the amenity value (in the numerator) but it also increases the disamenity effect of population (this effect increases from β_i to $\beta_i + (1-\theta)\gamma_i$, in the denominator). To account for these influences we will include in the equation the total amount of land in the community (ℓ_i) and several measures of the proportion of land that is more valuable (a proxy for γ_i).

[8] See Evenson (2003) and Evenson and Wheaton (2003) for discussions that consider the possible influence of the value of open space on urban expansion.

3.- Empirical analysis

3.1. *Empirical specification*

Let's assume that in period 0, after winning elections, the new government of *i* looks at the structural traits of the municipality and decides on the desired amount of developable land:

$$l^*_{i,0} = \alpha_1 w_{i,0} + \alpha_2 a_{i,0} + \alpha_3 \beta_{i,0} + \alpha_4 \lambda_{i,0} + \alpha_5 \eta_{i,0} + \alpha_6 \ell_{i,0} + \alpha_7 \gamma_{i,0} + \alpha_8 z_{i,0} + f_k \quad (10)$$

where $w_{i,0}$ is the wage premium that can be obtained in municipality *i*, $a_{i,0}$ are amenities, $\beta_{i,0}$ are the disamenity (or amenity) effects caused by new residents, $\lambda_{i,0}$ and $\eta_{i,0}$ are the political weights of renters and owners of non-developed land, proxied by a set of socio-demographic and political variables, $\ell_{i,0}$ is total land area under municipal jurisdiction, $\gamma_{i,0}$ are open space benefits, $z_{i,0}$ are other municipal-specific drivers, and f_k are area fixed effects, capturing possible influences that are common to all the municipalities in a given area.

Then, let's assume for the moment that the actual amount of developable land $l_{i,0}$ is lower than $l^*_{i,0}$ and that the government decides to eliminate this deficit as soon as possible. Given that it takes time to amend existing planning documents or to draft new ones, at the end of the term-of-office the government has eliminated a portion ρ of the initial deficit. This description of the decision-making process can be summarized in the following equation:

$$\Delta l_i = \rho(l^*_{i,0} - l_{i,0}) + \varepsilon_i \quad (11)$$

where ε_i is an error term with the usual properties. Now, substituting (10) into (11) we obtain the following equation:

$$\Delta l_i = \delta_0 l_{i,0} + \delta_1 w_{i,0} + \delta_2 a_{i,0} + \delta_3 \beta_{i,0} + \delta_4 \lambda_{i,0} + \delta_5 \eta_{i,0} + \delta_6 \ell_{i,0} + \delta_7 \gamma_{i,0} + \delta_8 z_{i,0} + f_k + \varepsilon_i \quad (12)$$

where $\delta_0 = -\rho$ is the adjustment coefficient, and the α coefficients in (10), measuring the long-run effect of a variable on the desired amount of developable land, can be obtained by dividing the δ coefficients by ρ. There are certain advantages to be gained from estimating equation (11) instead of using only a cross-section of data on developable land. First, by relating the growth in developable land to the initial traits of each municipality we are able to attenuate the endogeneity problems which plague cross-sectional analyses. Second, this approach allows us to concentrate on the actual decision taken by the local governments, which involves passing a new land regulation allowing a certain amount of new land to be developed.

3.2. *Econometrics*

The estimation of equation (12) entails two main problems, namely, the difficulty of controlling and measuring all the area-wide influences on local development, and the possible estimation bias caused by the censoring of the dependent variable.

Area-wide influences. As expressions (6) to (9) show, the amount of land assigned for development does not depend only on municipal traits but also on area-wide influences including, for example, the population, income, amenities, commuting costs and number of municipalities in the area. It could also be argued that the increase in developable land should depend not only on the deficit of land at year zero (expression (11)) but also on forecasted demand growth, which may also become higher, the higher the population and income growth for the entire area are during the period considered. We could have dealt with this problem by attempting to quantify all these area-wide influences. However, such a procedure would be plagued by many problems, such as the endogeneity of area-wide demand variables (i.e., a higher supply of land might also stimulate demand), or the omission of other variables. For this reason, we decided to control for all these influences by including a set of area fixed effects in the regression. Although it is true that we will not now be able to obtain results for the area-wide effect, it is also the case that the coefficients obtained from this intra-regional analysis for the municipality-specific variables will not be affected by the econometric problems stated above.

To create the set of fixed effects used in our regression we first divided all the Spanish territory into a mutually exclusive number of areas. We define three types of area: urban, non-urban and tourist. Urban areas include all the municipalities located less than 30 km from a central city with more than 100,000 residents or located less than 15 km from a central city with more than 50,000 but fewer than 100,000 residents. This criterion is similar to that used in previous analyses (see, e.g., Solé-Ollé and Viladecans-Marsal, 2004). In total, we identified 64 urban areas. Non-urban areas include all the municipalities in a province (NUTS-II EU regions) that are neither urban nor tourist. Since there are 50 provinces, there are also 50 non-urban areas. Tourist areas are the non-coastal municipalities located less than 10 km from a main *tourist resort*, plus the coastal municipalities located less than 10 km from a main coastal tourist resort, plus the non-coastal municipalities located at less than 5 km from any coastal municipality included in the tourist area. A main tourist resort is a municipality with a *tourist index* higher than 300 that is not located less than 10 km from another tourist municipality with the same trait but with a higher tourist index. The tourist index is computed as the average per capita local business tax revenues coming from tourist-related activities

(e.g., hotels, restaurants, etc.), and is expressed in relation to the average (see Table A.1 in the Annex). Using this procedure, we identified 99 tourist areas.

Censored data. Recall that to justify the adjustment process in (10) we assumed that the actual amount of developable land $l_{i,0}$ is lower than $l_{i,0}^{*}$. However, this may not be the case in all municipalities. In some cases, the amount of land put on the market by previous governments, and still vacant, may be sufficient given demand forecasts. In other cases, the new government may consider the amount of land assigned for development by the previous government to be too high. But, even if the desired amount of developable land is higher than the actual amount, the local government will find it very difficult to convert land already declared developable into open spaces. The reason for this irreversibility of status is that when a plot of land is declared developable its price increases abruptly, creating a (non-realized) capital gain for its owner, which is protected under Spanish law. The only option open to a government wishing to revert this situation is to buy open space at its market value, a transaction that is not very common in Spain, given the shortage of local financial resources. Therefore, although in many cases the desired increase Δl_i^{*} is negative, the real increase Δl_i appears to be zero. In fact, around 25% of the observations of Δl_i in our database are zero. This means that our dependent variable is censored and that OLS estimates of equation (12) will be biased if the decision to expand developable land is correlated with the desired increase in the amount of developable land, something that is plausible a priori.

To solve this problem we estimate a Tobit model following the two-step procedure proposed by Heckman (1976 and 1979). In the first step we estimate a selection equation using a probit model of the decision to expand the amount of developable land, where the dependent variable is an indicator equal to one if $\Delta l_i > 0$ and equal to zero if $\Delta l_i \leq 0$. The explanatory variables for this first step are all those included in (12). The results of the probit estimation are used to construct the "inverse of the Mill's ratio", which is then included in an OLS estimation of equation (12) using only those observations with $\Delta l_i \geq 0$.

3.3. *Variables and data*

Sample. Equation (12) is estimated using data for 2,212 Spanish municipalities in the period 1999-2003. Spain has more than 9,000 municipalities, but most of them are quite small. We obtained land-use and census data for all of them, but we lacked important economic data for municipalities with fewer than a 1,000 residents (e.g., income). Moreover, in the interval between 1,000 and 20,000 residents, our database only provides fiscal data for a sample of representative municipalities. Additionally, we had to eliminate a few municipalities from the

sample because either we lacked political data or the data we had was unreliable. In the end, we were thus restricted to a sample of 2,212. Our feeling is that this sample is representative of the full population because the vast majority of large municipalities (those with over 5,000 residents) are present and a number of checks run on the smaller ones suggest that sample values of most variables do not differ greatly from the population average.

The period analyzed is also a particularly good one because, as discussed at the beginning of this paper, urban expansion has been very high during these years. Moreover, the huge database used in the analysis could not be assembled for previous periods. Our land-use data covers the period 1994-2003, but we had problems in finding some of the variables for years prior to 1999. The period of analysis, 1999-2003, corresponds exactly with the municipal term-of-office, which in Spain lasts the same four years for all the municipalities.

Data on developable land. The data used to measure the amount of developable land comes from the Spanish national property assessment agency (Dirección General del Catastro, DGC) and arises as a byproduct of the assessment process which this agency performs on all properties in the country. Although value reassessments are only carried out from time to time, the update in the traits of each property (and thus its classification as developed, developable or not developable) and the inclusion of new properties (either buildings or land plots) is performed yearly. According to this agency, the measure of developable land used includes: "all land classified in planning documents as developed", i.e., land already built on, plus "that land considered developable according to planning documents or other land-use regulation instruments that develops it" (DCG, 2007. p.1). This means that the variable does not account for the land that has been reserved in general land-use plans, but which will not be ready for development until it is included in a more detailed planning document. We believe that this definition is very appropriate for our purposes here, because it implies that future development of the land we account for rests primarily in the hands of the developers[9].

Thus, the variable used to measure developable land has been constructed by summing the built-up and vacant land areas (the information for both variables being taken from the aforementioned source). It should be noted that this is the only statistical source of data covering all Spain that can be used to measure the land-use category of undeveloped urban land plots. For example, the very rich data provided by the aerial photographs of the *Corine*

[9] See Riera et al. (1991) for a description of urban land-use planning instruments in Spain. As is explained there, general land-use plans in Spain are updated only after long periods (e.g., 20 years) and detailed development regulations are then required in order to convert reserved land into land ready for development. However, once the land is ready for development, the granting of building permits is virtually automatic.

Land Cover project (Ministerio de Fomento, 2006) could not be used in our case because it only measures what can be seen (land already developed) but not what has been approved by the local government but which does not yet physically exist (land assigned for development). Recall that here it is this last variable that has to be analyzed, because it is the main land-use regulatory decision taken by local governments.

However, this variable presents a number of peculiar traits. First, as a result of the irreversibility of land-use decisions (recall the discussion in the previous section), the increase in this variable is always positive or zero. Second, land-use changes only happen from time to time, the reason being that they are both time-consuming and potentially conflictive. This means that this variable does not evolve continuously from one year to the next but rather it jumps forward in certain years. These traits indicate that we should not try to model the yearly changes in this variable, and so instead we chose to use the growth in developable land throughout the term-of-office (1999-2003). This has been done at no cost in terms of explanatory variables, because most of them can only be measured at one data point during this period (e.g., census data or political data, which is only recorded after one election). The explanatory variables have been measured for 1999 or for the nearest year (e.g., census variables are for 2001). The dependent variable is in log form, so it has to be interpreted as a growth rate. The other variables, with the exception of dummies and ratios, are also in log form. The log specification is the one that fits the data best and, moreover, it has also been used elsewhere (Evenson, 2003; Evenson and Wheaton, 2003).

Income (w) and amenities (a). We include here per capita income of residents in the municipality (*income*), dummy variables indicating whether the municipality is a suburb or not (*suburb*) and whether it has a coastal location (*coast*), and also the distance in kilometers to the center of the urban area (*distance-to-center*) and to the coast (*distance-to-coast*). Table A.1 in the Annex provides details about variable definitions and data sources used.

Disamenity (amenity) effects of growth (β). There are many reasons that might explain why newcomers affect the utility of existing residents. One obvious reason is that new residents can have an effect on taxes paid as well as on the costs of local public services. Of course, the impact on the standard of living of existing residents might be more general, such as newcomers simply affecting the beauty and communal character of the place. In this paper we use two different procedures to account for these effects.

The first procedure involves selecting variables that are deemed to be related to the decline in the standard of living in the community as its size increases. First, the so-called flight-from-blight hypothesis (Mieszkowsi and Mills,1993; Downs, 1999; Gordon and

Richardson, 1997; Ewing, 1997; Brueckner, 2000 and 2001) says that high income people might choose a community in the suburbs in order to isolate themselves from the problems of central cities and that, once these high income communities are created, growth should be restricted in order to avoid low income people entering the community and eroding its amenity values. The paper by Evenson (2003) finds evidence of this effect in the US. Note, however, that our theoretical model suggests that high income in itself is a reason to relocate to a given place, leading us to expect a positive effect for this variable. So, here we add an interaction to the equation between income and the suburb dummy (*income* × *suburb*), in the expectation that the negative effect of income will only be apparent in this type of community. Second, some authors (see, e.g., Evenson, 2003) also argue that past growth is related to this disamenity effect - the reason for this behavior being that residents might be more aware of the decline in their standard of living given the concentration in time of the arrival of newcomers. So we include in the equation the population and housing growth rates in the four-year period prior to the one we are analyzing (*lagged population growth* and *lagged housing growth*). The inclusion of housing growth aims at accounting for the effects of growth in the non-resident population, which could also cause a disamenity effect. Third, we also include in the regression the population density (*density*) in order to account for the possibility that denser areas are highly congested, meaning that further resident arrivals will have a particularly erosive effect on amenities there. Fourth, we also control for population size (*population*) which accounts for the possibility that disamenity effects of new residents appear after an 'optimal' size has been reached (Capello and Camagni, 2000).

The second procedure involves quantifying the effect that new residents have on the local finances of Spanish municipalities. We take into account both the effects on the revenue side and on the cost side computing the *net-fiscal-impact* of a new resident as:

$$net\text{-}fiscal\text{-}impact_i = \Delta\ own\ revenues_i + \Delta grants_i - \Delta costs_i \qquad (13)$$

On the revenue side, the items that are potentially affected by urban expansion are: the *vehicle license tax*, *user charges*, *impact fees*, the *tax on building activity*, the *tax on land transmission*, and the *property tax*. We consider, however, that the impact of a new resident is potentially the same across municipalities in all these instruments with the exception of the property tax. In this case, the impact might differ quite simply because the assessed value of new houses does; our measure of property taxes contributed by an additional resident (Δ*property tax*) is precisely the product of the average Spanish property tax rate and the average assessed value of a new urban unit in each municipality (See Table A.1 for details of the calculation and data sources). Grant revenues in Spain are also affected by population

growth and the magnitude of the increase also differs across municipalities. The main grant received by the Spanish municipalities is unconditional, 75% of which is distributed using a weighted population formula (see Bosch and Solé-Ollé, 2005) and which reads as follows:

$$G_i = \sum_j \psi_j d_{ij} \bar{g}^N N_i + G_i^O \tag{14}$$

Where G_i is the amount received from this grant, ψ_j are population weights, which increase with population (e.g., one resident in a municipality with fewer than 5,000 residents has a weight of 1 while in a city bigger than 500,000 this weight is 2.8), d_{ij} is a dummy equal to one if the municipality *i* is in the population bracket *j*, $\bar{g}^N$ is the average grant per adjusted resident and G_i^O are grants received from variables other than population (assumed invariant with respect to population growth). The marginal grant received can be computed as:

$$\Delta grants_i = \psi_j d_{ij} \bar{g}^N \tag{15}$$

We also computed a second variable related to grants which is not included in the computation of the *net-fiscal-impact* (13) but added separately to the regression. This variable captures the increase in per capita grants which occurs when a municipality jumps from a lower to a higher bracket as its population grows. Of course, in practice there are no municipalities in this marginal situation. Note, however, that as local planning used to be based on the long-run population size that the municipality wished to attain, planned future population growth cannot be discrete. So it is natural to assume that local politicians will take into account the potential future gain in per capita grants stemming from any future bracket jump. However, since it may take many years to achieve the planned level of population, it is also natural to consider that the incentive to take this gain into account is lower, the further the actual population is from the nearest threshold. The expression for this variable is:

$$\Delta grants\text{-}per\text{-}resident_i = \sum_j d_{ij} (\psi_{j+1} - \psi_j)(\tilde{N}_{ij+1} - N_i)^{-1} \bar{g}^N N_i \tag{16}$$

Note that expression (16) assumes that the gain in transfers is higher: the greater the size of the 'jump' $(\psi_{j+1} - \psi_j)$, the lower the distance between population and the next threshold $(\tilde{N}_{ij+1} - N_i)$, and the higher the population size.

On the expenditure side, it is often asserted that population growth contributes to a deterioration in the quality of public services and/or to an increase in the cost of providing them (Ladd, 1992). This can happen if new residents put existing facilities under too much pressure and new ones have to be constructed. Costs may also rise if new developments are less dense than previous ones (Ladd, 1994) or if a bigger city has a harsher environment (e.g., rising crime rates or other social problems), thereby making it more costly to finance current

service levels. To compute the marginal effects of new residents on costs (Δ*costs*), we depart from the expenditure needs index designed for Spanish municipalities in Bosch and Solé-Ollé (2005) and data for the first year of the period. The variables and coefficients of this earlier index were selected after estimating an expenditure equation with a sample that is very similar to the one we use here. One interesting trait of this index is that one of the variables is weighted population. Although the weights are also related to population size (as in the case of the grant), the shape of the profile is different: per capita costs decrease abruptly for low population sizes (below the 5,000 threshold) and increase afterwards but flatten out completely above the 50,000-resident threshold. The other variables considered in the index (i.e., *% unemployed*, *% immigrants*, *responsibilities*, *visitors*) also help contribute in giving variation to this variable. We computed the effect of an additional resident on expenditure needs using the following expression:

$$\Delta costs_i = \frac{e_i}{\bar{e}}\bar{s} + \frac{\partial e_i / e_i}{\partial N_i} N_i \frac{e_i}{\bar{e}}\bar{s} \qquad (17)$$

The first term of expression (17) is expenditure on each new resident, computed as the product of an expenditure needs index ($e_i / \bar{e}$, which is equal to one when the municipality has expenditure needs equal to the average) and average per capita spending ($\bar{s}$). The second term in (17) is the proportional change in per capita needs when population increases, and is bigger the bigger the size of the population.

Finally, note that in the above discussion we have implicitly assumed that the local government is responsive to the interests of its residents, so it takes into account both the additional revenues and costs created by new development[10]. However, it is also possible that while local politicians consider the positive impact of development, namely increased revenues, they ignore the negative impact, i.e., increasing costs. This sort of fiscal illusion may occur, for example, if politicians have a short time horizon and development revenues are obtained time before higher costs are experienced. Note, for example, that the cost variables introduced in the previous paragraphs are deemed to measure the permanent or long-term effect of a new resident on costs, and that the revenue variables measure the permanent or long-term effect of revenues. However, in our calculation of the revenue variables we have discarded certain revenue sources because they do not change with population and/or they are equal across municipalities. The revenue sources not used in the above calculation, and those that are more prone to create this sort of fiscal illusion, are the *tax on building activity* and the

[10] Recently, a number of papers have argued that property tax financing in the US also fosters urban expansion (Brueckner and Kim, 2003, Song and Zenou, 2006) because, with this system of finance, new development does not cover the marginal costs. We are not able to test this effect since Spanish municipalities have no choice regarding whether or not to use property taxation.

tax on land transmission which are both paid on a one-off basis. Another source of fiscal illusion is the charge imposed on developers, who must give a proportion of the developed land, which might range from 10 to 30% depending on the region, to the local government. This land can be used to build local facilities or social housing, but many municipalities simply decide to sell it on the market to raise additional funds. As discussed in the introduction, Spanish governments have often been blamed for putting too much land on to the market simply to obtain these short-term revenues; we will term this the *Revenue-machine* hypothesis. Note that this hypothesis is extremely difficult to test, since these instruments have the same effect across municipalities; of course it might be thought that the revenues will rise the higher the level of development, but the fact that intended development is our dependent variable rules this possibility out. The way we test this hypothesis, therefore, is to assume that some municipalities will be more prone than others to account only for the short-term benefits of growth. These municipalities will be those that are in a weaker financial position, namely those that have a higher debt stock and a lower current surplus.

Political weight of renters and owners of undeveloped land (λ and η). The model presented in Section 3 clearly predicts that the increase in the amount of developable land will be higher, the more numerous and powerful the renters and owners of the undeveloped land in a municipality are. We will include the proportion of families that are renters in order to control for this effect (*% renters*). This variable presents a problem in the case examined here, since the rate of homeownership in Spain is particularly high, no municipality having more than 20% of renters. Therefore, this group is too small for us to assume that it might have much influence on local politics. This is the reason why we also introduced the proportion of voting population between 25 and 40 years (*% residents*-25*to*40) in the equation. People in this age group make up the majority of new buyers and, given the high level of attachment to the home-municipality, they have a clear preference for buying in their own municipality. Therefore, they constitute a sizeable voting group that should be given some weight in the local political process.

We also include a number of political variables in the equation. We expect that some political parties are more sensitive than others to the interests of renters and owners of undeveloped land. The expectation is that parties to the right of the political spectrum will allow more land to be developed, since it might well be the case, for example, that rightwing candidates are land owners or even land developers and have, thus, vested interests in land development and/or the housing industry. The same argument applies to certain local parties that gained the mayoralty with the express purpose of initiating huge development projects.

To account for this we include two dummies that measure the ideology of the mayor: a *center-mayor* is given a value of one representing a party or parties that we consider to occupy the center of the political spectrum, while a *right-mayor* is given a value of one representing the parties that are right of center; the excluded category, a *left-mayor* is attributed to parties that are left of center. We also include in the equation a dummy which identifies a mayor that belongs to a local party (*local-party-mayor*). It is difficult to make a prediction concerning the local parties as this category is more heterogeneous, including parties with vested interests in development as well as parties founded with the aim of fighting development (i.e., environmentalists).

We also expect that the incentives to disregard the interests of residents and to heed solely those of a handful of powerful land developers depend on the quality of local democracy. We will take into account the fact that local governments that do not face a serious electoral threat will care less about the wishes of residents. A number of papers have recently shown that the degree of electoral competition may be relevant in explaining the influence of vested interests in public policies, leading sometimes to the adoption of inefficient policies (see, e.g., Besley et al., 2006, on the positive effect of electoral competition on the growth of the US states). The study completed by Solé-Ollé (2006) shows that electoral competition has a marked effect on fiscal policies pursued by Spanish municipalities. It is natural to expect that competition will also have an impact on urban expansion: more competitive communities should in principle be expected to develop less. To account for this we include a measure of electoral competition, computed as the absolute distance between 50% and the vote obtained in the last elections by the party or parties in the local government (% *vote-margin*). We also include a measure of turnout at the last municipal election (% *electoral-turnout*) in the expectation that in communities with a higher turnout democratic control will be greater and, therefore, it should be more difficult for politicians to cater to the interests of developers. We will also consider certain interactions between the ideological dummies and the electoral margin, in order to account for the possibility that parties with different ideologies react differently to electoral competition, as Solé-Ollé (2006) suggests. The idea here is that the higher the margin is, the greater the freedom enjoyed by the parties to apply their political program; if the platform of the political left/right is openly against/for development a left/rightwing party may restrain/promote more growth when the margin is higher. Finally, we also include a coalition dummy (*coalition*) in the expectation of finding a negative effect on urban expansion, derived from the fact that coalitions usually find it extremely difficult to agree to projects that are particularly conflictive.

Open land benefits. To account for this factor we include in the equation the total amount of land under the jurisdiction of the municipality (*total-land-area*) and the proportion of open land that is not in agricultural use, considering separately the proportion of land dedicated to forest (% *forest-land*) and other uses (*% other-non-agricultural-land*). As explained in the theoretical section, we expect a positive effect for the total amount of land while the expected effect of the various variables measuring quality of open space is not clear.

Other influences. Finally, we include some additional control variables that do not fit particularly neatly with the explanations given above, but which, nevertheless, we think might have an influence on the amount of developable land. First, we should consider the possibility of communities growing without the need to expanding their spatial size. This may be done, for example, by redeveloping old districts or by encouraging the owners of unused houses to put them on the market (either by renting or selling). We will measure this effect with the proportion of old and empty houses (% *old-houses* and % *empty-houses*), since the more of these there are, the easier it will be to rebuild and, hence, there will be less need to allow for more land to be developed. Second, some communities might want to develop simply to create employment in the building industry, suggesting that development will be higher in places with a high unemployment rate (% *unemployed*).

4.- Results

The results of the estimation are presented in Tables 1 and 2. Table 1 provides the results obtained when the equation is estimated for the full sample of municipalities while Table 2 provides detailed results for each of the three sub-samples (urban, non-urban and tourist municipalities).

General results (*All the municipalities*). The estimation contained in the first column of Table 1 focuses on the set of variables that seek to identify the *Disamenity* (*amenity*) *effects of growth*, and excludes the variables related to *Political factors*. The second column includes both sets of variables, while the third one includes interactions between some of the political variables. In all the specifications we have also included variables that account for *Income and amenities* and for *Open space benefits*, for *Other influences*, and also the lagged *developable-land-area*, the *inverse of Mill's ratio* and the area dummies. The explanatory capacity of the model is reasonable for cross-sectional data, with the R^2 lying between 0.25 and 0.38. At the bottom of the table we include F tests on the joint statistical significance of all the variables as well as that for groups of variables. The different groups of variables were

always found to be jointly significant, with the exception of the dummies for the non-urban areas, which were not and have been excluded from the specifications presented in the table.

[INSERT TABLE 1 ABOUT HERE]

The results of Table 1 suggest the following. First, regarding *Income and amenities*, high income communities grow more than their low-income counterparts, suburbs grow more than city centers although more distant suburbs grow less (these two effects are significant only at the 90% level), the coastal municipalities grow more than the non-coastal ones and those that are far from the coast grow even less (the last two variables are statistically significant at the 99% level once political variables are included). Second, regarding the *Disamenity* (*amenity*) *effects of growth,* high income suburbs grow less than other suburbs (although the effect is significant at the 90% level), communities that grew more in the past, both in terms of population and number of houses, place greater restrictions on more future urban growth (although the effect is only statistically significant in the case of previous housing growth), denser communities expand their spatial size more, suggesting that the way they reduce congestion is not by restricting population size but rather by becoming less dense. Third, the hypothesis that marginal revenues and costs influence the growth decisions of municipalities is rejected. Although they have the expected sign, neither the *net-fiscal-impact* nor the Δ*transfers-per-resident* are statistically significant when all the other variables are included in the equation. The results regarding the breakdown of the *net-fiscal-impact* variable (not shown here for reasons of space) are no better: all the variables have the expected sign (positive in the case of Δ*property tax* and Δ*grants* and negative in the case of Δ*costs*) but none of them are statistically significant at conventional levels. Fourth, we find evidence in favor of the *Revenue-machine* hypothesis, since municipalities with a higher debt stock and a lower surplus put more land on the market. These results suggest that Spanish municipalities are short-sighted, placing a greater weight on the short-term revenues associated with development than on the medium or long-term costs created by urban expansion. Fifth, both the share of renters (%*renters*) and that of new buyers (%*residents*-25*to*40) has a positive effect on urban expansion, although only in the second case is the coefficient statistically significant. Thus, the homevoter hypothesis cannot be completely discarded in the Spanish case, although it needs to be interpreted in a more flexible manner than in other countries: the collective that demands more development is not only current renters, but also potential new buyers that also live and vote in the municipality.

Sixth, municipalities governed by center (*center-mayor*) and rightwing parties (*right-mayor*) allow more land to be developed than those governed by the left (which is the base

category), and municipalities governed by the right allow a little bit more land to be developed than those governed by the center, and the difference between these two coefficients is statistically significant. By looking at column (ii) of Table 1, we can see that the rate of growth of developable land during the period 1999-2003 would have been 5.2% higher in a municipality governed by the right party than in one governed by the left. To gauge the magnitude of this effect, recall that the average rate of growth in this period was 11.4%[11].

Neither municipalities governed by local parties (*local-party-mayor*) nor those controlled by a coalition (*coalition*) seem to grow more or less than others: in both cases the sign of the variable is negative but not statistically significant. Municipalities with a higher turnout (%*electoral-turnout*) and a lower vote margin (%*vote-margin*) allow less land to be developed, so it seems that the quality of the local democracy, both in terms of participation and the degree of electoral competition, is crucial for providing politicians with incentives to cater to the interests of the general population and not to those of the developers. Column (iii) of Table 1 includes some of the interactions between the vote margin and the ideological dummies. The results suggest that parties on the right always allow more land to be developed and that this behavior intensifies when the government faces no strong electoral competition (the margin is lower). This suggests that rightwing parties cater more to the interests of the developers, but as they may wish to stay in power, they will choose to attend to general interests when they risk losing the elections. This result, however, should be interpreted with caution, as the interaction coefficient is only statistically significant at the 90% level. In the case of center parties the interaction coefficient is also positive but not statistically significant. In the case of leftwing parties the effect of increasing the vote margin is negative, indicating that they cater to anti-development interests (e.g., environmentalism), and only when they risk losing the election do they allow more land to be developed; this coefficient, however, is not statistically significant. In the case of local parties, the sign of the interaction is negative and statistically significant (at the 90% level). This result can be interpreted in two possible ways: (i) if the local party is anti-development, it only caters to the general public when facing stiffer competition, or (ii) if the local party is pro-development, a lower margin could mean that it has a higher probability of being replaced and, therefore, it only has one term-of-office to 'take-the-money and run'.

[11] These differences are to be found between the parties located at the two extremes of the left-right spectrum since, as Table A.1 in the Annex shows, the main leftwing party in Spain (PSOE) has been included in the center with the result that the left category is occupied by the most extreme leftwing parties. The reason for this grouping is not any a priori considerations about the ideology of this party, but rather it is justified by the results: in a separate regression we found that the coefficient for this party is not statistically different from that of other parties in the center category.

Eighth, communities having a larger amount of land under their jurisdiction (*total-land-area*) allow more land to be developed. However, the higher the environmental value placed on this land, as measured by the share of forest and other non-agricultural land (% *forest-land* and % *other-non-agricultural-land*), the lower the probability that it will be developed. So, it seems that the disamenity effect generated by new residents, through the erosion of open space benefits, dominates the demand-enhancing effect of valuable open space.

Ninth, among other influences, we should highlight that communities with old houses (%*old-houses*) need to put less land on the market, because they find it easier to rebuild. However, municipalities with a higher proportion of empty houses (%*empty-houses*) typically develop more; we interpret this as an indicator of decline in the center of these municipalities (i.e., the 'old town'). Finally, local governments seem not to be motivated by the desire to enhance the local economy when allowing more development, since the unemployment rate (%*unemployment*) was not statistically significant (although it had the expected positive sign).

Tenth, there is evidence of sluggish adjustment in the decision to put more land on the market, since the coefficient on the existing stock of land (*developable-land*) is negative and statistically significant. The magnitude of the coefficient, around 0.3, suggests that local governments need three terms-of-office to complete this adjustment, confirming that decisions of this nature are indeed very complex and lengthy[12]. The results also suggest that the decision to put more land on the market and the actual amount of land assigned for development are correlated, as suggested by the significance of the "inverse of Mill's ratio".

[INSERT TABLE 2 ABOUT HERE]

Results by type of municipality. Table 2 shows the results for urban, non-urban and tourist municipalities. For reasons of space we have omitted the results for the joint F-tests of the different groups of variables. The results obtained for the three categories are very similar to those presented in Table 1, both in terms of the overall performance of the model and of the concrete variables that proved to be significant. Therefore, we will concentrate only on the main differences between the three groups. First, note that the income effect is higher for the non-urban municipalities than it is for their urban and tourist counterparts. This might be due to the fact that suburbs are not chosen because of wage differentials, since people living there can commute to the central city. In the case of tourist municipalities, people buy houses there to go on vacation so they also disregard the wage level. Second, note that lagged housing

[12] Recently, the CEO of Fadesa, one of the main building firms in Spain, complained because of the long time needed to put more developable land on the market, which he assessed around an average of eight years (so two terms of office) compared with around two years (he said) in other European countries (*La Vanguardia* 24/10/2007).

growth only has a statistically significant negative effect in the case of tourist areas and that now urban municipalities that are growing more in terms of population do in fact seem to allow less land to be developed. Third, regarding the fiscal variables, the results are the same as those reported above, but the *Revenue-machine* effect seems to be stronger in the case of tourist municipalities, where point estimates are twice those of urban municipalities and both variables are statistically significant at the 95% level. Fourth, the effect of renters and new housing buyers seems to be stronger in urban areas (in fact, renters are now statistically significant at the 90% level), which is precisely where housing affordability problems have been stronger. Fifth, the effect of the different political variables is maintained across the different samples, but the effect of ideology is much stronger in tourist areas: a rightwing tourist municipality would have grown during the period at a rate that was 5.6% higher than one governed by the left, while this differential in non-urban and urban areas is of 2.9% and 1.7%, respectively. The effect of turnout and electoral competition is also slightly stronger in tourist areas. Overall, it seems that the politics of urban development are more polarized in tourist areas than in the rest of the country and because of that, both the quality of the local democracy and the stiffness of electoral competition may have a substantial effect on the observed patterns of development in these areas. We should point out that this result is not at all surprising, since the most controversial episodes of excessive urban expansion and (sometimes) of local corruption have appeared in tourist areas. Finally, the results for the remaining variables are fairly similar across types, with the exceptions of old-houses, which do not present any effects in tourist areas, and unemployment, which now has the expected positive and statistically significant effect, but only in non-urban and tourist areas.

5.- Conclusion

In this paper we have examined the economic and political determinants of decisions taken by local governments regarding the amount of new land to be assigned for development. The results show that urban expansion is influenced by a variety of factors. First, we find, for example, that the communities that have expanded most tend to be richer and, moreover, to have enjoyed lower growth in the past. Thus, it would seem that, on the one hand, growth is fuelled by rising demand even at the local level, while on the other, that fast growth rates do indeed create some sort of disamenity to existing residents. Second, we have also identified a link between urban expansion and local public finance. However, Spanish municipalities do not appear to be entirely rational when taking these effects into account, since they do not consider the long-run net fiscal impact of new residents, but tend to focus only on short-run benefits. The evidence suggests that Spanish municipalities use urban expansion as a *Revenue-*

machine, as some commentators have recently pointed out. Third, politics also seem to have an impact on the decision as to whether to put more land on the market. Our findings show that the decision is influenced by the interests of different client groups: more land is assigned for development in municipalities in which there are more renters and (in particular) more potential new house buyers, and where the local government is controlled by rightwing parties (that typically cater more to the interests of land developers). The quality of local democracy tends to induce local politicians to cater to more general interests: we find that a higher turnout and stiffer local competition help restrain urban expansion. Our results are valid for a wide sample of Spanish municipalities, but also for three subsamples of urban, non-urban and tourist municipalities. However, both the *Revenue-machine* and the political effects are more pronounced in tourist municipalities than elsewhere. This is as expected, since most recent local corruption scandals have occurred in tourist areas. Fourth, we also found evidence that open space benefits have a bearing on the decision to put more land on the market: communities with more land under their jurisdiction allow more development to occur and communities with more valuable land allow less development. Although this last point requires a more thorough analysis, it does seem to suggest that local governments are not so prone to overgraze the commons as expected.

Thus the picture that emerges from our analysis confirms some of the illnesses that have been attributed to Spanish local land-use regulations (namely, the short-sighted view adopted in local public finances, a bias favoring developers), although it does not fully confirm other problems (for example, overgrazing the commons). Pending more research, the immediate remedies should seek to target the specific illness that has been identified. Thus, where the problem is one that is related to a short-sighted fiscal policy and special interest politics, greater transparency (in terms of both budgets and the adoption of land-use regulations) should be prescribed, as has been done by a recent report (Fundación Alternativas, 2007).

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Table 1: *Determinants of new municipal developable land; dependent variable: Δ developable land area; period:* 1999-2003 *term-of-office. Sample: all municipalities* (*N*=2,212); *Tobit estimation*

	(i)	(ii)	(iii)
a.- Income and amenities			
income	0.202 (2.761)***	0.235 (3.030)***	0.225 (2.977)***
suburb	0.029 (1.945)*	0.021 (1.776)*	0.020 (1.721)*
distance-to-central-city	-0.008 (-1.850)*	-0.011 (-1.688)*	-0.013 (-1.694)*
coast	0.023 (1.745)*	0.012 (2.967)***	0.012 (2.876)***
distance-to-coast	-0.011 (-1.955)*	-0.014 (-2.544)**	-0.015 (-2.432)***
b.- Disamenity (*amenity*) *effects of growth*			
income × *suburb*	-0.044 (1.866)*	-0.041 (1.809)*	-0.040 (1.812)*
lagged population growth	-0.030 (-1.321)	-0.034 (-1.576)	-0.032 (-1.465)
lagged housing growth	-0.012 (-2.175)**	-0.017 (-2.356)**	-0.020 (-2.259)**
density	0.042 (2.654)***	0.021 (2.237)**	0.023 (2.258)**
population	-0.014 (-0.721)	-0.001 (-0.455)	-0.001 (-0.425)
net-fiscal-impact	0.002 (1.423)	0.001 (0.654)	0.001 (0.633)
Δ*transfers-per-resident*	0.056 (2.072)**	0.039 (1.348)	0.038 (1.454)
debt	0.014 (1.842)*	0.009 (2.105)**	0.008 (2.145)**
surplus	-0.026 (-1.951)*	-0.024 (-2.205)**	-0.025 (-2.222)**
c.- Political factors			
% renters	--.--	0.129 (1.359)	0.129 (1.255)
% residents-25*to*40	--.--	1.001 (2.310)**	1.020 (2.258)**
center-mayor	--.--	0.044 (2.468)**	0.015 (2.511)***
right-mayor	--.--	0.052 (2.598)**	0.021 (2.661)***
local-party-mayor	--.--	-0.030 (-1.026)	-0.009 (-1.140)
coalition	--.--	-0.005 (-0.284)	-0.004 (-0.510)
% electoral- turnout	--.--	-0.062 (-2.110)**	-0.058 (-2.036)**
% vote-margin	--.--	0.150 (2.340)**	--.--
left-mayor × *% vote-margin*	--.--	--.--	-0.084 (-1.356)
center-mayor × *% vote-margin*	--.--	--.--	0.144 (1.605)
right-mayor × *% vote-margin*	--.--	--.--	0.149 (1.904)*
local-party-mayor× *% vote-margin*	--.--	--.--	-0.010 (-1.724)*

Notes: (1) All explanatory variables (with the exception of %s) are measured in logs and refer to the base year 1999. (2) ***, ** and * = statistically significant at the 99, 95 and 90% levels.

Table 1: (continued)

	(i)	(ii)	(iii)
d.- Open space benefits			
total-land-area	0.044 (5.015)***	0.044 (5.315)***	0.045 (5.412)***
% forest-land	-0.057 (-2.308)**	-0.056 (-2.478)***	-0.052 (-2.433)**
% other-non-agricultural-land	-0.037 (-2.540)**	-0.036 (-2.054)***	-0.038 (-2.114)**
e.- Other influences			
% old-houses	-0.193 (-1.925)*	-0.187 (-3.644)***	-0.176 (-3.259)***
% empty-houses	0.145 (2.140)**	0.133 (1.593)	0.135 (1.401)
% unemployed	0.422 (1.316)	0.462 (0.598)	0.685 (0.514)
developable-land-area	-0.288 (-6.840)***	-0.275 (-4.760)***	-0.285 (-4.520)***
inverse of Mill's ratio	0.095 (17.119)***	0.095 (16.543)***	0.099 (16.584)***
urban-area-dummies (64)	YES	YES	YES
non-urban-area-dummies (50)	NO	NO	NO
tourist-area-dummies (99)	YES	YES	YES
adj.-R^2	0.331	0.374	0.365
F-est. (*all variables*)	6.038**	6.245**	6.124**
F-est. (*disamenity/amenity*)	11.014**	13.411**	12..741**
F-est. (*political*)	7.445**	6.998**	6.771**
F-est. (*open space benefits*)	18.411**	17.521**	17.018**
F-est. (*other influences*)	6.412**	6.666**	6.548**
F-est. (*urban area dummies*)	9.140**	6.898**	6.785**
F-est. (*non-urban dummies*)	3.038	3.245	2.124
F-est. (*tourist area dummies*)	6.102**	6.133**	6.441**

Notes: (1) All explanatory variables (with the exception of %s) are measured in logs and refer to the base year 1999. (2) ***, ** and * = statistically significant at the 99, 95 and 90% levels.

Table 2: *Determinants of new municipal developable land; dependent variable: Δ developable land area; period:* 1999-2003 *term-of-office. Samples: urban, non-urban and tourist municipalities*; *Tobit estimation*

	(i) *Urban* (N=567)	(ii) *Non-urb.* (N =786)	(iii) *Tourist* (N =619)
a.- Income and amenities			
income	0.101 (2.113)**	0.234 (2.547)***	0.082 (2.411)***
suburb	0.026 (2.143)**	--.--	--.--
distance-to-central-city	-0.008 (-1.855)*	--.--	--.--
coast	0.016 (1.881)*	0.010 (1.554)	0.024 (3.667)***
distance-to-coast	-0.008 (-1.776)*	-0.010 (-1.566)	-0.019 (-2.776)***
b.- Disamenity (*amenity*) *effects of growth*			
income × *suburb*	-0.021 (1.721)*	--.--	--.--
lagged population growth	-0.031 (-1.841)*	-0,023 (-1.234)	-0,010 (0.710)
lagged housing growth	-0.012 (-1.282)	-0.006 (-1.231)	-0.013 (-2.110)**
density	0.026 (2.776)***	0.019 (2.124)**	0.011 (1.975)**
population	-0.003 (-0.518)	-0.002 (-0.650)	-0.003 (-0.624)
net-fiscal-impact	0.004 (1.541)	0.002 (1.511)	0.006 (1.241)
Δ*transfers-per-resident*	0.077 (1.605)	0.035 (1.264)	0.046 (1.025)
Δ*property-tax*	--.--	--.--	0.001 (1.201)
debt	0.010 (2.100)*	0.002 (1.014)	0.017 (1.985)**
surplus	-0.012 (-1.751)*	-0.008 (-1.457)	-0.024 (-2.224)**
c.- Political factors			
% renters	0.145 (1.685)*	0.067 (1.200)	0.034 (1.054)
% residents-25to40	1.210 (2.341)***	0.747 (1.854)*	0.895 (2.211)**
center-mayor	0.025 (2.123)**	0.025 (2.123)**	0.032 (2.241)**
right-mayor	0.017 (2.234)**	0.029 (2.005)**	0.056 (2.569)***
local-party-mayor	-0.035 (-1.374)	-0.041 (-1.410)	0.022 (1.564)
coalition	-0.002 (-1.310)	-0.001 (-1.091)	-0.002 (-0.678)
% electoral- turnout	-0.044 (-2.123)**	-0.035 (-1.998)**	-0.058 (-2.041)**
% vote-margin	0.120 (2.332)***	0.166 (2.365)***	0.153 (2.415)**
d.- Open space benefits			
total-land-area	0.044 (5.015)***	0.031 (6.541)***	0.061 (5.412)***
% forest-land	-0.057 (-2.308)**	-0.078 (-2.211)**	-0.012 (-2.010)**
% other-non-agricultural-land	-0.037 (-2.540)***	-0.035 (-2.112)**	-0.028 (-2.001)**
e.- Other influences			
% old-houses	-0.222 (-2.778)***	-0.110 (-2.100)**	0.091 (0.325)
% empty-houses	0.166 (1.155)	0.185 (1.844)*	0.085 (0.543)
% unemployed	0.210 (0.601)	0.776 (1.981)*	0.854 (2.223)**
developable-land-area	-0.218 (-5.883)***	-0.312 (-4.543)***	-0.376 (-4.776)***
inverse of Mill's ratio	0.110 (15.212)***	0.092 (12.432)***	0.088 (13.776)***
adj.-R^2	0.394	0.360	0.291

Notes: (1) See Table 1; (2) Same controls as in Table 1.

Table A.1:
Variable definitions and data sources

	Definition	*Data sources*
Δ*developable-land-area*	Growth rate of built-up + vacant land area in 1999-2003	Centro de Gestión Catastral, Ministry of Economics and Finance
developable-land-area	Built-up + vacant land area in 1999	
income	Per capita income in 1999	
tourist resort	Dummy = 1 if tourist index > 300; Tourist index computed with data on the local business tax paid by the tourist sector in 1999	Anuario Económico de España, La Caixa
coast	Dummy = 1 for coastal municipalities	
distance-to-coast	Km to the coast	
central city	Dummy = 1 if population > 100,000 (principal) or between 50,000 and 100,000 (secondary)	National Institute of Statistics (INE)
suburb	Dummy = 1 if municipality is less than 30 km from main urban center or less than 15 km from secondary center	
distance-to-central-city	Km to urban center × suburb dummy	
lagged pop. growth	Resident population growth rate in 1995-1999	
lagged housing growth	Growth rate in the number of urban units 1995-1999	Centro de Gestión Catastral
density	Resident population / Km2 of build up area in 1999	National Institute of Statistics (INE) and Centro de Gestión Catastral
population	Resident population in 1999	National Institute of Statistics (INE)
net-fiscal-impact	(Average Spanish property tax rate in 1999 × average assessed value of new homes in 1995-1999) + (population weight in unconditional grant formula in 1999) - (per capita expenditure needs in 1999 + increase in per capita costs according to estimated cost-population profile × population size in 1999)	Centro de Gestión Catastral (property tax) Bosch and Solé-Ollé (2006): per capita expenditure needs and cost-population profile
Δ*transfers-per-resident*	(Increase in population weight in the unconditional grant formula / distance between 1999 population and next population threshold) × 1999 resident population	National Institute of Statistics (INE)
debt	Interest payments outlays (cap. 3 of the budget) + Capital repayment outlays (cap. 9)/ Current revenues, in 1999	Ministry of Economics and Finance
surplus	Current revenues – Impact fees – Current spending, in 1999	
% renters	% of buildings rented, in 2001	National Institute of Statistics (INE
% residents-25to40	% of residents between 15 and 40 years old, 2001	
center-mayor	Main party on left (PSOE) or main right regionalist parties (e.g., PNB, CiU) are single parties or coalition leaders, 1999	
right-mayor	Main party on right (PP) or some right regionalist parties who are its natural partners (e.g., UV, UPN, CC) are single parties or leaders of a coalition, 1999 elections	
local-party-mayor	The mayor of a single party or the leader of a coalition is a candidate from a local party, 1999 elections	Ministry of Interior and Ministry of Public Administrations
coalition	Local government with more than one party, 1999 elections	
% electoral- turnout	Valid votes cast as % of voting population, 1999 elections	
% vote-margin	Abs. value of the difference between 50% and the % of votes obtained by the party/parties in the government in the 1999	
total-land-area	Total land area under the jurisdiction of a municipality	National Institute of Statistics (INE)
% forest-land	% of municipal land area occupied by forests	National Institute of Statistics (INE), Agricultural Census
% other-non-agricultural-land	% of municipal land not occupied by forests nor by agricultural or artificial land	
% old-houses	% of buildings built before 1950, in 2001	National Institute of Statistics (INE), Census of Buildings
% empty-houses	% of buildings not occupied, in 2001	
% unemployed	% of population 16 to 65 years unemployed, in 2001	National Institute of Statistics (INE)