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The Political Economy of Coastal Development

Abstract

We study the role of political parties as facilitators of intergovernmental cooperation regarding the development of coastal land. Slowing down this development has benefits (e.g., preservation of environmental amenities) and costs (e.g., job losses), not only for residents in the political jurisdiction but also for non-residents. Local governments may not consider the welfare of non-residents and therefore may not choose the right amount of development. This paper investigates how political alignment between mayors of nearby municipalities enhances the incentives to cooperate and affect development in coastal areas. We rely on high-quality administrative data from the cadaster on the amount of built-up land along the Spanish coast. Using a close-elections regression discontinuity design, we find that municipalities with mayors belonging to the ideological bloc governing a majority of municipalities in the coastal area develop less land than other municipalities. The effect is larger for land close to the coastline and in places with a large share of environmentally valuable land. This suggests that negative externalities are dominant in this context and that political parties are a useful tool to internalize them.

JEL-Codes: D720, H700, R520.

Keywords: local government, land use policy, regression discontinuity.

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1. Introduction

In the US, 59 million people, or 18 percent of the population, live less than 5 km from the seashore. This number is even higher in Spain, our case study, where 44 percent of the population (20 million people) live within the same distance to the coastline. Moreover, Spain received 84 million tourists in 2019, most of them attracted by its sunny beaches. As a result, the coast tends to be heavily developed. The country's artificial land covers 36.5 percent of the coastline, and this figure is much higher in tourist hotspots[1]. These numbers suggest that both residents and visitors value coastal locations. Yet, excessive coastal development may erode the very benefits provided by the coast. The reduction of forests, wetlands, dunes, and beaches spoils coastal landscapes, harms biodiversity, and increases flood damages (Greenpeace, 2019). The increase in visitors contributes to the pollution of bathing waters and the overcrowding of beaches and natural spaces[2]. Moreover, unchecked construction may generate oversupply in the hospitality industry, driving down prices and profitability[3]. Governments need to consider these benefits and costs when deciding whether to deter or spur additional development close to shore.

In this paper, we study the role of the incentives faced by local governments, which are essential players of development policy in many countries. The main issue here is the spatial externalities related to coastal development. Notice that the abovementioned benefits (and costs) are borne both by the residents in the municipality granting development permits and the residents in nearby coastal municipalities. For instance, residents and tourists in one municipality may enjoy

[1] Population figures correspond to the year 2020 and have been computed from the gridded world population (https://sedac.ciesin.columbia.edu/data/set/gpw-v4-population-count-rev11). We selected the cells within 5km from the coast shapefiles of the US and Spain; then we sum up the population, and we compare the figure with the 2020 population (https://www.census.gov and https://www.ine.es). The tourism data comes from Turespaña (http://estadisticas.tourspain.es). The data on land development in Spain is from the Corine Land Cover Project (https://land.copernicus.eu/pan-european/corine-land-cover).

[2] Notice that these effects might also reduce the capacity of the coast to deliver economic benefits. For example, beach shrinkage has a negative impact on economic indicators as job creation and tax revenues (Alexandrakis *et al.*, 2015). Also, there is evidence that beach overcrowding reduces tourism attractiveness (Santana and Hernández, 2011).

[3] Overcapacity is an important issue in analyses of hotel markets (Dev and Hubbard, 1989). Overbuilding also affects housing markets in general (especially those with a large proportion of vacation homes and out-of-town owners, which are found on the coast), see Glaeser (2013).

visiting beaches in neighboring localities. Residents may also care about the existence of natural spaces in the whole coastal area[4]. In addition to this, development in one municipality might directly harm the quality of the environment in other municipalities[5]. Moreover, overcapacity might reduce prices in the whole tourist market, not just in municipalities where hotels are built. Finally, additional jobs generated by new development may benefit commuters who live in nearby municipalities. All these externalities may hinder efficient decision-making. Because local governments do not consider the welfare of non-residents, they might not choose the right amount of development. When negative externalities dominate (i.e., when development brings about more costs than benefits for non-residents), the outcome is over-development. The converse is true when positive externalities are more prevalent.

We use a novel approach to study this issue by estimating the effect of political alignment between mayors of neighboring municipalities on coastal development. The hypothesis is that mayors who belong to the same political party have more incentives to cooperate (and thus, to internalize the externalities) than mayors belonging to different parties. For instance, politically aligned mayors have similar preferences, have more opportunities to engage in policy conversations, are bound by internal party discipline or coalition agreements, and share the same electoral fate. We develop a theoretical model that accounts for this effect and that allows us to generate several predictions. First, when negative externalities dominate, an aligned municipality (i.e., the mayor belongs to the party ruling in a majority of municipalities in the coastal area) will allow for less development than an unaligned one (i.e., the mayor belongs to the minority party). Second, the difference in the amount of land developed by an aligned and an unaligned municipality increases with the number of municipalities in the majority. Third, the size of the effect grows with the intensity of the negative externality and the relative preference of residents in favor of land preservation instead of job creation. Fourth, when positive externalities dominate, a politically aligned

[4] Existence value reflects the benefit received from knowing that a particular environmental resource (e.g., a wild beach) is preserved, even if it is never utilized or experienced.

[5] For example, inadequate wastewater treatment in one municipality might affect bathwater quality in nearby municipalities. Also, infrastructure building in one municipality (the construction of harbors and dams or the paving of dry stream beds) might contribute to the shrinkage of beaches in another municipality.

municipality is expected to develop more land (instead of less) than an unaligned one, and this effect also increases with the size of this externality.

Our model's key predictions are then taken to a novel dataset that provides detailed information on the development of the Spanish coastline over the last four decades. Spain represents an excellent context for our study for several reasons. First, land-use regulations in Spain are the responsibility of a myriad of local governments, whose impact on the coastal development is difficult to prevent by higher layers of government. Second, most of these local governments are ruled by politicians who run under national or regional party brands. Moreover, the current high level of ideological polarization hinders cooperation across political parties[6]. Third, as already discussed, the Spanish coastline is subject to enormous development pressures.

We use high-quality administrative data on the amount of built land along the Spanish coast for our analysis. The data source used is the cadaster, which provides the precise geocoded location for all buildings in Spain and includes information on the year of construction. This allows us to measure the amount of coastal land that has been built during each term of office. We then use a new database on all local elections held in Spanish municipalities since Franco's dictatorship's end. To identify the effects of political alignment, we rely on a close-elections regression discontinuity design. This approach was used previously by Durante and Gutierrez (2015) to study the impact of cooperation on crime prevention between Mexican municipalities. To take into account the specific characteristics of Spain's proportional representation system, we follow the method pioneered by Folke (2014) and described in detail in Curto *et al*. (2018).

Our results are in line with the predictions of the theoretical model. First, we find that municipalities with aligned mayors develop around 32 percent less land than unaligned municipalities during a term of office. The effect is sizeable and persists for several terms, although the magnitude subsides with time. The sign of the effect suggests that negative externalities are dominant on average. Second, we find that the effect is larger when the number of municipalities in the majority increases. This

[6] See, for example, a recent blog post on the effect of affective polarization on COVID responses in Spain (https://blogs.lse.ac.uk/eurocrisispress/2020/06/26/polarization-coronavirus/).

suggests that our findings are genuinely due to the enhanced incentives to cooperate, as our model's predictions depend on the number of neighbors with whom a given municipality is politically aligned. Third, we also find that the effect is larger for land closer to the coast and in municipalities with a higher share of environmentally valuable land. These results indicate that the size of the alignment effect grows with the strength of negative externalities. They also suggest that the negative externalities that matter are those related to preserving the environmental value of the coastline. Fourth, there is also some (less conclusive) evidence that the effect is large in places with a large number of visitors, suggesting that negative externalities related to tourism congestion may also play some role. Fifth, we find that the size of the alignment effect diminishes with the share of commuters in the labor force, which indicates that positive externalities (related to the generation commuter jobs) may also be relevant. Interestingly, the sign of the alignment effect is still negative for the municipalities with a large share of commuters, suggesting that negative externalities are the most important ones. Finally, we find evidence that the alignment effect is larger in places with a high preference for amenities vs. economic development, as proxied by either a low unemployment rate or a left-wing mayor.

The paper contributes to several strands of the literature. First, several papers examine the effects of local governments fragmentation or decentralization reforms on policy. See, for example, Hoxby (2000) and Galiani *et al.* (2008) for studies applied to education. In studies more related to our topic, Burgess *et al.* (2012) and Lipscomb and Mobarak (2016) look at the impact of decentralization on deforestation and river pollution, respectively[7]. Both papers find evidence of negative externalities and suggest that decentralization might be detrimental. We contribute to this literature by basing our identification strategy on the fragmentation of parties in control of local governments rather than fragmentation in the number of governments.

Second, a body of literature argues that political parties are crucial to internalizing externalities in federal countries, which started with a pioneering study by Riker (1964). In the next section, we dissect the different arguments that justify this

[7] There is also theoretical literature on intergovernmental cooperation in environmental policies that focus, for example, on the design of conservation contracts (e.g., Harstad and Mideska, 2017) and climate change treaties (e.g., Harsdtad & Battaglini, 2020).

tenet and cite the relevant papers. Note, however, that just a few papers have explored the effect of parties on the outcomes of intergovernmental cooperation. In addition to the paper by Durante and Gutierrez (2015), which studied horizontal cooperation, Dell (2015) looked at the effects of vertical cooperation in the fight against organized crime in Mexico. We followed the approach of these works but applied it to a different policy. Third, the paper also contributes to the literature on local land-use regulations. For example, Fischel (2008) study the role of jurisdictional fragmentation on land-use decisions, and Helsey and Strange (1995) and Brueckner (1995, 1998) show that cities that make isolated decisions regarding the use of *urban growth controls* do not take into account the externalities they impose on each other. Suburban governments might restrict residential development too much, creating a housing affordability problem in the whole metropolitan area[8]. One can apply the same logic to a system of cities in a country (Hsieh and Moretti, 2019). The idea in our paper is similar, but the type of externality differs. While most of the literature explores urban areas and focuses on positive externalities and land undersupply, we emphasize negative externalities and oversupply, which we think is a more relevant issue to coastal areas specialized in the hospitality industry.

Finally, our work relates to some recent papers that evaluate the impact of tourism on economic development and environmental amenities. For example, Faber and Gaubert (2019) find that tourism along the Mexican coast has a positive effect on inland areas through its impact on manufacturing, suggesting that there are positive geographical externalities related to job creation. This paper does not consider the impact on coastal amenities. The paper by Hilber and Schöni (2020) evaluates the effect of a Swiss ban on second residences. The paper reports that the ban has a detrimental impact on housing prices, which the authors interpret as evidence that the adverse effects on local development outweigh the positive effects of amenity preservation.

The paper is organized as follows. In the next section, we review the arguments underpinning the idea that parties might enhance cooperation. In that same section, we develop a model that formalizes the idea that alignment is relevant to cooperation

[8] Tricaud (2021) provides evidence that cooperation among suburban municipalities in France contributes to internalizing positive externalities and increasing housing supply.

in local land development decisions. In section three, we provide some details on the Spanish context. In section four, we introduce the data used in our empirical application and describe our methodology, based on a regression discontinuity design for close elections. Section five presents the results, and the last section concludes.

2. Theoretical framework

2.1 Why do parties enhance cooperation?

A central idea of the paper is that local governments controlled by the same political party will cooperate more than those controlled by different political parties. This tenet is justified by many studies in the fields of political economy and political science.

Studies by Riker (1964), Filippov *et al.*, (2004) and Wibbels (2006) suggest that centralized political parties competing in all jurisdictions can provide a solution to the collective action problem affecting federations. Rodden (2003) and Enikolopov and Zhuravskaya (2007) provide evidence that political party centralization enhances fiscal discipline and the provision of other national public goods. According to Wibbels (2006), parties have the ability to force local governments to cooperate because local co-partisans interact more often and expect to have to rely on mutual support to build alliances in the future. Local politicians usually need the endorsement of co-partisans when running for higher office. Also, local officials are more willing to cooperate with co-partisans whose electoral success influences their own electoral chances.

There is also a strand in the literature that emphasizes the importance of political homophily (i.e., similarity in political traits of local jurisdictions) for participation in intergovernmental cooperation networks. This literature is based on the *institutional collective action* framework (Olson, 1965; Clingermayer and Feiock, 2001; Feiock, 2007 and 2009) which assumes that actors compare potential benefits and transaction costs when deciding whether or not to collaborate. Political homophily reduces transaction costs and enhances cooperation due to the similarities in political attitudes and ideology and also to the higher levels of trust. Empirical papers in this strand focus on similarity of characteristics of the electorate (Gerber *et al.*, 2013) but focusing on political leaders also seems to be a sensible option[9].

[9] A few papers include political congruence among the drivers of municipalities' decision to merge or participate in cooperation networks (see Sorensen, 2006; Feiock, 2007; Bruns *et al.*,

We want to stress that this logic may extend beyond strict party boundaries. Mayors might also cooperate more with partners who have a similar ideology, even if they do not strictly belong to the same political party. This might happen for several reasons. First, the parties might be coalition partners in nearby municipalities or at higher layers of government. Parties entering a coalition government are bound by the agreements they have reached and will police them. Moreover, sharing government responsibilities provides many opportunities for members of the different parties to meet and exchange policy views. Second, there is a chance that the politicians will meet again in the future as coalition partners or even as members of the same party (after a process of party realignment). Finally, politicians of a similar ideology tend to belong to the same informal social network (e.g., interest groups, NGOs). The exchange of information among network members might facilitate the convergence of opinions (Algan *et al.,* 2019).

2.2 A model of cooperation

In this section, we develop a formal model of cooperation in land development by nearby local governments controlled by different political parties[10]. The purpose of the model is to clarify the empirical predictions regarding the effect of political alignment on the amount of land developed.

Model layout. We focus on a coastal area with N beach municipalities located along the coastline. Each municipality has a local government with full capacity to control land development within its jurisdiction. We begin by assuming that all of these municipalities are identical in all respects; at some point we will allow them to differ with respect to the identity of the political party of the local government.

We consider a fixed number of projects that developers want to execute in the coastal area, which depends on exogenous traits of the area such as the number of sunny days and road accessibility. The number of projects is high, so the only limit to development is the unwillingness of the local government to authorize it. We consider that each local government maximizes the utility of a representative voter living in the

2015; Saarima and Tukkianen, 2013). The evidence obtained is mixed. However, these papers do not attempt to identify the effect of congruence in a causal way.

[10] For simplicity, we will use the term 'party' throughout the theoretical analysis. However, as discussed previously, similarity in political ideology could also facilitate cooperation.

municipality. We express voters' utility, $V(a_i, y_i)$, as a function of the value of environmental amenities, a_i, and the level of economic development, y_i. This utility function has the usual properties: $V_a \geq 0, V_y \geq 0, V_{aa} \leq 0$ and $V_{yy} \leq 0$.

Amenities depend on the amount of land kept undeveloped in the municipality, u_i, and in the rest of the municipalities in the coastal area, u_{-i}:

(1) $$a_i = u_i + \theta(N-1)u_{-i}$$

where parameter $\theta \in (0,1]$ measures the strength of the externality. When θ=0, residents only care about amenities located in the municipality where they live, and when θ=1, amenities in the municipality and in the rest of the coastal area are equally valued[11].

We assume that each municipality is endowed with a unit of land, which means that developed land can be written as:

(2) $$d_i = 1 - u_i \qquad \& \qquad d_{-i} = 1 - u_{-i}$$

If (2) is plugged into (1), the level of amenities can then be rewritten as:

(3) $$a_i = 1 - d_i + \theta(N-1)(1 - d_{-i})$$

Economic development is expressed as $y_i = d_i$, which means that income and economic opportunities in *i* grow with the amount of land developed.

Results without political parties. We abstract for the moment from political parties. In this case, each local government chooses the amount of development to maximize the representative voter's utility in the municipality, thus totally disregarding the effects of the residents in other municipalities. To simplify this, we assume that the indirect utility function takes the form $V(a_i, y_i) = a_i{}^{\alpha}\, y_i{}^{1-\alpha}$. The parameter α measures the relative preference for amenities vs. economic development. After substituting the expressions for a_i and y_i, looks like:

(4) $$V(a_i, y_i) = [1 - d_i + \theta(N-1)(1 - d_{-i})]^{\alpha} d_i{}^{1-\alpha}$$

Taking the derivative w.r.t. d_i, we obtain the first-order condition:

[11] To keep the argument simple, the model accounts only for this type of externality. Later on, we will discuss the implications of considering other types of externalities as, for example, negative externalities generated by tourist congestion or positive externalities related to job creation that benefits commuters.

$$(5) \qquad \frac{\partial V(a_i, y_i)}{\partial d_i} = -\alpha[\,\cdot\,]^{\alpha-1} {d_h}^{1-\alpha} + (1-\alpha){d_h}^{-\alpha}[\,\cdot\,]^{\alpha} = 0$$

When we rearrange this, we obtain the expression of the reaction function for *i*:

$$(6) \qquad d_i = (1-\alpha)[1-\theta+\theta N] - (1-\alpha)\theta(N-1)d_{-i}$$

An analogous expression can be found for municipality -*i*. The reaction function tells us that development in municipalities *i* and -*i* are strategic substitutes (i.e., an increase in development in the neighborhood triggers a reduction in the municipality). The slope of the reaction function grows with the strength of the externality, measured by θ.

Considering that all the municipalities are identical, we can solve for the symmetric Nash equilibrium and get:

$$(7) \qquad d^N = \frac{(1-\alpha)[1-\theta+\theta N]}{1+(1-\alpha)\theta(N-1)}$$

By contrast, in the cooperative solution, the local government chooses the amount of development for all the municipalities in the whole area at the same time. The solution can be obtained by maximizing the following expression w.r.t. to *d*:

$$(8) \qquad W(a, y) = [(1-\theta+\theta N)(1-d)]^{\alpha} d^{1-\alpha}$$

After obtaining the F.O.C. and rearranging, the cooperative solution is simply:

$$(9) \qquad d^C = (1-\alpha)$$

Note that the cooperative level of development depends on the weight of economic benefits versus amenities in the utility function, α, but not on the strength of the externality, θ. It is easy to show that this level is lower than the amount of development in the non-cooperative equilibrium in (7).

Note that (9) is the expression obtained when the number of jurisdictions is fixed to one. This means that a comparison of (7) and (9) reveals the effect of decentralizing land development decisions. From expression (7), we can also show that the amount of development in the non-cooperative equilibrium increases with the number of jurisdictions *N.* Either of those two predictions could provide the basis for an empirical test. In the first case, we would need information on a decentralization reform affecting a subset of municipalities, but no such reform exists in Spain. In the second case, we would need an exogenous driver of the number of municipalities in each coastal area, and this information is also difficult to obtain. This is one of the reasons why we resort to fragmentation in party control for identification.

Results with political parties. We now assume, for the sake of simplicity, that there are only two political parties, which are labeled *j* and *-j*. We define N_j and $N_{-j} = N - N_j$ as the number of municipalities controlled by each party. For convenience, we assume perfect within-party cooperation, which means that a local government will take into account the effect of development on residents in all municipalities controlled by the same party. Given that all municipalities are identical except for the fact that some are controlled by one party and some by the other, we can write the objective function of a local government controlled by party *j* as:

$$(11) \qquad V(a_j, y_j) = \left[(1-\theta)(1-d_j) + \theta N_j(1-d_j) + \theta N_{-j}(1-d_{-j})\right]^{\alpha} {d_j}^{1-\alpha}$$

where d_j and d_{-j} are the average development in a *j* and a *-j* municipality, respectively. Taking the derivative w.r.t. d_j we obtain the F.O.C.:

$$(12) \qquad \frac{\partial V(a_j, y_j)}{\partial d_j} = -\alpha\left((1-\theta) + \theta N_j\right)[\cdot]^{\alpha-1}{d_j}^{1-\alpha} + (1-\alpha){d_j}^{-\alpha}[\cdot]^{\alpha} = 0$$

After some operations, we get the expression of the reaction function for *j*:

$$(13) \qquad d_j = (1-\alpha)\left[\frac{(1-\theta)+\theta N}{(1-\theta)+\theta N_j} - \frac{\theta N_{-j}}{(1-\theta)+\theta N_j} d_{-j}\right]$$

There is an analogous expression for *-j*. Solving the system for d_j^P and d_{-j}^P, we get:

$$(14a) \qquad d_j^P = (1-\alpha)\left[\frac{(1-\theta)+\alpha\theta N_{-j}}{\Lambda}\right] \geq 0$$

$$(14b) \qquad d_{-j}^P = (1-\alpha)\left[\frac{(1-\theta)+\alpha\theta N_j}{\Lambda}\right] \geq 0$$

where the super-index *P* denotes the Nash equilibrium values with political parties and $\Lambda = (1-\theta) + (2-\alpha)\alpha\theta^2 N_{-j} N_j / ((1-\theta)+\theta N)$, which is positive given the values assumed for α and θ. Working with these expressions, we obtain the following result:

PROPOSITION 1. *Average effect of alignment: a municipality ruled by the political party which controls the majority of municipalities in the coastal area allows for less development than an (identical) municipality ruled by a party that does not control the majority of municipalities in the coastal area.*

To explain this result, let us assume that *j* and *-j* are the parties ruling in the majority and in the minority of municipalities, respectively. Then, we take the difference between expressions (14a) and (14b) to get:

(15) $$d_j^P - d_{-j}^P = -\frac{(1-\alpha)\alpha\theta\left(N_j - N_{-j}\right)}{\Lambda} < 0$$

The negative effect of being in the majority arises from our assumption that *j* is the majority party, which guarantees that the $N_j > N_{-j}$ condition holds. This happens because a municipality in the majority accounts for what happens in a larger number of municipalities than a municipality in the minority, and so internalizes the effect of the externality to a greater extent.

PROPOSITION 2. *Intensity of the alignment effect*: *the difference in the level of development between a municipality ruled by the party in the majority and an (identical) municipality ruled by a party in the minority increases with: (a) the majority size, (b) the strength of the externality, and under light requirements, (c) the preference in favor of amenities vs. economic development.*

These results also arise from expression (15). Intuitively, note that the numerator of that expression grows with the majority size (i.e., $N_j - N_{-j}$). The size of the denominator also shrinks when the majority size grows (holding N fixed), which reinforces the former effect. The proof and a simulation of the value of the alignment effect for different values of the parameters are provided in the Online Appendix. Moreover, the numerator of expression (15) also grows with the parameter θ (which measures the strength of the externality) and with the parameter α (which measures the preference in favor of amenities vs. economic development). The Online Appendix also provides a proof of these results and some simulations.

PROPOSITION 3. *Effect of alignment on neighbors*: *the effect of adding a municipality to the majority on the level of development in the rest of municipalities in the area is ambiguous.*

This ambiguity is due to several reasons. First, the effect on development in municipalities already in the majority is ambiguous. Internalization improves because the majority is larger and, thus, development should fall, but there is also an incentive to develop more due to strategic substitutability. Second, the effect on municipalities still in the minority is positive. In this case, there is a reduction in the size of the minority that worsens internalization, thereby providing incentives to develop more.

These minority municipalities will also develop more due to strategic substitutability. However, the overall effect on development in neighboring municipalities remains ambiguous because, by definition, there are more municipalities in the majority than in the minority. In the Online Appendix, we formally show these results and provide numerical simulations, which suggest that this effect is negative (though small) for a wide range of parameter values.

Key predictions. Summing up, the key predictions of the model are the following. First, when negative externalities are dominant, an aligned municipality (i.e., the mayor belongs to the party that rules in a majority of municipalities in the coastal area) will allow for less development than an unaligned one (i.e., the mayor belongs to the minority party). This first prediction is amenable to be tested with the help of a close-elections regression discontinuity design. Second, the difference in the amount of land developed by an aligned and an unaligned municipality increases with the number of municipalities in the majority. This prediction will be tested by looking at whether the alignment effect is higher in municipalities with a large number of aligned neighbors. Third, the size of the effect grows with the intensity of the negative externality. To test this prediction, we will look at whether the alignment effect is higher for land close to the coast and in places with a large share of environmentally valuable land. Fourth, the alignment effect is higher in places that put a relatively higher value on amenities (e.g., preserving land from development) than economic development (e.g., jobs brought about by that development). To test this prediction, we look at whether the effect of alignment depends on the unemployment rate and the mayor's ideology.

The above predictions will also hold for other negative externalities. For example, additional development of already crowded places might displace visitors to nearby beaches, also increasing congestion there. Moreover, this development might also generate overcapacity and drive down hospitality prices in the whole coastal area. Introducing the first externality would require modeling the effects of congestion on leisure trips. Studying the effect of overcapacity would require modeling the oligopolistic nature of the market (Burguess *et al.*, 2012, and Hardstad and Mideska, 2017, for an application to logging). A model including these possibilities seems too convoluted for the purpose of this section. However, in the empirical analysis, we explore the capacity of negative externalities related to tourism overcrowding and overcapacity to explain our results. We will examine whether the alignment effect is stronger in places with high tourist congestion, measured by the ratio between visitor numbers and population.

The main prediction differs when externalities are positive. These externalities could arise, for example, if the additional jobs generated by coastal development in one municipality mostly benefit commuters who live in neighboring municipalities. In this case, the prediction would be reversed: one would expect an aligned municipality to develop more land (instead of less) than an unaligned one. In a situation where both negative and positive externalities operate at the same time, the sign of the alignment effect is indicative of the type of externality that dominates: a negative sign indicates that the effect of negative externalities is stronger than the one of positive externalities; a positive sign indicates the opposite[12,13]. In the empirical analysis, we will investigate the role of positive externalities by examining whether the alignment effect is weaker in places where commuters represent a large share of the workforce.

3. The Spanish context

3.1 <u>Coastal development</u>

The Spanish coast underwent a development boom that started in the early 1960s when the Franco regime decided to open the country to international tourism and foreign investment. These years are known as the *desarrollismo* period, a concept that implied that development was the only priority and that the collateral effects, in terms of loss of open space and loss of cultural character, were sidelined.

The Spanish coast continued to undergo development at more or less the same pace after the arrival of democracy. Decades of tourist development have left their mark on the Spanish coast. Figure A.1 of the Appendix shows aerial photos from 1956

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[12] One could easily introduce positive externalities in the model by expressing economic development as $y_i = d_i + \vartheta(N-1)d_{-i}$, where ϑ measures the intensity of the externality. If there are no amenity externalities (i.e., $\theta = 0$) then the alignment effect is positive and proportional to ϑ. When both externalities are present, the alignment effect depends on the difference $\vartheta - \theta$, that is, is positive if $\vartheta > \theta$ and negative otherwise.

[13] The ambiguity of the prediction regarding the effect of decentralization also arises in studies on deforestation. As shown by Hardstad and Mideska (2017), the prediction that decentralization leads to more deforestation can be reversed when one accounts for the externalities generated by the monitoring of illegal logging.

and 2012 as two examples of extreme development. The photos depict a completely undeveloped strip of white sand and of farmland in 1956, both of which had been completely developed by 2012. The Spanish coastline is now heavily built-up: 36.5% of the coastline has been developed, and this figure is as high as 74.3% in the region of Valencia and 100% in the city of Marbella (Greenpeace, 2010). Coastal development has continued at a fast rate in recent years (see Figure A.4 in the Online Appendix for the period under study). For example, in the 1987-2005 period, Spain developed 7.7 Ha of coastal land per day, equivalent to eight soccer fields[14].

The consequences of this development on coastal amenities in Spain are diverse (Greenpeace, 2019). Development alters coastal landscapes by reducing forest cover, dunes, wetlands and the beaches themselves. This affects the beauty of the landscape but also reduces biodiversity and increases flood and forest fire risks. Some of these risks are becoming increasingly difficult to manage in light of climate change, hotter and drier summers, and rising sea levels. Development also increases pollution, depletes water resources and generates congestion, thereby reducing the quality of consumption amenities. All these concerns have been gaining ground in the Spanish debate on the need to preserve the remaining undeveloped coastal land[15]. However, economic benefits also feature prominently in the discussion. For example, during a recent conflict regarding the construction of a huge hotel in a protected area, the mayor argued in favor of the development by mentioning the jobs that would be generated and the high unemployment rate in the municipality[16].

3.2 Coastal land-use policies

In Spain, all layers of government have some level of responsibility regarding coastal land use. However, local governments are by far the main players. The local landscape in Spain is highly fragmented; the country has more than 8,000 municipalities, 455 of

[14]See the newspaper report "Spain destroys an area of coastal land equivalent to eight soccer fields every day," *El Mundo*, 18/07/2010.
[15] This is evidenced by the rise in the number of conflicts between local environmental groups and local governments with development plans. See, for example: "A new platform emerges to protect the Costa Brava from new construction," *La Vanguardia*, 4/8/2018.
[16] See "The mayor of…in favor of opening 'El Algarrobico' because 'it will bring jobs'," *El Mundo*, 11/10/2011; the mayor mentions the very high unemployment rate in the municipality. For another example, see "The Partido Popular in the Balearics justifies a hotel on a virgin beach on grounds of job creation," *El País*, 4/3/2012.

which are located on the coast. Land-use planning in Spain is mostly a municipal responsibility (Solé-Ollé and Viladecans-Marsal, 2013). Municipalities draw up a Master Plan, which divides land into three categories (built-up, developable and non-developable land) and includes detailed regulations regarding other aspects: zoning (residential, commercial, industrial), floor-to-area ratios, and reservation of land for streets, green spaces and public amenities.

Local incumbents can use local planning to leave their mark on development in various ways, for example, by accelerating the update of the plan. The Master Plan has to be updated every decade, but significant delays are not unusual. They can also speed up the plan's execution by passing the amendment plan (the so-called Partial Plan) to allow for more development. Since the plan creates landowner rights, it is difficult to stop a project once it has been accounted for. This also means that an expansionist plan may still impact development years after the incumbent who promoted the plan has left office. In any case, incumbents who want to discourage development (as proposed in the plan) can always find some excuse to delay the granting of permits, which could have an immediate effect on development.

Higher layers of government also play a role in coastal protection. Regional governments are responsible for approving and overseeing local plans and have the power to veto them if they do not comply with basic laws, regional infrastructure plans (e.g., roads, water systems and energy supply) or regionally protected land (e.g., regional parks). The central government is responsible for protecting the coast and maritime space. In Spain, the strip of land closest to the coast (and the maritime space) is a national public good and its use is regulated by the central government. This strip of coastline has always been subject to special protection, which was enhanced by the so-called *Coastal Protection Law* of 1988. This law banned all development on land less than 100 meters from the shore and heavily regulated development within 100-200 meters of the shore. Note, however, that the effectiveness of the application of this law and of the previous ones has been questioned by both NGOs and experts (Greenpeace, 2010; Torres, 2010).

The European Union also has some responsibilities related to coastal land, derived from directives and regulations on the protection of ecosystems. The main policy tool is the Natura 2000 network, an ecological network of protected areas considered the key instrument to protect biodiversity in the European Union. This instrument has its roots in EU protection directives from 1979 and 1992 but has been implemented very slowly and haphazardly. In Spain, the list of areas has been known for years, but they have been included in the network only recently and the level of enforcement is low[17].

Finally, in the absence of effective coastal protection by a higher layer of government, municipalities might decide to address the issue by cooperating on a voluntary basis. They might decide to establish a voluntary association of municipalities (a *mancomunidad*), to reach specific agreements (*convenios*), or to coordinate their zoning and infrastructure policies on a more informal basis. The main issue with this voluntary cooperation is that it is hard for the parties to commit to comply with the agreement. There is anecdotal evidence to suggest that voluntary agreements are abandoned more readily when the municipalities involved are ruled by different parties[18]. The aim of this paper is to provide quantitative evidence regarding this issue on the level of development allowed close to the coast.

3.3 Local politics

Local elections are held simultaneously every four years in all municipalities. Voters choose between several closed party lists. The electoral system used is proportional representation and seats in the municipal council are allocated among party lists according to the d'Hondt method[19]. In most municipalities, several left-wing and right-wing parties run separately, and pre-election coalitions are very rare. Most of these parties run under national or regional party brands. There are also many local parties (e.g., independent candidates and civic lists), but these win the mayoralty in just a

[17] The EU periodically warns Spain about inadequate levels of enforcement of these regulations. See "Warning about possible fine for Spain for bad management of the Natura 2000 network," *EFEVerde*, 23/07/2020 (https://www.efeverde.com/noticias/advierten-europa-multar-espana-natura-2000/).

[18] See, for example, two excerpts from local newspapers: "Political clashes and partisanship blur the workings of voluntary associations (*mancomunidades*) in the district", in *LaOpinion deMalaga*, 19/ 09/2009, and "A particularly difficult case is the voluntary association of… where the open conflict among municipalities of different political affiliations adds to the problems of viability", in *La Información*, 23/02/2016.

[19] The d'Hondt method works as follows: the number of votes for each party are divided by 1, 2, 3, etc. The comparison numbers resulting from this operation for all parties running in the election are ranked and the seats in the council are allocated to parties based on this ranking. All countries with proportional elections use similar methods to transform votes into seats.

handful of cases. In practice, most mayors belong to the main two parties, which are represented by 69.9% of the mayors in the whole sample and period studied and by 83.7% in close elections (i.e., within the bandwidth used in the paper)[20]. Local parties hold only around 6% of mayors (2% in close elections).

The mayor is elected by a majority of the council. A proportion of municipalities have governments backed by legislative coalitions (around one third), usually formed along ideological lines. However, in small municipalities there are other considerations that might matter more than ideology. In addition to local parties, there are also some centrist and regionalist parties that are willing to enter into agreements with both left- and right-wing parties.

The mayor appoints the cabinet members and staff, has executive powers and sets the agenda for all initiatives and regulations passed by the council. The discipline enforced by Spain's political parties means that the chances of the mayor's proposals being amended are fairly low for mayors who control a majority of the seats. Coalition mayors can be unseated at any time through a censure motion. However, since there is no possibility to call for early elections, this requires the existence of an alternative candidate backed by a council majority[21]. Moreover, the mayor also has the option of calling a motion of no confidence linked to certain policies that require the approval of the council (e.g., budgets and Master Plan). This combination of rules gives the mayor extraordinary powers over the design and execution of land use planning. Spanish municipalities are classified by scholars in the 'strong mayor' category (Mouritzen and Svara, 2002) and have been qualified as examples of 'municipal presidentialism' (Magre and Bertrana, 2005).

4. Empirical design

4.1 Regression discontinuity

Motivation. The theoretical results presented in section two guide the selection of our hypotheses. The main hypothesis to test is that a municipality controlled by the

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[20] Of these, 36.45% of mayors belonged to the PSOE (the main party on the left) and 33.46% to the PP (the main party on the right) or to its predecessor parties from the 1980s (UCD, CDS or PDP, see Tables A.3). These numbers are 45.23% and 38.47% in the close elections sample.

[21] This is a rare event: in around 97% of cases a mayor from the same party stays in office for the entire term (see Fujiwara and Sanz, 2020).

majority party (the party controlling most municipalities in the coastal area) develops less land than a party controlled by the minority party. Note that the prediction is conditional on municipalities being identical in all respects except the identity of the mayor's party. This prediction is well suited to be tested with the help of a regression discontinuity design (RDD), by comparing municipalities where the majority party won the local election by a slim margin of votes to municipalities where the majority party also lost by a slim margin. Since winning and losing come down to a small number of votes in these two cases, the municipalities at either side of the threshold should be very similar. For this reason, this method of identification is considered the closest to an experiment and has recently been used by economists and political scientists to study the effect of party identity (Lee *et al*., 2004; Lee, 2008; Pettersson-Lidbom, 2008; Ferreira and Gyourko, 2009; Gerber and Hopkins, 2011).

Note that the identification of the effect of alignment by observational methods would be fraught with difficulties. Keep in mind that, according to our model, the level of development in a given municipality depends on its alignment status but also on a vector of characteristics of the municipality and of its neighbors. These characteristics might be correlated with alignment in a manner that is difficult to account for in a typical regression framework. Consider, for example, the possibility that the voters in several municipalities in a booming coastal area could turn simultaneously towards the same party because they think this will lead to development. This will increase the chance that a given municipality is aligned with its neighbors, thereby leading to a correlation between the treatment and the probability of experiencing a boom. This problem cannot be handled with the use of fixed effects in a panel setting, since these shocks are heterogeneous in time and space at the same time.

RDD in PR systems. The fact that local councils in Spain are elected using party-list proportional representation (PR) precludes the use of a traditional RDD. In PR systems, voters can vote for one of many party lists and these votes are transformed into seats in the local council using a specific conversion method (i.e., the d'Hondt method in Spain). City council members then elect the mayor. The first challenge posed by such an institutional setting is that sometimes no single party holds a majority of seats in the council, which means that the mayor has to be supported by a coalition of parties. The second challenge concerns the difficulties in identifying the vote threshold at which an additional vote switches a seat from one party to another (and, thus, from the coalition that supports the mayor to the one that supports the opposition's candidate). Here, we apply the solution proposed recently for Spain by Curto et al. (2018), which followed other studies that had adapted the close-elections RDD to a PR system for other countries (see Folke, 2014; Ade and Freier, 2013; Fiva *et al*., 2015; Fiva and Halse, 2016).

The solution consists of two steps. First, ideology represents a very powerful driver for the creation of coalitions of parties that support the mayor. This allow us to define our treatment as a situation in which the ideological bloc of parties (i.e., either left-wing or right-wing) holding most mayoralties in the coastal area also has a majority of seats in a particular local council. For example, when the parties on the left of the ideological spectrum hold a majority of seats in a local council, it is highly likely that the mayor will also belong to the left-wing party bloc. In this case, if the mayor is left-wing and the parties on the left control most municipalities in the coastal area, we can say that the mayor is aligned. The same logic applies to right-wing parties. This is very similar to the procedure used in Fiva *et al*. (2015) and Fiva and Halse (2016). However, the fact that centrist and/or local parties are sometimes able to enter into coalition agreements with both right- and left-wing parties means that the ideological factor might not work in all cases, a fact that justifies the use of a 'fuzzy' RDD, as in Fiva and Halse (2016).

Second, even if the treatment in terms of discontinuity in seats is relatively straightforward to define, elections won or lost by a difference of one seat are probably not that close in terms of the number of votes. Thus, using the number of seats as the forcing variable might not be entirely appropriate (Fiva *et al*., 2015). Instead, we used a forcing variable computed as the percentage of votes that the majority ideological bloc (the one with most mayoralties in the coastal area) must lose in order to miss out on the majority of seats in the municipal council or must win in order to obtain that majority. In order to make this calculation, we first have to identify the last seat that was won by the ideological bloc holding a majority of seats in the municipal council. We then have to compute how many votes the parties in that bloc would have to lose for that seat to be transferred to a party in the other bloc. The computation follows the procedure proposed by Curto *et al*. (2018), which is similar to that applied in other papers (see Folke, 2014 and Fiva *et al*., 2015).

Equation specification. The regression discontinuity design (RDD) involves estimating a discontinuity in coastal development at the close-elections threshold. We use the following two-equation model:

$$(16) \qquad \mathcal{B}uilt_{it} = \alpha.a_{it} + g(v_{it}^{0}) + \beta.\mathcal{V}acant_{it} + X'_{it}\gamma + f_k + f_t + \varepsilon_{it}$$

$$(17) \qquad a_{it} = \delta.\mathbb{I}(v_{it}^{0} > 0) + q(v_{it}^{0}) + \mu.\mathcal{V}acant_{it} + X'_{it}\eta + f_k + f_t + \epsilon_{it}$$

where $\mathcal{B}uilt_{it}$ is the amount of land surface that has been built on during the term of office t by local government i at a given distance from the coast (e.g., 1 km), and a_{it} is equal to one if there is *Alignment* and zero otherwise. The forcing variable is v_{it}^{0} (which we will call *Vote margin*) and is the percentage of votes that the parties belonging to the ideological bloc with most mayoralties in the coastal area should lose in the local elections in i to lose the majority of the seats in that municipal council[22]. The variable $\mathbb{I}(v_{it}^{0} > 0)_{it}$ is a dummy equal to one if the vote margin is positive and zero otherwise. The terms $g(v_{it}^{0})$ and $q(v_{it}^{0})$ are polynomials in v_{it}^{0}, fitted separately at each side of the threshold using observations in a neighborhood around the threshold, which we labeled h, hereinafter referred to as the bandwidth. The variable $\mathcal{V}acant_{it}$ is the amount of vacant land (total land minus the land already built up at the start of the term) in the same distance band, and accounts for differences in municipal scale. f_k and f_t are region and term-of-office fixed effects, and X is a vector of covariates. Control variables are not strictly needed to ensure consistency in this setting but will be included in some specifications because they improve the precision of the estimates.

Equation (16) is used to estimate the effect of *Alignment* on coastal development. Equation (17) is the first stage and gives us the discontinuity in *Alignment* that we use for identification. We estimate (16) by 2SLS, using $\mathbb{I}(v_{it}^{0} > 0)_{it}$ as an instrument for a_{it}. The coefficient of interest is α, which can be interpreted as the 'treatment on the treated,' or TOT. This is a local treatment effect: the coefficient identifies the effect for units that are located near the cutoff. Additionally, since the design is 'fuzzy,' the effect

[22]Alternatively, in case this bloc does not control the majority of seats in the municipal council i, the variable would be defined as the percentage of votes that the parties in this ideological bloc would have to win to get the majority of the seats in the council.

is identified for the 'compliers,' i.e., municipalities switching from unaligned to aligned when there is a change in the identity of the ideological bloc holding a majority of seats in the council.

By plugging (17) into (16), we obtain the reduced form equation:

$$(18) \qquad \mathcal{B}uilt_{it} = \rho.\mathbb{1}(v_{it}^{0} > 0) + g(v_{it}^{0}) + \sigma.\mathcal{V}acant_{it} + X_{it}'\theta + f_k + f_t + \xi_{it}$$

The coefficient $\rho = \alpha.\delta$ can be interpreted as the 'intent to treat,' or ITT. This analysis relies on all randomized units, including non-compliers. Because of this, the estimates can be considered more conservative.

RDD validity. The validity of the RD design lies in certain assumptions that must be tested. First, we document a genuine discontinuity in the probability of treatment and show graphically that this is the case. The jump in the probability of treatment is lower than one, and this justifies the use of a 'fuzzy' design. Second, we show that the forcing variable used is continuous around the threshold by inspecting the histogram and using the formal test proposed by Cattaneo *et al.* (2018). The continuity test provides a means to discard the manipulation of the forcing variable. Third, we also test for the continuity of predetermined covariates to show that all factors, that could influence development (besides *Alignment*) are continuous at the threshold.

Estimation and inference. The main RD results presented in the paper fit a local linear regression on a bandwidth around the close-elections threshold. This is convenient because it eases the implementation of some additional analyses (e.g., non-linear estimation and subgroup analyses) and performs as well as other alternatives. We therefore used this approach throughout our presentation of the main results and discuss the other options in the robustness checks. The bandwidth is chosen as per Calonico *et al.* (2014) and is the one minimizing the mean squared error. We will also report results for a bandwidth that minimizes the coverage error probability, which Calonico *et al.* (2020) suggests using to check the sensitivity to bandwidth choice. In the robustness checks section, we also present results for a broad range of bandwidths.

4.2 Sample and data

Sample. We start with the 455 Spanish coastal municipalities, which are defined as those whose jurisdiction includes some portion of the coast (see Figure A.3 in the

Online Appendix). Because of a lack of information in the cadaster, we have to exclude the 30 coastal municipalities in the Basque Country. This leaves us with a final sample of 425 municipalities. The period of analysis spans nine terms of office separated by 10 local elections held every four years during the 1979-2015 period. This results in a total of 3,784 elections, approximately 30% of which are close (i.e., within the optimal bandwidth h=0.142)[23].

Land development. Our dependent variable is the amount of land built up during a term of office. The data comes from the Spanish cadaster (Dirección General del Catastro, http://www.catastro.meh.es), which provides a description of all buildings in Spain. Importantly for our purposes, the database includes information regarding the exact geolocation, area and year of construction of each building. We want to emphasize the high reliability of this information. The cadaster is an administrative register that is overseen by the Ministry of Finance and whose main purpose is to support tax administration. For example, the cadaster is used to create tax rolls for the local property tax. Registering a building in the cadaster is free of charge and compulsory, and failure to do so on time can result in a fine. Notaries, property registries and local governments regularly supply the cadaster with this information.

[Insert Figure 1]

This information is used to compute the amount of built-up land (area) for each coastal municipality at a specified distance from the shore during a given term of office. For the main analysis, we focus on land developed at less than 1 km from the shore. At this distance, locations are within walking distance of the shore, so they benefit most from coastal amenities. This is also the distance used in the Greenpeace reports on the destruction of the Spanish coastline (Greenpeace, 2010). However, we also look at shorter distances (100, 150, 200, 250, 500 and 750 meters) and longer distances (5km and 10Km). Studying areas very close to the shore is important because amenities are more valuable there and because national and regional regulations may interact with incentives to cooperate horizontally. Figure 1 shows an

[23] All regions and terms have a substantial percentage of close elections. The most competitive elections are found in Valencia (49% of elections are close) and Asturias (39%), while the least competitive elections are in the Canary Islands (18%). The most competitive term is 2007-2011 (39% of elections are close), while the least competitive is 1983-1987 (21%).

example of the kind of information provided by the cadaster. The figure displays (in different colors) the amount of land built up in each term of office. The dashed lines indicate some of the distance bands we used in the analysis.

There are two issues that have to be addressed when measuring this variable at the micro level (i.e., for a specific distance band and municipality). First, the variable is highly skewed, which suggests the need for a log transformation. Second, the variable has some zeros[24]. The solution adopted is to use the *inverse hyperbolic sine* transformation (i.e., $\widetilde{\mathcal{B}uilt_{it}} = \log\left(\mathcal{B}uilt_{it} + \sqrt{(\mathcal{B}uilt_{it})^2 + 1}\right)$), which deals with the zeros and also provides a coefficient that can still be interpreted as a semi-elasticity[25]. Recent studies have shown that this option is preferable to using logs after adding a small constant to the variable (Bellemare and Wichman, 2020). This solution has the advantage of allowing us to implement the standard tools used for RD designs (i.e., bandwidth selection and graphical analysis). Additionally, we show that the results were nearly identical when using a Poisson model (Santos Silva and Tenreyro, 2015).

Alignment. The first step to make the alignment measure operative is to define coastal area. The preferred definition of coastal area used in the paper is that of *County* (called *comarca* in Spain). *Comarcas* are not administrative units, but groups of municipalities defined by common geographical and historical traits that tend to share a widely known place name. Along the coast, the borders of *comarcas* are defined by mountain ranges, river mouths or coastal orientation. Coastal municipalities within the same *comarca* tend to have a similar natural landscape and are affected by the same microclimate. Because of this, they may share concerns regarding the protection of environmental amenities and the promotion of a common tourist brand. An issue with *comarcas* is that there is no official list, since they are not administrative units. Fortunately for us, we can piggy-back on synthesis work carried out by geographers[26].

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[24] The proportion of zeros is 3.98% in the 1 km band. This number rises to 6.14% in the 500 m band, 9.62% in the 250 m band and 23.93% in the 100 m band.

[25] Note that, as in the case of logs, a transformation is needed to interpret the coefficient as a semi-elasticity. The semi-elasticity for $\hat{\alpha}$ can be computed as $\exp(\hat{\alpha} - 0.5.\widehat{Var(\hat{\alpha})}) - 1$ (see Bellemare and Wichman, 2020). For small values of the coefficient (as our case would be), this transformation does not alter the interpretation of the results much.

[26] This builds on an old government classification, the so-called agricultural counties (*comarcas agrarias*), defined by the Spanish Ministry of Agriculture in 1976 (https:// www. mapa.gob.es/es/cartografia-ysig/ide/descargas/agricultura/default.aspx). Its aim was to support the design of agricultural aid policies, but it was not used much in practice. The

According to this work, Spain could be divided into 526 *Counties*, 109 of them along the coast. The median number of coastal municipalities in each county is 5.6, and the interquartile range is 3-7[27].

As robustness checks, we will also report results for *Coastal denominations*. These are larger geographical units, with names corresponding to internationally recognized tourist brands (e.g., the Costa Brava and the Costa del Sol). These units are much larger than the *Counties*: there are 29 of them, the median number of municipalities is 17.6, and the interquartile range is 11-24. The average distance between municipalities is relatively large and their interests are more heterogeneous, which means that cooperation might be more difficult to sustain. In addition to these two fixed area definitions (*Counties* and *Coastal denominations*), we will present results for several definitions based on *Nearest neighbor* criteria: the two nearest neighbors, the four nearest neighbors, etc. Under this approach, the distance between neighbors is less heterogeneous. However, this approach does not account for geographical barriers and makes inference more difficult[28].

Once the coastal area has been defined, we define alignment (a) as a dummy equal to one when the mayor of a municipality belongs to the ideological party bloc (either left-wing or right-wing) that holds more mayoralties in the coastal area (recall the $N_j > N_{-j}$ condition from the theory section), and equal to zero otherwise. The information regarding the party of the mayor, and also on the votes and seats of all parties running in the local elections, comes from the Spanish Ministry of Interior. In addition to this variable, we also use a measure of *Local-regional alignment*, computed as a dummy equal to one if the mayor and regional president belong to the same party. We account for *Local-regional alignment* because one might argue that the effect of *Alignment* among neighbors could be due to the fact that all of them are aligned with the regional

geographer's work departs from this classification but provides a more detailed breakdown based on a larger variety of geographical, ethnographical and historical sources. The data can be downloaded from www.Geosoc.udl.cat/export/sites/Geosoc/ca/.galleries/Documents/municipiosporcomarcas.xls.

[27] See Figure A.4 in the Online Appendix. These numbers refer only to coastal municipalities (i.e., those with a portion of shore in its jurisdiction). Most coastal counties have a larger number of inland municipalities. In the paper, we focus only on coastal municipalities because these are the only municipalities that can make decisions regarding construction close to shore.

[28] In the first case, we cluster standard errors by *County* or *Coastal denomination*. In the case of *Nearest neighbors,* we will account explicitly for the spatial correlation of the error term.

government at the same time. We focus on alignment with the regional government because, as explained in section three, this level of government also has some responsibilities in coastal development.

Forcing variable. The forcing variable is the *Vote margin*, computed as the votes needed for the ideological bloc that rules in most municipalities to gain control of the local city council, expressed as the percentage of total votes cast at the local election[29]. To define the ideological blocs, we classify all parties standing in local elections into two groups: *left* and *right*[30]. The parties are classified as left or right based on party statutes or newspaper reports. This is a straightforward task for national parties and the most relevant regional parties. For minor regional parties and local parties (parties running in only one or a few municipalities), we also rely on the party brand, which is very informative in the case of left-wing parties (e.g., typical leftist names include words as 'socialist,' 'communist,' 'green', 'progressive'). The few remaining local parties whose names offer no clues as to their ideology (e.g., 'civic list' , 'neighborhood association', 'independent,') are classified as right-wing. Later, we will check that the results are not altered to a great extent when this assumption is modified.

To compute the forcing variable, we use the algorithm developed by Curto *et al*. (2018), which is based on the workings of the d'Hondt method used to translate votes into seats in Spanish local elections. Intuitively, the algorithm works by subtracting a small number of votes from one of the blocs and distributing these votes among the parties of that bloc, according to their initial vote share, while keeping the votes of the other bloc constant. We stop subtracting votes when we observe a shift in the seat majority from one bloc to the other (i.e., when the last seat that gave one bloc the majority moved over to the other bloc). The number of votes to reach this stage, divided by the total number of votes cast at the election, is our forcing variable[31].

Covariates. We assemble a number of covariates (see Table A.1 in the Appendix). These variables are used in the validity checks and subgroup analyses. Some of the

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[29] This happens if this bloc does not have a majority of seats in the council. If the bloc does have a majority of seats, the variable is defined as the votes needed to loss control of the council.
[30] See Tables A.2 and A.3 in the Online Appendix for basic statistical information on the composition of the two blocs and for a list of the most relevant party names.
[31] The Online Appendix of Curto *et al.* (2018) provides the full algebraic development of the algorithm and numerical examples.

variables are time invariant. The time-invariant covariates include *Coast length*, the ratio of *Beach* to *Coast length* and the amount of *Vacant* land in each distance band, computed by subtracting the amount of land already built on in the past (data from the cadaster) from the total *Land* area in each band (the source being the Global Human Settlement Layer database, https://ghsl.jrc.ec.europa.eu). Our database also includes information on the number of *Rainy days* and on the *Av. Temperature* (data were taken from the Agencia Estatal de Meteorología, https://www.aemet.es), a dummy identifying ocean or sea (Mediterranean vs. Atlantic/Cantabrian), a dummy for island status (Balearic Islands and Canary Islands) and the %*Environmentally valuable land*, according to the European Union's Natura 2000 network (https://www.miteco.gob.es/es/biodiversidad/temas/espacios-protegidos/rednatura2000). In the subgroup analysis, we also use information on the %*Commuters*, measured as the number of non-resident workers over the total number of workers. This information is available for the 2001 census only.

The time-varying information comes from the 1981, 1991, 2001 and 2011 censuses and refer to employment shares by education level and sector. These data are interpolated for the years between censuses. We obtain unemployment data from the *Anuario Económico La Caixa*. These data are made available biannually. This is also the source of data for the *Tourism index*, which we use as a proxy for the number of visitors, and that is available only for a few cross-sections[32]. We also use several political variables: Left-wing mayor, Left-wing region, Left-wing central government, Council majority (dummy equal to one if a single party has a majority of seats in the local council) and Local-regional alignment and Local-central alignment (if the mayor and the regional or the national president, respectively, have the same ideology). These variables are computed from data on local elections provided by the Spanish Ministry of the Interior.

[32] More precisely, this indicator measures the tax base of the local business tax in the hospitality sector (i.e., hotels, restaurants, and cafes). The Spanish local business tax is presumptive, and the base is computed with objective indicators. For example, in the case of hotels, it depends on the number of rooms and the hotel category. Therefore, this variable is a measure of the hospitality industry capacity, although it is correlated with the number of visitors. Direct information on the number of visitors is not available for all the municipalities, hence our reliance on this proxy.

5. Results

5.1 Exploring the discontinuity

Figure 2 plots the *Alignment* status dummy (a) against the *Vote margin* (v^0). When the *Vote margin* is positive, it means that the ideological bloc ruling in a majority of municipalities in the coastal area holds a majority of seats in the local council. When the *Vote margin* is negative, this ideological bloc has a minority of seats in the local council. We observe a large jump in the probability of being aligned at the threshold. The *Vote margin* measures the distance from the threshold in terms of the percentage of votes necessary to get the seats that guarantee a majority in the council. The value of the discontinuity in the first stage (i.e., the discontinuity in the probability of alignment) is around 66 percent.

[Insert Figure 2]

To test for manipulation, we examine the histogram and, more formally, we test for the continuity of this variable at the cutoff (see Figure 3). Neither of the two tests reported suggest any evidence of manipulation. Another validity check involves testing for the presence of a discontinuity in pre-determined covariates. Table A.4 in the Online Appendix shows a large group of variables, none of which seems to be discontinuous at the threshold. Note that this is also the case with the lagged dependent variable ($\widetilde{\mathcal{B}uilt}$) and the amount of vacant land, log ($\mathcal{V}acant$). In Table A.5, we repeat the same exercise for the average of the rest of the municipalities in the Coastal area and reach the same conclusion.

[Insert Figure 3]

5.2 Alignment and development

Main results. The discontinuity in coastal development around the cutoff is illustrated in Figure 4, which shows the plot between coastal development and the forcing variable. The graph provides evidence of a clear and sizeable discontinuity: municipalities marginally to the right of the cutoff (i.e., those more likely to be aligned) develop less land than those marginally to the left (i.e., those more likely unaligned).

[Insert Figure 4]

Table 1 presents the estimates of the reduced form effect (the 'intent-to-treat' effect, or ITT). Keep in mind that this estimate can be interpreted as the effect on all units potentially treated and is, therefore, a conservative estimate of the effect of alignment. The value of the estimated ITT coefficient is around -0.25. However, to interpret this coefficient as a semi-elasticity, it should be transformed as $\exp(\hat{\alpha} - 0.5.\widehat{Var(\hat{\alpha})}) - 1$ (Bellemare and Wichman, 2020). The transformed coefficient takes the value of -0.23. Thus, according to these results, municipalities where the ruling ideological bloc has a majority in the council develop on average around 23% less land than municipalities where this bloc does not hold a majority of seats in the council.

[Insert Table 1]

This table presents different specifications. All use a local linear regression with the optimal bandwidth. The first column presents the raw estimates without any type of control. The second column controls for $\log(\mathcal{V}acant)$ to account for municipality scale. The third column includes region and year fixed effects. All these specifications use the MSE bandwidth selector. The point estimates are very similar in these three specifications. The estimates are, however, more efficient when we control for scale and fixed effects; this was expected, given the increase in the R^2, which grew from 0.005 to 0.464. In column four, we use the CER optimal bandwidth with similar results. In column five, we introduce a full set of pre-determined covariates, with no discernible effect on the results. Finally, in column six, we also control for a set of contemporaneous political variables (Left-wing mayor, Council majority and Local-regional alignment). These controls are introduced to account for the possibility that alignment is confounded with other treatments[33]. In any case, they do not seem to affect the results.

[Insert Table 2]

Panel A of Table 2 presents the 2SLS estimates, which correspond to the 'treatment on the treated' (TOT) effect. These results should be interpreted as the

[33] In fact, Local-regional alignment is also a bit higher to the right of the threshold (see Table A.6 in the Online Appendix). The jump is smaller (0.15) than that of alignment between neighboring municipalities (0.66). The reason for this is mechanical: municipalities surrounded by other municipalities controlled by the same ideology are in regions where the regional government is controlled by that ideology.

effect on units where the mayor is actually aligned with the ideological bloc ruling in the coastal area. Note that the coefficient obtained is equal to the one presented in Table 1 divided by the size of the first-stage coefficient, presented in panel B of Table 2. Therefore, the results in Table 2 mirror those in Table 1. The results are fairly stable and statistically significant across specifications; the precision of the estimates is again higher when controlling for scale and for region and time fixed effects. The value of the coefficient is around -0.38 and the semi-elasticity (Bellemare and Wichman, 2020) is -0.32. Thus, according to these results, a municipality with a mayor that belongs to the ideological bloc ruling in most municipalities in the coastal area will develop around 32% less than other municipalities during a term of office.

Robustness: RD methods. The results presented above are statistically significant and quantitatively meaningful. Moreover, they are robust to the variations in the RD methods employed. First, Figure A.8 in the Online Appendix shows the TOT effects for a wide range of bandwidth values. The profile is as expected: the coefficients grow in size as we approach the threshold, but the precision of the estimates drops. The estimates become smaller for larger bandwidths, thus probably suggesting the need for a higher-order polynomial. Second, Figure A.9 shows that very similar results are obtained when the bias-corrected estimator suggested by Calonico *et al.* (2014) was used. The bias-corrected estimator is a bit larger (-0.44 vs. -0.38, or -0.36 v. -0.32 in terms of semi-elasticities), which would suggest that our estimates might be a lower bound. Importantly, the estimates remain statistically significant when robust standard errors are used. The same figure shows that the results are very similar when a non-parametric analysis with a triangular or Epanechnikov kernel is used. Third, Figure A.10 shows the results for different polynomial orders (one to four) using both the optimal bandwidth and the full bandwidth. The results for the optimal bandwidth are larger for higher-order polynomials but fairly stable. In accordance with the suggestion by Pei *et al.* (2020), we compute the MSE for each of these specifications[34] finding that the local linear specification is the one performing better[35].

[34] The MSE of the specifications with polynomials of orders 2, 3 and 4 were 24%, 58% and 78% larger than the MSE of a local linear regression.
[35] Notice that the figure also reports results for the full bandwidth. In this case the polynomial minimizing the MSE was of fourth order. It is reassuring that the coefficient was also -0.4.

Robustness: close-elections design. The results are also robust to modifications in the assumptions used to implement the close-elections design for proportional elections. First, Table A.11 in the Online Appendix checks the robustness of the results to the classification of parties used. As already discussed, there are some doubts regarding the ideology of a residual category of local parties. Also, it is not clear how the existence of regional and centrist parties affects the performance of the RDD. This table reports the results obtained when we exclude municipalities where the mayor belongs to Local parties, Regional parties and Centrist parties from the analysis and also when we restrict the analysis to municipalities where the mayor belongs to one of the two main parties (i.e., PSOE and PP). The 2SLS results (left panel) are similar to those obtained when the whole sample is used. The table also reports the coefficient for the first stage (right panel) and shows that the strength of the instrument does not depend at all on the inclusion or exclusion of these parties.

Second, Figure A.12 reports the results obtained when different neighbor definitions are used. The first two coefficients reported on the left are those for fixed area definitions: the 2SLS coefficient is smaller and less precisely estimated when the *Coastal denomination* definition was used. The other five coefficients on the right refer to 'nearest-neighbor' (NN) definitions. Here again, the largest coefficients are for definitions that imply shorter distances: the effects are larger and more precisely estimated for NN(1) and NN(2) than for NN(3) to NN(5). This suggests that cooperation occurs at short distances and involves a small number of municipalities.

Robustness: functional form. Table A.7 in the Online Appendix explores what happens when we deal with the zeros in the dependent variable in different ways. The first column repeats the results obtained with the *inverse hyperbolic sine* transformation. The second column drops the zeros; the results hold but the coefficient is larger. The third and fourth columns report estimates from IV-Poisson and negative binomial specifications. The results are similar to the main ones.

Additional results: dynamic effects. As discussed in section three, the effects of cooperation in land use regulation may extend beyond a single term of office. First, discretion in permit granting should have an immediate and strong effect on the number of houses started and some effect on houses finished during the term. Second, modifications in the Master Plan might condition construction in future terms. The results reported in Figure 5 below confirm that the effect of alignment on land development is persistent. The effect lasts for (at least) three terms (or 12 years); the current term and two future terms. The size of the effect shrinks progressively and is no longer statistically significant after four terms. At this point, one might naturally wonder whether this effect is due to the persistence of the policy effects or to the persistence of the alignment status. In Table A.13 in the Online Appendix, we explore this issue by looking at the effect of $\mathbb{1}(v^0 > 0)$ on alignment in future terms. The results suggest that alignment is not persistent, so the impact on development in the future seems to be due to the persistence of the policy; changes in current planning due to cooperation affect future development, even if the municipality is no longer aligned.

Additional results: effects on neighbors. In the theoretical section, we discussed the possible effects of alignment on development in the rest of the municipalities in the coastal area. The model's prediction is ambiguous: on the one hand, municipalities in the majority might want to develop less because the increase in the size of the cooperating coalition also implies a greater degree of internalization but, on the other hand, municipalities in the minority develop more because of strategic substitutability. The simulations (see Figure A.2 in the Online Appendix) suggest that, although the negative effect might dominate, the expected size of the effect is small. Table 3 reports the results of the estimation of the RD model using the average level of development in the rest of the municipalities in the county as the outcome. The first three columns report the reduced form (ITT) results, while the other three columns report the 2SLS (TOT) results. The coefficients are negative but small and not statistically significant, which is consistent with the above discussion[36].

[Insert Table 3]

5.3 <u>Mechanisms</u>

This section provides some additional evidence that helps us establish the validity of the theory sketched in this paper. First of all, we study whether the intensity of the alignment effect depends on the factors identified by our model (recall Proposition 2):

[36] On might wonder whether the dynamic response of neighboring municipalities is different. In Figure A.14 in the Appendix, we report these estimates for future periods, which turn out to be negative but small and not statistically significant.

majority size, the strength of the externality, and preference for land preservation vs. job creation. Second, we will also analyze whether the intensity of the alignment effect is affected by the multilayer structure of government. This is justified because regions also have some responsibilities that might impact the development of land close to the coast (see section 3.3).

Majority size: Number of aligned municipalities. Panel (a) in Figure 6 explores one key implication of the cooperation theory outlined in section two: the effect of alignment should grow with the majority size in the coastal area, i.e., with the number of mayors belonging to the ideological bloc ruling in most municipalities. This determines the difference in the number of aligned neighbors between municipalities in the majority and minority blocs which enhances the intensity of the alignment effect (Proposition 2.a). We test this hypothesis by splitting the sample into two subgroups according to the number of aligned neighbors that a municipality has (#*Aligned*). The High subgroup includes the treated units (a=1) for which #*Aligned* is higher than the median plus the control units (a=0) with #*Aligned* lower than the median. The low subgroup includes the remaining units[37].

[Insert Figure 6]

We implement this subgroup analysis as follows. We estimate a single equation using a parametric local linear regression with our preferred specification (i.e., that which controls for the amount of vacant land and fixed effects) and allow for different RD coefficients in each subgroup. This enables us to test the equality of the treatment effects across subgroups. An issue with this approach is that the number of aligned neighbors might be correlated with other municipality traits. To address this, we reweight our data using the method proposed by Carril *et al.* (2019). First, we estimate a logit model using the High/Low dummy as the dependent variable and a set of variables plausibly correlated with both the majority size and the intensity of the

[37] Note that the High subgroup identifies instances where a municipality that changes status (from unaligned to aligned) experiences a large increase in the size of the aligned coalition and, therefore, in its incentives to cooperate. The Low subgroup identifies instances where the size of the aligned coalition does not change much.

alignment effect[38]. Then, we use the results to obtain the *inverse propensity score weights* that are as explanatory variables used to re-estimate the RD equation[39].

The results indicate that the effect of cooperation is driven by the municipalities located in coastal areas with large majorities. The High coefficient is close to -0.6 and is estimated very precisely, while the low coefficient is small and not statistically significant. The two coefficients are statistically different from each other. The results suggest that the effect of cooperation grows with the majority size, as predicted by the theoretical model.

Majority size: Ideology v. party. In panel (b) of Figure 6, we test a related hypothesis, which is suggested by our discussion on the role of parties in fostering cooperation. In section two, we argued that cooperation could operate beyond party lines and could involve coalition partners and politicians who share a similar ideology. However, it is also true that political parties might be more able to discipline party members (e.g., by excluding candidates from the lists or through promotions to higher office). Therefore, one might hypothesize that the alignment effect might grow with the number of neighbors belonging to the exact same political party rather than to just to the same ideological bloc. We study this possibility by looking at whether the alignment effect depends on the share of aligned neighbors (%*Party aligned*) that are controlled by the same party. More specifically, we divide the sample in two subgroups, depending on whether %*Party aligned* is higher or lower than the median. The results indicate that the coefficient of the High subgroup (%*Party aligned* higher than the sample median) is large and statistically significant, while the coefficient of the Low subgroup is smaller and not significant at conventional levels[40]. However, the difference between the coefficients of the two subgroups is not statistically significant. This suggest that

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[38] The variables are those used in this section to test for different mechanisms, and include %*Party aligned,* %*Environmentally valuable land*, *Tourist index*, %*Commuters*., %*Unemployed*, *Left-wing mayor* dummy and *Local-regional* alignment dummy.

[39] Table A.8 in the Online Appendix reports the estimated coefficients with and without weights and statistical tests showing the improvement in the balance of covariates correlated with the variable used to define the subgroups.

[40] The results do not depend much on the use of weights (see Table A.8 in the Online Appendix). Note also that, in this case, the result is not due to the fact that municipalities with more aligned party neighbors also have more aligned neighbors in general. This could not be the case, because the IPS weights ensure that #*Aligned* is balanced across the High and Low groups. The same happens in panel (a), where the IPS weights ensure that % *Party aligned* is balanced.

the evidence regarding the number of aligned neighbors is more reliable than that related to the specific type of political alignment (i.e., ideology vs. party).

Negative externalities: Environmental amenities. Externalities from environmental amenities constitute a central element of the model described in section three. A key implication of this model is that the effect of alignment should be larger the higher the value of these environmental amenities.

[Insert Figure 7]

The first evidence regarding this mechanism is presented in Figure 7. Here we show the 2SLS-RD coefficient estimated for different distance bands from the shore. Keep in mind that the results presented so far in the paper correspond to the 1 km band. The figure reports the results for several non-overlapping bands (less than 100 m, less than 200 m, and so on), including the 1 km band. The results clearly show that the alignment effect is small and not statistically significant for small distance bands (less than 100 m or 150 m) but statistically significant and large for greater distances. The size of the effect is maximal at 500 m and drops again for greater distances.

Figure A.15 in the Online Appendix reports the results for non-overlapping bands (0 to 100 m, 100 to 150 m, and so on). The results show that the alignment effect is very small and not statistically significant for the first band (less than 100 m) and for all bands above 500 m. The effect of alignment is stronger in the 100-150 m and 200-250 m bands, and is also sizeable in the other bands below 500 m. This pattern can be interpreted as follows. At short distances, the regulations established by the central and regional governments might be effective at curbing development. The first 100 m band is subject to some special protection. This is also the case to some extent with the 100-200 m band. The increase in the effect of alignment at the 100-150 m and 200-250 m bands may be the result of the effort to relocate development away from the protected bands. The reduction in the effect of alignment at distances greater than 500 m is probably the result of a reduction in the amenity value of these locations, which makes cooperation less necessary. Therefore, the results presented in Figures 7 and A.15 are in line with the implications of our model.

[Insert Figure 8]

The second piece of evidence regarding the role of environmental amenities is presented in panel (a) of Figure 8, which displays estimates of RD coefficients for two subgroups defined according to the share of municipal land deemed environmentally valuable. The intuition is that the preservation of this land will have a larger impact on the utility of non-residents than the decision to keep undeveloped land that is not so valuable. This variable has been defined as the land included in a European Union's network of protected spaces called Natura 2000 (https://www.eea. europa.eu/data-and-maps/data/natura-11). The inadequate enforcement of this policy in Spain (recall section 3.3) suggests that this network is more a quantification of the land deserving protection than of the land that it is actually protected. Thus, we expect that voluntary cooperation among municipalities would be needed to preserve this land.

The results suggest that the effect of alignment on development is indeed much larger in municipalities with a high percentage of land included in the Natura 2000 network. The coefficient for the High subgroup is around -0.56 and statistically significant at the one percent level. The coefficient of the low subgroup is -0.18 and not statistically significant at conventional levels. We are able to rule out the equality of both coefficients at the 10 percent level. See Table A.8 in the Online Appendix for the complete results. Therefore, these results support the claim that local governments cooperate to preserve the value of coastal amenities.

Negative externalities: Tourist congestion. The model presented in section two restricts the attention to one type of externality related to depleting the value of environmental amenities. However, other types of negative externalities might generate the same prediction. Here we focus on what we call *Tourist congestion* externalities. The idea is that development in one municipality might generate visits to beaches in nearby municipalities, or drive down hospitality prices in the whole area, or both. Failure to account for these effects could cause too much development.

To test this hypothesis, we use the *Tourist index*, a proxy for the number of visitors. This variable is expressed relative to the population of the municipality[41].

[41] The results are similar when the number of visitors is computed relative to other scale variables as, for example, coast or beach length, which can be considered better proxies of the 'carrying capacity' of a municipality with respect to the number of visitors.

Panel (b) of Figure 8 presents the results of this analysis. They suggest that the alignment effect is indeed stronger in places with high *Tourist congestion*. In this case, however, the two coefficients are sizeable (around -0.51 vs. -0.25 in places with a high/low tourist congestion, respectively) and statistically significant. Note, however, that we could not rule out the equality between both coefficients. Therefore, although the results suggest that tourist congestion might play some role in fostering cooperation, the evidence is less conclusive than that relating to the effect on the quality of environmental amenities.

Positive externalities: Commuter jobs. Positive development externalities have not yet been accounted for in the paper. They could appear, for example, if jobs (or other measures of economic opportunity) in one municipality are obtained by residents who live (and vote) in another municipality. Such externalities could also occur if a large project is underway and requires the coordination of many municipalities. Note, that in this case, the prediction of the effect of alignment would be different than in the other two scenarios discussed above: neighboring municipalities would cooperate in developing more instead of less. This means that the direction of the effect of alignment on development will inform us about the type of externality that prevails.

[Insert Figure 9]

The results presented so far suggest that, on average, negative externalities prevail. However, it is impossible to discard the possibility that positive externalities play some role for some municipalities. In Figure 9, we investigate this possibility by splitting the sample according to the share of commuters in the municipality's labor force. The intuition behind this test is as follows: in places with many commuters, a large proportion of the benefits of development (e.g., those related to job creation) might spill over the municipality boundaries, thereby discouraging development. In this situation, an aligned government, which internalizes this externality, may want to develop more than an unaligned one. The results suggest that this might be the case: in municipalities with a share of commuters lower than the median, the alignment effect is larger than in other places (i.e., around -0.61 vs. -0.23). However, the difference between coefficients is not statistically significant, so the results should be treated with caution. Moreover, the coefficient is negative and statistically significant in both subgroups, thus indicating that negative externalities are dominant everywhere.

Preferences: Unemployment. Another piece of evidence that might shed light on the role of development goals in cooperation in land-use policies consists of looking at the unemployment rate. As already discussed in section three of the paper, in places with high unemployment, job creation is an argument frequently used by politicians who favor land development. In terms of theory, unemployment might affect the relative preference for amenities vs. economic development (which is accounted for by the α coefficient). In Figure 10, we report the results of a subgroup analysis that compares municipalities with a high and low unemployment rate (%*Unemployment*), measured relative to the median of its region and term. The coefficient for the Low unemployment subgroup is larger than the one for the High unemployment subgroup (i.e., -0.54 v. -0.084, respectively), and only the Low coefficient is statistically significant. Moreover, the two coefficients are statistically distinct from each other. It seems, therefore, that local governments are more willing to cooperate when the unemployment rate is low, which is actually what our model predicted.

[Insert Figure 10]

Preferences: Mayor's ideology**.** Another variable that might be worth exploring in a subgroup analysis is the mayor's ideology. Left-wing ideology might also be positively correlated with the preferences for amenities vs. economic development (Solé-Ollé and Viladecans-Marsal, 2013). This might be especially true in Spain, given the lack of noteworthy green parties. Panel (b) of Figure 10 reports some evidence in favor of this hypothesis: the alignment effect is stronger for left than for right-wing mayors (i.e., the coefficients are -0.62 and -0.32, respectively). This is consistent with the prediction of our model. However, the coefficients are large and statistically significant for the two subgroups, which would suggest that cooperation is not limited to left-wing mayors. Note also that we cannot rule out the hypothesis that the coefficients of the two subgroups are equal.

Multilayer governance. As explained in section three, Spanish regional governments also have some responsibilities with respect to land-use development (e.g., general planning guidelines and approval and oversight of local master plans). Also, political parties use targeted regional policies (e.g., grants and roads) to incentivize local cooperation. This raises the question of whether the alignment between local and regional governments is either a complement or a substitute for alignment between neighboring local governments. Moreover, keep also in mind that the Local-regional alignment dummy displays a small discontinuity at the threshold (see Table A.6 in the Online Appendix). This might confound the effect of the alignment between neighbors with that of the alignment across government layers. We address these concerns with a subgroup analysis that estimates different alignment coefficients for municipalities that are aligned and unaligned with the regional government.

[Insert Figure 11]

The results presented in Figure 11 suggest that the strength of cooperation between neighbors is larger when there is no Local-regional alignment (i.e., -0.38 and -0.47 in the vertically aligned and unaligned cases, respectively). This might suggest that horizontal (between neighbors) and vertical cooperation (across layers) are substitutes: when the mayor belongs to the regional government's party, there is less need to cooperate with neighbors[42]. Note, however, that the difference between coefficients is small and not statistically significant. In any case, the large and significant alignment effect in both subgroups suggests that the estimated treatment effect is genuinely due to voluntary cooperation between nearby municipalities.

6. Conclusion

In this paper, we investigate the role of intergovernmental cooperation in the protection of coastal land from development using Spanish data. Fragmented local governments do not take into account of the development externalities imposed on non-residents and, as a result, end up making suboptimal decisions. We argue that politicians belonging to the same political party and/or sharing the same ideology might give greater consideration to the welfare of non-residents and may be more willing to cooperate in relation to coastal development policies.

[42] Notice that this result is similar to the one obtained regarding the size of the alignment effect for land at different distances from the coast (Figure 7). There we also found that horizontal cooperation lessened as the involvement of the central government increased, which happens for land very close to the coastline.

We show that this seems to be the case in Spain. Mayors belonging to the ideological bloc that controls most municipalities in the coastal area develop much less than other mayors. Additional results that show that the effect grows with the number of aligned municipalities, confirm that this is actually the result of improved incentives to cooperate. The negative effect of alignment on development indicates a failure of municipalities to account for negative externalities. This conclusion is confirmed by additional evidence showing a stronger effect for land close to the coastline and for municipalities with a higher share of environmentally valuable land and (less clearly) with high tourist congestion. Evidence showing a weaker effect for municipalities with a large share of commuters, in the labor force is suggestive of the presence of positive externalities. However, the fact that the alignment effect is negative even in places with a lot of commuters suggests that negative externalities are in fact dominant.

These results have some implications for the design of coastal preservation policies. They signal the need to reconsider the benefits of keeping coastal land-use regulations in the hands of local governments. They also warn of the difficulties of relying on voluntary cooperation between local governments to deal with spatial externalities. In Spain, all attempts at local government amalgamation have so far failed. Acknowledging the huge political costs involved in these proposals, some experts have instead proposed to incentivize voluntary cooperation. This paper suggests that this could also be fraught with difficulties, given that these cooperation efforts might be hindered by ideological differences between local politicians.

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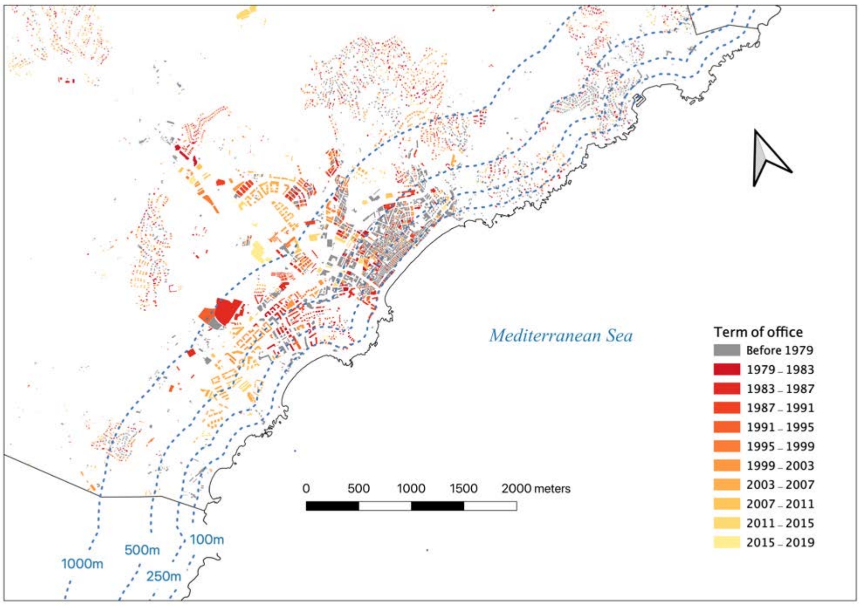
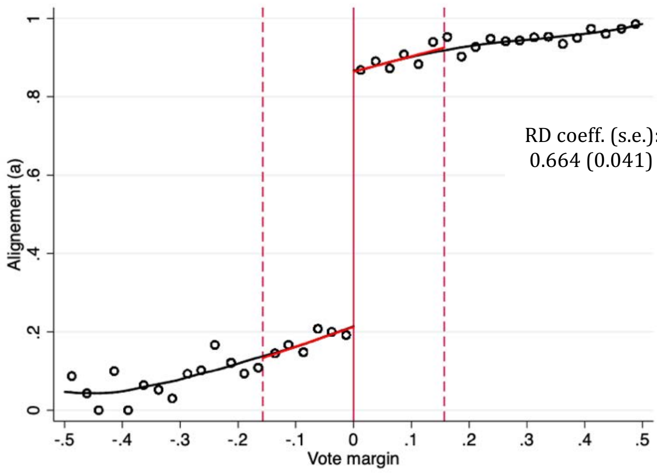
Tables and figures

Figure 1:
Built land. Data from the cadaster. Lloret de Mar (*Costa Brava*, *Girona*).



Notes: (1) Built-up land during each term of office, depicted in different colors. The graph also indicates the location of some of the distance bands used in the analysis. (2) The example is for a municipality called Lloret de Mar, which is one of the main tourist hot spots on the Costa Brava (north of Barcelona, close to the French border). (2) Source: Spanish cadaster (Dir. Gal. del Catastro).

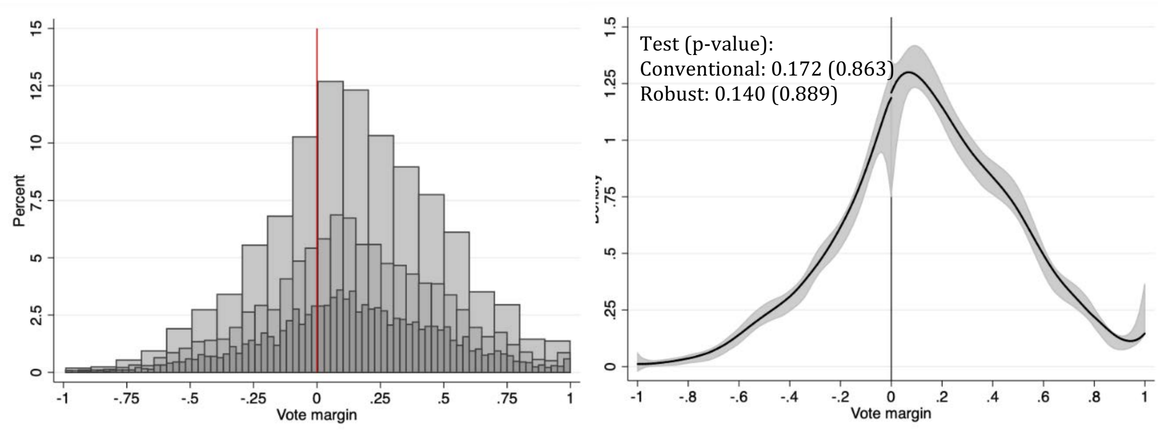
Figure 2: *First stage.*
Dependent variable: Alignment (a)



Notes: (1) The dots are 2.5% bin averages of the Alignment dummy. (2) The black line is a local polynomial smoother and the red line is a local linear regression fit on the optimal bandwidth used in the main analysis (computed as per Calonico *et al.*, 2014), and is delimited by the vertical dashed lines. (3) We report the RD coefficient estimated using the local linear regression method and its standard error.

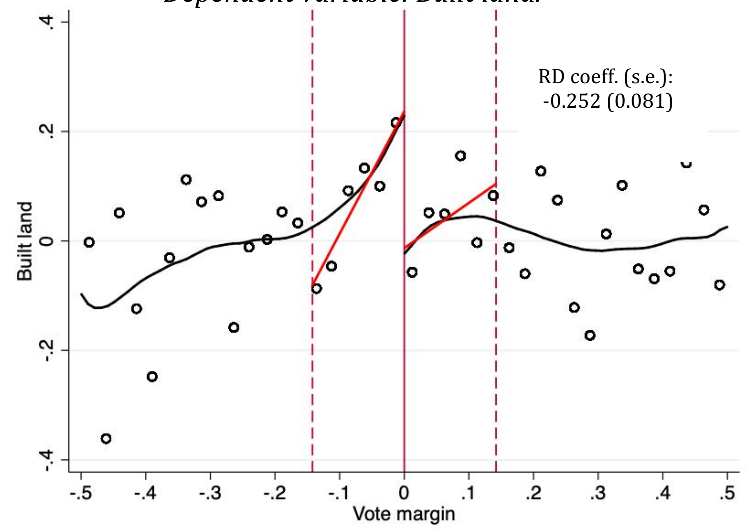
Figure 3: *Continuity of the forcing variable.*

(a) Histogram (b) Manipulation test



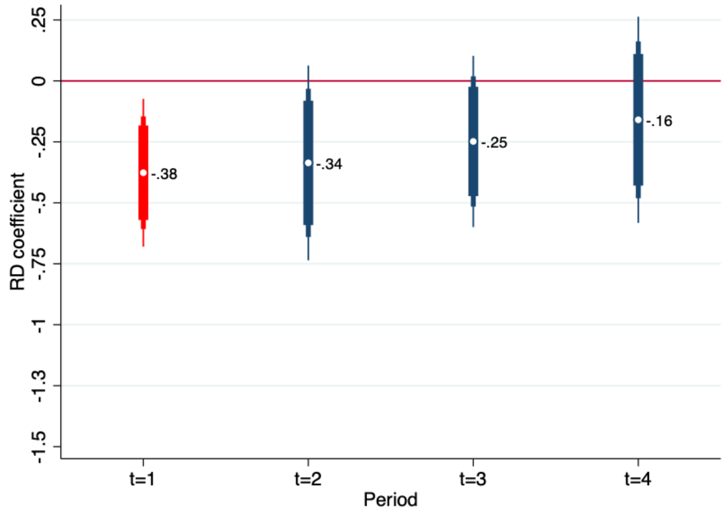
Notes: The left-hand panel shows the histogram of the forcing variable using 5%, 2.5% and 1.25% bins. The right-hand panel shows the Cattaneo *et al*. (2018) manipulation test; we report both the conventional and robust versions of the test; for each, we report the test and the p-value (in parentheses).

Figure 4: *Reduced form.*
Dependent variable: Built land.



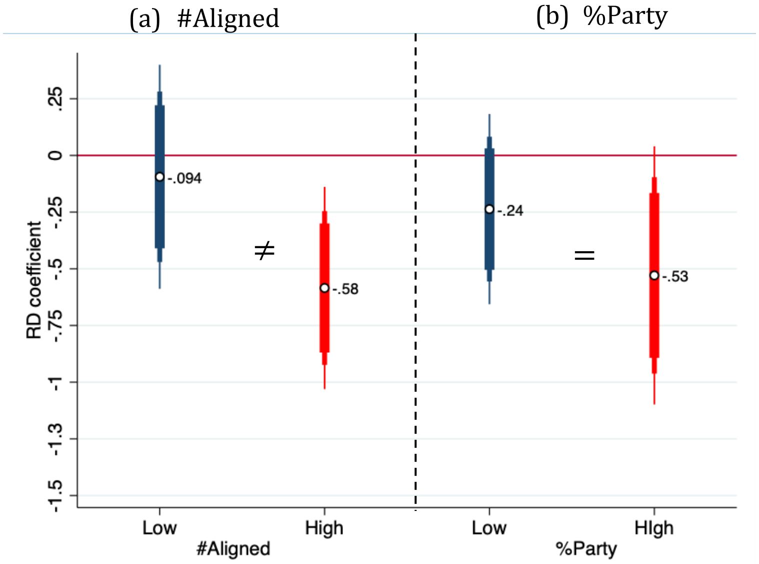
Notes: (1) The dots are 2.5% bin averages of the residual of a regression between $\widetilde{Built}$ and $\log(Vacant)$ and region and year f.e. The dependent variable was measured as $\widetilde{Built} = \log(Built + \sqrt{Built^2 + 1})$. (2) The black line is a local polynomial smoother and the red line is a local linear regression fit on the optimal bandwidth (computed as per Calonico *et al*., 2014), and is delimited by the dashed lines. (3) We report the RD coefficient estimated using the local linear regression method, and its standard error.

Figure 5: *Dynamic effects.*
Dependent variable: Built land



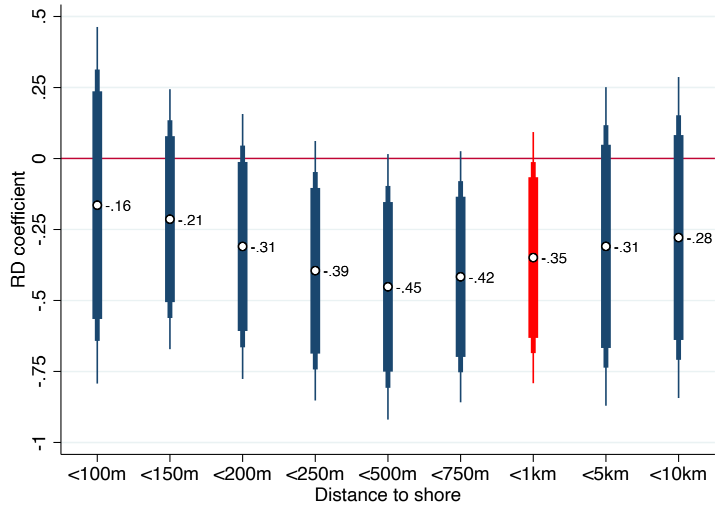
Notes: (1) 2SLS estimates. Dependent variable measured as $\widetilde{Built} = \log(Built + \sqrt{Built^2 + 1})$. Estimation by local linear regression with the bandwidth selected as per Cattaneo *et al.* (2014), controlling for $\log(Vacant)$ and region and year f.e. (2) The figure reports the coefficients estimated for the current term of office (t=1, in red) and for three future terms (t=2, t=3 and t=4, in navy). We show the point estimate and the 90, 95 and 99% c.i. Standard errors are clustered at the County level.

Figure 6: *Majority size*



Notes: (1) *#Aligned* = number of aligned neighbors; High: dummy equal to one if *#Aligned* is higher than the median of similarly sized counties for the treated units and lower than the median for the control units; Low: dummy equal to one if this condition does not hold. (2) % *Party aligned* = number of aligned neighbors that belong to the same political party / number of aligned neighbors; High: dummy equal to one if % *Party Aligned* is higher than the median; Low: dummy equal to one if this condition does not hold. The ≠ and = symbols indicate that the coefficients of the two subgroups are statistically different (equal) at the 10% level. (3) Dependent variable is the average amount of built-up land in the rest of the municipalities in the County, and was measured as $\widetilde{Built} = \log(Built + \sqrt{Built^2 + 1})$. (4) Estimation using a single parametric local linear regression fully interacted with the subgroup dummy (High/Low); optimal bandwidth selected as per Calonico *et al.* (2014) using the whole sample; controls included: $\log(Vacant)$and year and region fixed effects; the estimation uses *inverse propensity score* weights, in accordance with the method proposed by Carril *et al.* (2019). (5) The point estimate and the 90, 95 and 99% c.i. are shown. Standard errors are clustered at the County level.

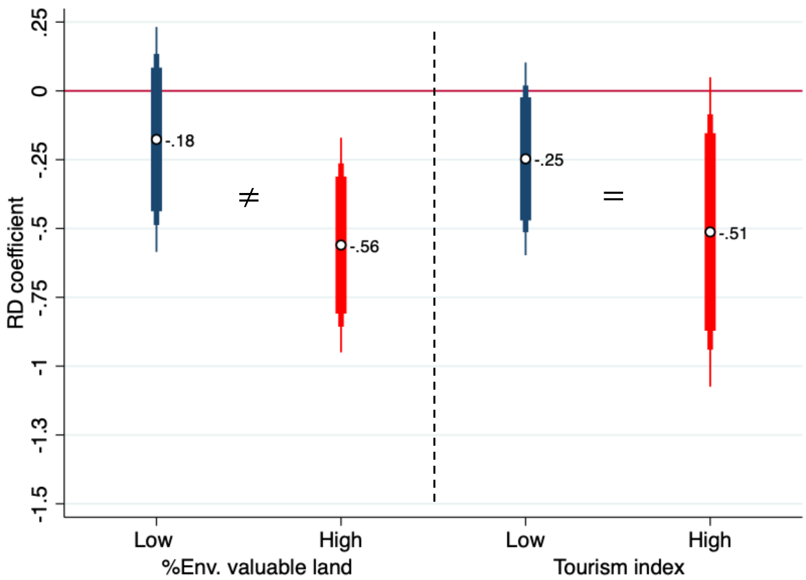
Figure 7: *Distance from shore.*
Overlapping distance bands.



Notes: (1) Dependent variable: Developed land. Estimation by IV-Poisson using the qvf command in Stata. Dependent variable is the amount of Built land during the term. (2) Parametric RD using a polynomial of order one and the bandwidth selected as per Cattaneo *et al.* (2014). (3) We control for log ($Vacant$) and region and year fixed effects. (4) We show the results for overlapping distance bands in meters (in red we show the 1 km band, which is the one used in the main analysis). In the Online Appendix, we show the results for non-overlapping distance bands. (5) The point estimate and the 90, 95 and 99% c.i. are shown. Standard errors are clustered at the County level.

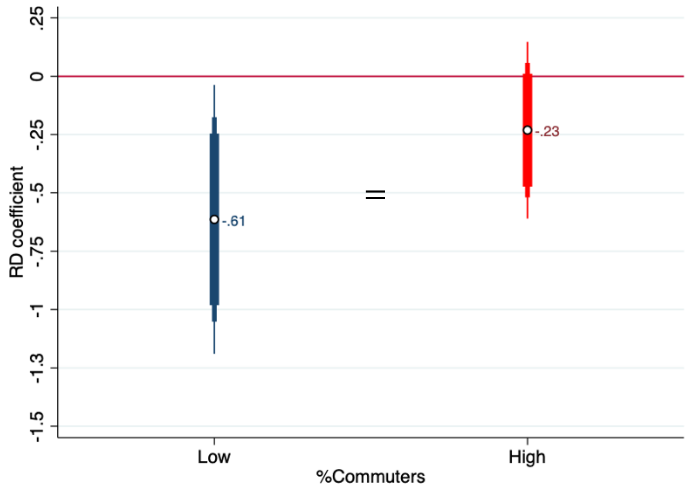
Figure 8: *Negative externalities*

(a) Environmental amenities (b) Tourist congestion



Notes: (1) *%Environmentally valuable land*: land area included in the Natura 2000 network over total land area of the municipality; High/Low= *%Environmentally valuable land* >(<) median. (2) *Tourism index:* index of supply in the hospitality index relative to the length of the beach. High/Low = *Tourism index* >(<) median. The ≠ and = symbols indicate that the coefficients of the two subgroups are statistically different (equal). (3) See Figure 7. (4) The point estimate and the 90, 95 and 99% c.i. are shown. Standard errors are clustered at the County level.

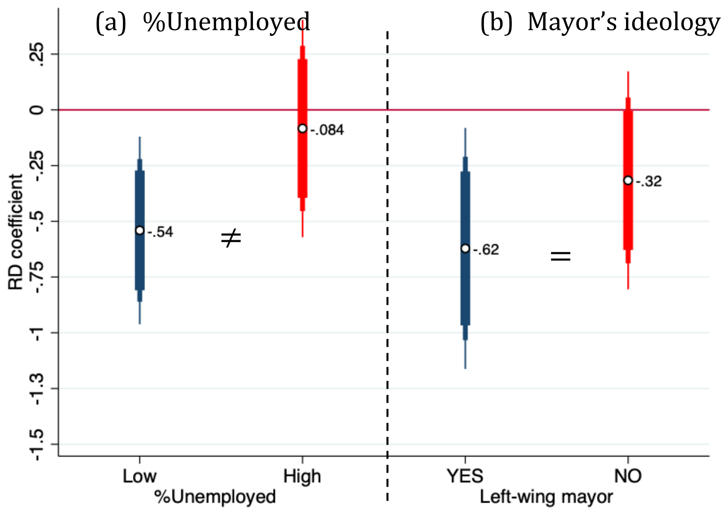
Figure 9: *Positive externalities: commuter jobs*



Notes: (1) %Commuters = non-resident workers / total workers; High/Low = %Commuters>(<) median (2) the ≠ and = symbols indicate that the coefficients of the two subgroups are statistically different (equal). (3) See Figure 7. (4) The point estimate and the 90, 95 and 99% c.i. are shown. Standard errors are clustered at the County level.

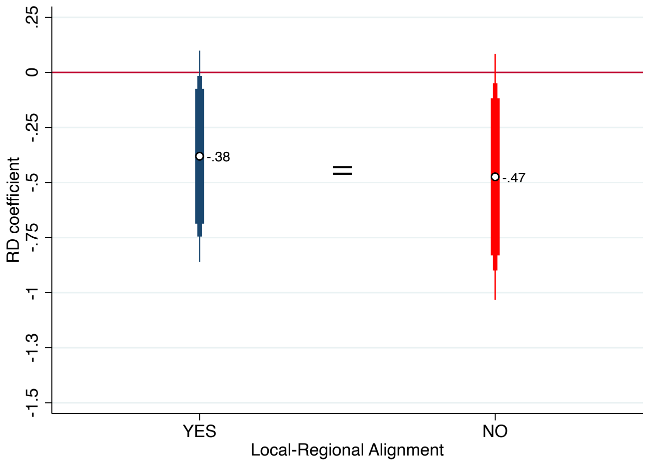
Figure 10:

Preferences for amenities vs. economic development



Notes: (1) %Unemployed = unemployed/population; High/Low = %Unemployed>(<)median; (2) Left-wing mayor: dummy equal to one if the mayor belongs to a party classified in the left-wing ideological bloc; YES = dummy is one, NO = dummy is zero; the ≠ and = symbols indicate that the coefficients of the two subgroups are statistically different (equal). (3) See Figure 7. (4) The point estimate and the 90, 95 and 99% c.i. are shown. Standard errors are clustered at the County level.

Figure 11: *Multilayer governance*



Notes: (1) Local-regional alignment: dummy equal to one if the mayor and regional president belong to the same ideology; YES = dummy is one, NO = dummy is zero; (2) the ≠ and = symbols indicate that the coefficients of the two subgroups are statistically different (equal). (3) See Figure 7. (4) The point estimate and the 90, 95 and 99% c.i. are shown. Standard errors are clustered at the County level.

Table 1: *Reduced-form RD results. Dependent variable: Built land.*

	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{I}(v^0 > 0)$	-0.269**	-0.241**	-0.252***	-0.241***	-0.230***	-0.247***
	(0.110)	(0.102)	(0.081)	(0.106)	(0.072)	(0.072)
Adj. R²	0.005	0.196	0.464	0.496	0.520	0.532
Bandwidth selector	MSE	MSE	MSE	CER	MSE	MSE
Bandwidth	0.157	0.167	0.142	0.109	0.142	0.142
Controls:						
$\log(\mathcal{V}acant)$	NO	YES	YES	YES	YES	YES
Region & year f.e.	NO	NO	YES	YES	YES	YES
Pre-determined controls	NO	NO	NO	NO	YES	YES
Political controls	NO	NO	NO	NO	NO	YES
Effective obs.	1,257	1,315	1,165	899	1,143	1,142

Notes: (1) Dependent variable measured as $\widetilde{\mathcal{B}uilt} = \log(\mathcal{B}uilt + \sqrt{\mathcal{B}uilt^2 + 1})$. The *Vote margin* is denoted by v^0 and $\mathbb{I}(v^0 > 0)$ indicates whether the majority party (the one ruling in most municipalities in the coastal area) also has a majority of seats in the local council. (2) Column 1 presents the results without controls; in column 2 we control for $\log(\mathcal{V}acant)$; in columns 3 and 4 we control for region and year fixed effects; in column 5 we control for pre-determined socioeconomic and geographic variables: log(Coast length), %Beach/Coast, %Environmentally valuable land, %Unemployed, %Low education level, %High education level, %Employed in construction and %Employed in services; in column 6 we add contemporaneous political variables as controls: Left-wing mayor dummy, Council majority dummy and Local-regional alignment dummy. (3) Standard errors clustered at the county level in parentheses and p-values in brackets; ***, ***, and * indicate that the coefficient is significant at the 1%, 5% and 10% levels.

Table 2: 2SLS-*RD results. Dependent variable: Built land.*

	(1)	(2)	(3)	(4)	(5)	(6)
	A. 2SLS, *Dep. Variable: Built land*					
Alignment (a)	-0.406** (0.163)	-0.365** (0.151)	-0.377*** (0.118)	-0.359*** (0.156)	-0.344*** (0.106)	-0.379*** (0.109)
	B. *First stage: Dep. variable: Alignment* (a)					
$\mathbb{I}(v^0 > 0)$	0.664*** (0.041)	0.659*** (0.041)	0.671*** (0.041)	0.670*** (0.052)	0.668** (0.046)	0.652*** (0.047)
Kleibergen-Paap rk LM F-stat.	259.47 [16.38]	271.59 [16.38]	240.53 [16.38]	185.92 [16.38]	230.56 [16.38]	213.56 [16.38]
Bandwidth selector	MSE	MSE	MSE	CER	MSE	MSE
Bandwidth	0.157	0.167	0.142	0.109	0.142	0.142
Controls:						
log($\mathcal{V}acant$)	NO	YES	YES	YES	YES	YES
Region & year f.e.	NO	NO	YES	YES	YES	YES
Pre-determined controls	NO	NO	NO	NO	YES	YES
Political controls	NO	NO	NO	NO	NO	YES
Effective obs.	1,25	1,315	1,165	899	1,143	1,142

Notes: (1) See Table 1. (2) Panel A reports the 2SLS results and panel B the First stage; *Alignment* (a) is a dummy equal to one if the mayor belongs to the party bloc ruling in a majority of municipalities in the county; $\mathbb{I}(v^0 > 0)$ is a dummy equal to one if the party bloc ruling in a majority of municipalities in the county controls a majority of seats in the legislature. (3) Kleibergen-Paap rk LM F-stat. is the weak instrument test; in brackets we report the value of the Stock-Yogo weak ID test critical value at 10% maximal IV size.

Table 3: *Effects on neighbors. Dependent variable: Built land.*

	Reduced form (ITT)			2SLS (TOT)		
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{I}(v^0 > 0)$	-0.049 (0.082)	-0.032 (0.080)	-0.031 (0.052)	-0.079 (0.131)	-0.052 (0.131)	-0.051 (0.093)
Adj. R^2	0.184	0.573	0.610	--.--	--.--	--.--
Kleibergen-Paap rk LM F-stat.	--.--	--.--	--.--	242.17 [16.38]	275.39 [16.38]	232.95 [16.38]
Bandwidth selector	MSE	MSE	MSE	MSE	MSE	MSE
Bandwidth	0.193	0.144	0.144	0.193	0.144	0.144
Controls:						
log($\mathcal{V}acant$)	YES	YES	YES	YES	YES	YES
Region & year f.e.	NO	YES	YES	NO	YES	YES
Pre-determined controls	NO	NO	YES	NO	NO	YES
Effective obs.	1,466	1,365	1,340	1,466	1,365	1,340

Notes: (1) See Table 2. (2) Dependent variable is the average amount of built-up land in the rest of the municipalities in the Coastal area, and was measured as $\widetilde{\mathcal{B}uilt} = \log(\mathcal{B}uilt + \sqrt{\mathcal{B}uilt^2 + 1})$. The *Vote margin* is denoted by v^0 and $\mathbb{I}(v^0 > 0)$ indicates whether the majority party (the one ruling in most municipalities in the Coastal area) also has a majority of seats in the local council. (3) Standard errors clustered at the county level in parentheses; ***, ***, and * indicate that the coefficient is significant at the 1%, 5% and 10% levels.

The political economy of coastal development

Pierre Magontier, Albert Solé-Ollé and Elisabet Viladecans-Marsal

Online Appendix

Section A.I: Theory proofs and simulations

Proof of Proposition 2.a

This proposition states that the alignment effect increases with majority size, that is with $(N_j - N_{-j})$. We depart from expression (15):

$$d_j^P - d_{-j}^P = \Gamma/\Lambda < 0$$

where $$\Gamma = -(1-\alpha)\alpha\theta\big(N_j - N_{-j}\big)$$

$$\Lambda = (1-\theta) + (2-\alpha)\alpha\theta^2 N_{-j}N_j/(1-\theta+\theta N)$$

Differentiating $d_j^P - d_{-j}^P$ w.r.t. $(N_j - N_{-j})$ we obtain:

$$(d_j^P - d_{-j}^P)' = \frac{\Gamma'\Lambda - \Lambda'\Gamma}{\Lambda^2}$$

so the sign of $(d_j^P - d_{-j}^P)'$ depends on the sign of $\Gamma'\Lambda - \Lambda'\Gamma$, where $\Gamma'$and Λ' are the derivatives of Γ and Λ w.r.t. $(N_j - N_{-j})$. In order to sign of this expression, let's rewrite $(N_j - N_{-j}) \equiv \gamma > 0$, and $f(\gamma) \equiv N_{-j}N_j > 0$, where $f'(\gamma) < 0$ because $N_j > N_{-j}$. We also define $a = (1-\alpha)\alpha\theta \geq 0$ and $b = (2-\alpha)\alpha\theta^2/(1-\theta+\theta N) \geq 0$. This allows us to re-write the expressions for Γ and Λ as:

$$\Gamma = -\gamma a \quad \text{and} \quad \Lambda = (1-\theta) + f(\gamma).b$$

Now, differentiating w.r.t. $(N_j - N_{-j})$, we obtain $\Gamma'$and Λ' as:

$$\Gamma' = -a \qquad \text{and} \quad \Lambda' = f'(\gamma)b$$

Plugging the new expressions of $\Gamma, \Lambda, \Gamma'$and Λ' into $\Gamma'\Lambda - \Lambda'\Gamma$ we get:

$$\Gamma'\Lambda - \Lambda'\Gamma = a\{\gamma\, f'(\gamma)b - (1-\theta) - f(\gamma).b\} \leq 0$$

This expression is negative since $a \geq 0$, $b \geq 0$, $\theta \leq 1$ and $f'(\gamma) < 0$.

Proof of Proposition 2.b

This proposition states that the alignment effect increases with the strength of the externality, that is with the parameter θ. We depart again from expression (15):

$$d_j^P - d_{-j}^P = \Gamma/\Lambda < 0$$

where

$$\Gamma = -(1-\alpha)\alpha\theta\big(N_j - N_{-j}\big)$$

$$\Lambda = (1-\theta) + (2-\alpha)\alpha\theta^2 N_{-j}N_j/(1-\theta+\theta N)$$

Differentiating $d_j^P - d_{-j}^P$ w.r.t. θ we obtain:

$$(d_j^P - d_{-j}^P)' = \frac{\Gamma'\Lambda - \Lambda'\Gamma}{\Lambda^2}$$

so the sign of $(d_j^P - d_{-j}^P)'$ depends on the sign of $\Gamma'\Lambda - \Lambda'\Gamma$, where $\Gamma'$and $\Lambda'$are the derivatives of Γ and Λ w.r.t. θ. In order to sign of this expression, let's define $a = (2-\alpha)\alpha\theta N_{-j}N_j \geq 0$, $b = 1-\theta+\theta N \geq 0$, and $c = (1-\alpha)\alpha(N_j - N_{-j})$. This allows us to re-write the expressions for Γ and Λ as:

$$\Gamma = -\theta c \quad \text{and} \quad \Lambda = \frac{\theta a + (1-\theta)b}{b}$$

Now, differentiating with respect θ, we obtain $\Gamma'$and Λ' as:

$$\Gamma' = -c \quad \text{and} \quad \Lambda' = \frac{b(a-b)+a}{b^2}$$

Plugging the new expressions of $\Gamma, \Lambda, \Gamma'$and Λ' into $\Gamma'\Lambda - \Lambda'\Gamma$ we get:

$$\begin{aligned}\Gamma'\Lambda - \Lambda'\Gamma &= c\left(\theta\frac{b(a-b)+a}{b^2} - \frac{\theta a + (1-\theta)b}{b}\right) \\ &= \frac{c}{b^2}(\theta(b(a-b)+a) - \theta ab - (1-\theta)b^2) \\ &= \frac{c}{b^2}(\theta a - \theta b^2 - (1-\theta)b^2) \leq 0 \\ &= \frac{c}{b^2}(\theta a - b^2) \leq 0\end{aligned}$$

Indeed, we can show that $\theta a - b^2 \leq 0$:

$$\begin{aligned}\theta a - b^2 &= (2-\alpha)\alpha\theta^2 N_{-j}N_j - (1-\theta+\theta N)^2 \\ &= \theta^2(2-\alpha)\alpha N_{-j}N_j - (\theta^2(N-1)^2 + 1 + 2\theta(N-1)) \\ &= \theta^2(2-\alpha)\alpha(N-N_j)N_j - \theta^2(N-1)^2 - 1 - 2\theta(N-1) \\ &= \theta^2(2-\alpha)\alpha(N-1)N_j - \theta^2(2-\alpha)\alpha(N_j-1)N_j - \theta^2(N-1)^2 - 1 - 2\theta(N-1) \\ &= (N-1)\{\theta^2[(2-\alpha)\alpha N_j - N + 1] - 2\theta\} - [\theta^2(N_j-1)(2-\alpha)\alpha N_j] - 1 \leq 0\end{aligned}$$

This is negative because the sign of the following expressions:

$$\theta^2[(2-\alpha)\alpha N_j - N + 1] - 2\theta \leq 0$$
$$\theta^2(N_j-1)(2-\alpha)\alpha N_j \geq 0$$

Therefore, $\theta a - b^2 \leq 0$, implying that $\Gamma'\Lambda - \Lambda'\Gamma \leq 0$, so $(d_j^P - d_{-j}^P)' \leq 0$.

Proof of Proposition 2.c

This proposition states that the alignment effect increases with the preferences for amenities vs. economic development, that is with the parameter α. We depart again from expression (15):

$$d_j^P - d_{-j}^P = \Gamma/\Lambda < 0$$

where

$$\Gamma = -(1-\alpha)\alpha\theta\big(N_j - N_{-j}\big)$$
$$\Lambda = (1-\theta) + (2-\alpha)\alpha\theta^2 N_{-j}N_j/(1-\theta+\theta N)$$

Differentiating $d_j^P - d_{-j}^P$ w.r.t. θ we obtain:

$$(d_j^P - d_{-j}^P)' = \frac{\Gamma'\Lambda - \Lambda'\Gamma}{\Lambda^2}$$

so the sign of $(d_j^P - d_{-j}^P)'$ depends on the sign of $\Gamma'\Lambda - \Lambda'\Gamma$, where $\Gamma'$and $\Lambda'$are the derivatives of Γ and Λ w.r.t. α. In order to sign of this expression, let's define $a = \theta(N_j - N_{-j}) \geq 0$ and $b = \theta^2 N_{-j}N_j/(1-\theta+\theta N)$. This allows us to re-write the expressions for Γ and Λ as:

$$\Gamma = -a(\alpha - \alpha^2) \text{ and } \Lambda = (1-\theta) + (2\alpha - \alpha^2)b$$

Now, differentiating with respect α, we obtain $\Gamma'$and Λ' as:

$$\Gamma' = -a(1-2\alpha) \text{ and } \Lambda' = 2b(1-\alpha)$$

Plugging the new expressions of $\Gamma, \Lambda, \Gamma'$and Λ' into $\Gamma'\Lambda - \Lambda'\Gamma$ we get:

$$\begin{aligned}\Gamma'\Lambda - \Lambda'\Gamma &= a\big[(\alpha-\alpha^2)2b(1-\alpha) - (1-2\alpha)\big((1-\theta) + (2\alpha-\alpha^2)b\big)\big] \\ &= -a[(2\alpha-1)\theta - \alpha^2 b + 2\alpha + 1]\end{aligned}$$

The sign of $\Gamma'\Lambda - \Lambda'\Gamma$ depends on the expression in brackets. After substituting b, is:

$$\begin{aligned}&(2\alpha-1)\theta(1-\theta+\theta N) - \alpha^2\theta^2 N_{-j}N_j + 2\alpha(1-\theta+\theta N) + 1 - \theta + \theta N \\ &= \theta\big(\alpha\big(2\theta N + 2N - 2\theta - \alpha\theta N_{-j}N_j\big) + (\theta+1)(N-1) - 1\big) + 2\alpha + 1\end{aligned}$$

Note that $(\theta+1)(N-1) - 1 \geq 0$, but that the sign of $2\theta N + 2N - 2\theta - \alpha\theta N_{-j}N_j$ is undetermined. Yet, note that:

$$2\theta N + 2N - 2\theta - \alpha\theta N_{-j}N_j > 0 \iff \alpha < \lambda = \frac{2(N + \theta N - \theta)}{\theta N_{-j}N_j}$$

This means that when $\alpha < \lambda$, $\Gamma'\Lambda - \Lambda'\Gamma \leq 0$. In other words, $(d_j^P - d_{-j}^P)'$ will systematically be negative when $\alpha < \lambda$. It is then easy to show that when the number of neighbors in the majority is not larger than 8, the expression λ is systematically larger than α, irrespective of θ. Notice that this is satisfied for most of observations in our sample. Moreover, the threshold is lower for smaller values of θ. At the end of this section, we present some simulations that show that the effect of α on the size of the alignment effect is indeed negative for a wide range of parameter values.

Proof of Proposition 3

This proposition states that the effect on neighbor's development is ambiguous. To see why this is the case we have to look first at the effect on a typical neighbor in the majority and, after that, at the effect on a typical minority neighbor:

Effect on the majority. The derivative of expression (14a) w.r.t. N_j is:

$$(A.3) \qquad (d_j^P)' = \frac{(1-\alpha)}{\Lambda^2}\left[-\alpha\theta\Lambda - ((1-\theta) + \alpha\theta N_{-j})\Lambda'\right] \lesseqgtr 0$$

The effect is ambiguous because the first term inside the brackets is negative (indicating that higher internalization due to a larger majority) but the second one is positive (due to strategic substitutability). The second term is positive because $\Lambda' \leq 0$.

Effect on the minority. The derivative of expression (14b) w.r.t. N_j is:

$$(A.4) \qquad (d_{-j}^P)' = \frac{(1-\alpha)}{\Lambda^2}\left[\alpha\theta\Lambda - \left((1-\theta) + \alpha\theta N_j\right)\Lambda'\right] > 0$$

This effect is positive because both terms in the numerator are positive. The first effect picks up the reduction in internalization as the minority becomes smaller. The second effect picks the effect of strategic substitutability.

Effect on neighbors. The overall effect on the neighbors is ambiguous because, although the effect on the minority is positive the effect on the majority is ambiguous. Since, by definition, there are more municipalities in the majority than in the minority, the negative effect due to greater internalization in the majority might compensate for the other positive effects. The effect on an average neighbor can be expressed as:

$$(A.5) \qquad (\bar{d}^{P}_{j,-j})' = (d^{P}_{j})'\left(\frac{N_j}{N-1}\right) + (d^{P}_{-j})'\left(\frac{N_{-j}-1}{N-1}\right)$$

The intuition behind the above formula is that when one municipality switches from the majority to the minority, the N_j municipalities already in the majority internalize more and the $N_{-j} - 1$ municipalities still in the minority internalize less. Notice that the first effect always has a larger weight, since to start with there are more municipalities in the majority than in the minority (i.e., $N_j > N_{-j}$); in the extreme situation that there was only one municipality in the minority (i.e., $N_{-j} = 1$) the second term vanishes. Substituting (A.3) and (A.4) into (A.5) we get the following expression:

$$(A.5) \qquad (\bar{d}^{P}_{j,-j})' = \frac{(1-\alpha)}{\Lambda^2}\left[-\alpha\theta\Lambda\left(\frac{N_j - \left(N_{-j}-1\right)}{N-1}\right) + \cdots \right.$$
$$\left. \ldots - \Lambda'\left((1-\theta) + \alpha\theta\left(\frac{N_j(2N_{-j}-1)}{N-1}\right)\right)\right]$$

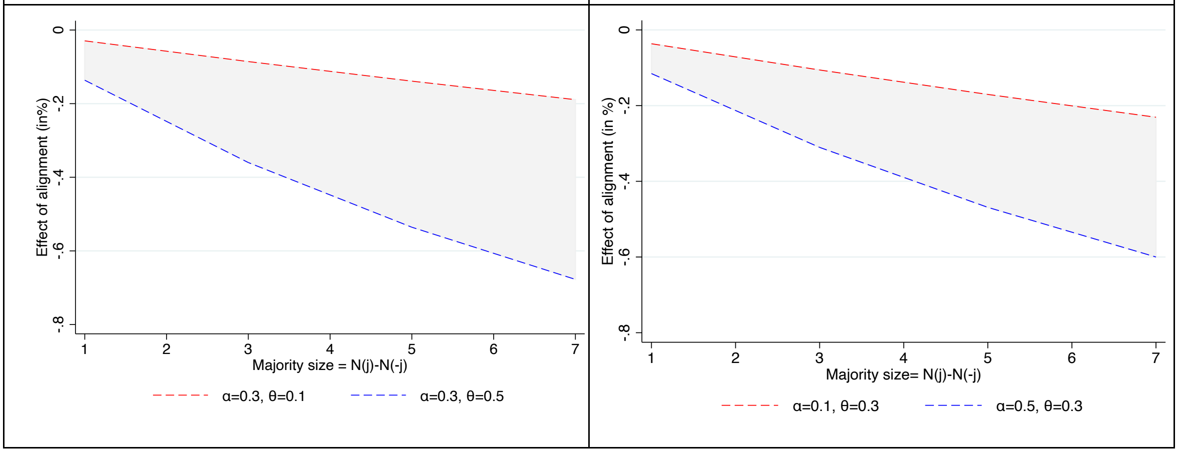
The first term in brackets is negative because $N_j > \left(N_{-j} - 1\right)$ and is larger the larger is the difference between the majority size and that of the minority. This term tells us that the average degree of internalization among neighbors will be higher the more of them are in the majority. The second term is always positive because of Λ' is negative. This makes the sign of the whole expression ambiguous.

Simulations

In this section we illustrate the theoretical predictions developed above with numerical simulations. We will show how the effect changes when we change: (i) the majority size (i.e., $N_j - N_{-j}$), (ii) the strength of the externality (the θ parameter), and (iii) the preference for amenities vs. development (the α parameter). We present results for values of these two parameters that go from 0.1 to 0.5 (holding the value of the other parameter in the middle of this range, i.e. 0.3). We perform the simulation for a coastal area of size N=7.

Figure A.1: *Effect of alignment for different parameter values*

(a) *Strength of externality* (θ) | (b) *Preferences* (α)



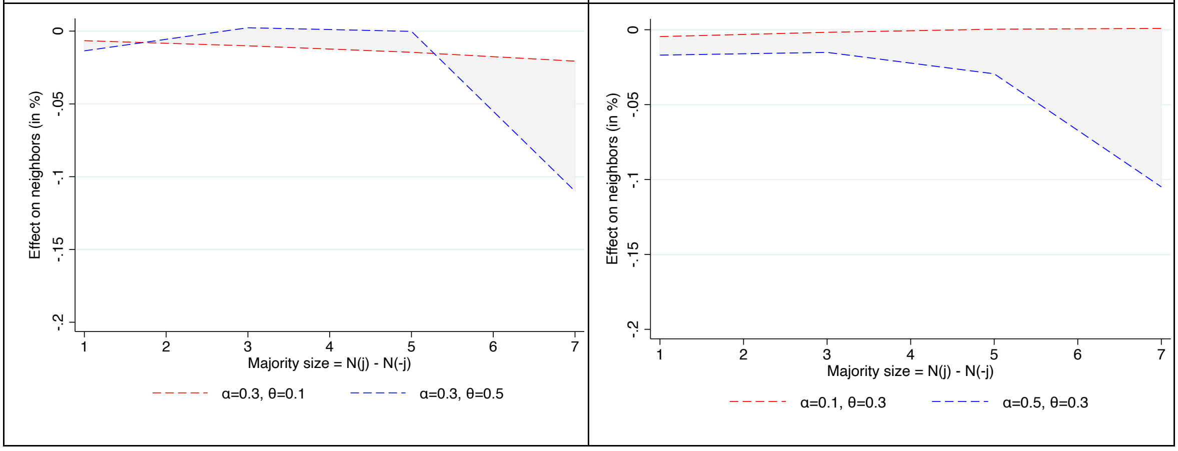
Notes: (1) Simulation of the *Effect of alignment* (in %). Computed using expression (15) in the main text and then dividing by the equilibrium value in a situation without alignment. (2) The simulation is performed for a coastal area of size N=7. (3) In Panel (a) we show the effect for different majority sizes (N_j -N_{-j} from 1 to 7), for a preference parameter $\alpha = 0.3$ and for an externality parameter θ that goes from 0.1 (in red) to 0.5 (in blue); the grey area indicates the values in between these two limits. In Panel (b) we show the effect for different majority sizes, for an externality parameter $\theta = 0.3$ and for a preference parameter α that goes from 0.1 (in red) to 0.5 (in blue); the grey area indicates the values in between these two limits.

In Figure A.1 we look at the impact of these parameters on the *Effect of alignment*, measured as a % of the development in a situation without alignment. In Panel (a) we report the simulated values for different majority sizes (N_j -N_{-j} from 1 to 7) and for different values of the externality parameter θ. The figure shows that the *Effect of alignment* increases monotonically (in absolute value) with majority size. This effect increases with the strength of the externality; moreover, the difference between low and high externality parameters increase with majority size (i.e., the distance between the two lines increases with majority size). In Panel (b), we report the simulated values for different values of the preference parameter α. This panel shows the same relationship with majority size and also shows that the effect is stronger for higher values of α.

In Figure A.2 below we look at the impact of these parameters on the *Effect of on neighbors*, also computed as a percentage of the amount of development in a situation where the treated municipality remains unaligned. The figure shows that the effect is negative but rather small for most majority sizes. Only for the largest majority sizes (and for high values of the externality parameter) the effect is a bit largest. Overall, these results suggest that we should expect this effect to be rather small on average.

Figure A.2: *Effect on neighbors* (*in* %) *for different parameter values*

(a) *Spillover intensity* (θ)	(b) *Preferences* (α)



Notes: (1) Simulation of the *Effect of on neighbors* (in %). Computed using expression (A.5) and then dividing by the equilibrium value of neighbors' development before the switch of the municipality from aligned to unaligned. (2) The simulation is performed for a coastal area of size N=7. (3) In Panel (a) we show the effect for different majority sizes (N_j -N_{-j} from 1 to 7), for a preference parameter $\alpha = 0.3$ and for an externality parameter θ that goes from 0.1 (in red) to 0.5 (in blue); the grey area indicates the values in between these two values. In Panel (b) we show the effect for different majority sizes, for an externality parameter $\theta = 0.3$ and for a preference parameter α that goes from 0.1 (in red) to 0.5 (in blue); the grey area indicates the values in between these two values.

Section A.II: Data sources and calculation of variables

Table A.1: *Variable definitions, data sources, and descriptive statistics*

Variable	*Mean (s.d.)*	*Definition*	*Source*
Built (<1Km)	3.71 (5.11)	Amount of land build up during a term, at less than 1km from shore, Ha.	Dir. Gal. del Catastro, Ministry of Economics and Finance
Vacant (<1Km)	1,339 (1,293)	Amount of land available for development at the start of the term at less than 1km (total land in the fringe – land already build up), Ha.	Global Human Settlement Layer Project (GHSL) & Dir. Gal. del Catastro
Land area	7,625 (11,019)	Total land area of the municipality	GHSL Project
%Environmentally valuable land	0.21 (0.24)	Land area protected by the Natura 2000 Network/ Total land area of the municipality, Ha.	Natura 2000 Network & GHSL Project
Coast Length	20.05 (20.87)	Coast length of the municipality, Km.	GHSL Project
%Beach	0.36 (0.73)	Beach length/Coast length	
#Rainy days	8.73 (3.91)	Number of rainy days per year	Instituto Metereológico Nacional (IMN)
Av. Temperature	16.82 (2.22)	Av. daily temperature	
% Unemployed	0.059 (0.031)	Number of unemployed/Population	Anuario Económico de España, 'La Caixa', several years
Population	28,423 (101,137)	Resident population	Municipal Population Register. National Institute of Statistics (INE).
%Low education	0.529 (0.175)	Residents with less than high school education/Population	Census of Population, National Institute of Statistics (INE), several years
%High education	0.091 (0.039)	Residents with graduate education/Population	
%Emp. agriculture	0.119 (0.100)	Residents employed in agriculture/Pop.	
%Emp. industry	0.169 (0.085)	Residents employed in industry/ Pop.	
%Emp. services	0.589 (0.121)	Residents employed in services/ Pop.	
%Emp. construction	0.109 (0.029)	Residents employed in construction/Pop.	
Tourist index	1.030 (2.79)	Index of tourism volume /Population	Anuario Económico de España, 'La Caixa', several years
%Commuters	0.614 (0.703)	Non-residents working in the municipality / Residents working in the municipality	Census of Population, National Institute of Statistics (INE), several years
Alignment (a)	0.676 (0.467)	Dummy equal to one if the ideological bloc of the mayor is the bloc that has more mayors in the coastal area	Own classification of parties by ideology, based on party statutes and media reports. County definitions from www.Geosoc.udl.cat. Coastal denominations from TurEspaña. Vote margin computed with the algorithm developed by Curto *et al.* (2018), using local election statistics (votes and seats for all the parties) and partisan identity of the mayor. Source: Ministry of Interior.
Vote margin (υ^0)	0.157 (0.363)	% of votes at the local elections that have to be added to (subtracted from) the ideological bloc that has more mayors in the coastal area in order to win (lose) a majority of seats in the local council	
Left-wing mayor	0.447 (0.497)	Mayor belongs to the left-wing ideological bloc	
Left-wing regional gov.	0.608 (0.488)	Regional president belongs to the left-wing ideological bloc	
Majority council	0.649 (0.477)	Dummy equal to one if single party has the majority of seats in the local council and zero otherwise	

Table A.2

Distribution of mayors by ideological party bloc

	Sample	
	Full	*Close elections*
Left wing:	46.33 %	51.17%
Far left	4.64 %	3.51 %
PSOE	36.45 %	45.23 %
Center left	5.24 %	2.43 %
Right-wing:	53.62 %	48.73 %
Local party	5.98 %	2.16%
Center right	14.18 %	8.10 %
PP	33.46 %	38.47 %
Far- right	0.05 %	0.09 %
Total	100.00 %	100.00 %
PP+PSOE	69.91 %	83.70 %

Notes: (1) Percentage of mayors belonging to the different ideological categories, for the coastal municipalities during all the terms that follow the local elections from 1979 to 2011. The Basque Country is excluded. (2) Full sample = all municipalities; Close elections = elections within the optimal bandwidth used in the main specification (h=0.142). (3) Party codes: own classification based on party names, party statutes, and press reports regarding the ideological stance of the party. (3) PSOE=Partido Socialista Obrero Español; this is the main left-wing party, with a left-wing moderate ideology (we include also the mayors of all the regional parties that are federated with the PSOE and all the left-wing pre-electoral coalitions where these parties participate). Far left and Center left = left-wing parties at the left (right) of PSOE. PP=Partido Popular; this is the main right-wing party in Spain (we include also the mayors to the parties that preceded the PP in the 1980s, as Alianza Popular and Union de Centro Democrático). Far right and Center right = right-wing parties at the right (left) of PP. Local parties = parties running only in just one or a few municipalities that we have not been able to classify as left-wing parties.

Table A.3 *List of political parties*

Party name	Acronym	Ideology	Scope	#Mayors		%Mayors	
				Full sample	Close elections	Full sample	Close elections
Partido Socialista Obrero Español	PSOE	Left	Spain	1,329	502	36.45	45.23
Partido Popular	PP	Right	Spain	821	326	22.52	29.37
Convergència i Unió	CiU	Center-right, Regionalist	Catalunya	274	59	7.52	5.32
Coalición Canaria	CC	Center-right, Regionalist	Canarias	180	20	4.94	1.80
Unión de Centro Democrático	UCD	Right	Spain	175	45	4.80	4.05
Alianza Popular	AP	Right	Spain	159	39	4.36	3.51
Izquierda Unida	IU	Far-left	Spain	72	15	1.97	1.35
Bloque Nacionalista Galego	BNG	Far-left, Regionalist	Galicia	60	19	1.65	1.71
Centro Democrático y Social	CDS	Right	Spain	37	12	1.01	1.08
Partido Regionalista de Cantabria	PRC	Center-left, Regionalist	Cantabria	35	12	0.96	1.08
Partido Andalucista	PA	Center-left, Regionalist	Andalucía	28	0	0.77	0.00
Unió Mallorquina	UM	Center-right, Regionalist	Balears	25	1	0.69	0.09
Bloc Nacionalista Valencià		Far-left, Regionalist	València	21	5	0.58	0.45
Esquerra Republicana de Catalunya	ERC	Center-left, Regionalist	Catalunya	19	5	0.52	0.45
Partido Demócrata Popular	PDP	Right	Spain	13	2	0.36	0.18
Total				3,248	1,062	89.08	95.68

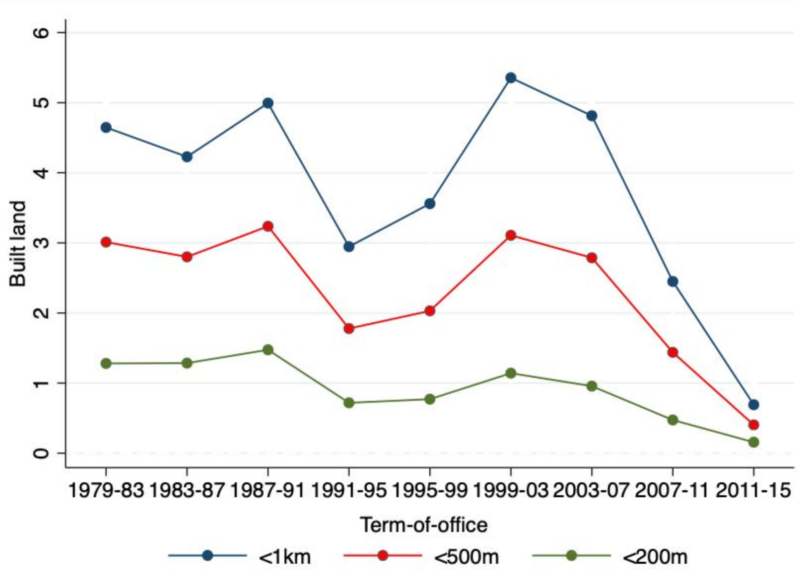
Notes: (1) List of the most prominent political parties in Spain during the period 1979-2011; we include only the political parties with at least 10 mayors during this period (notice that they account for 89,08% of all mayors and for 95,68% of all mayor in the close-elections sample (i.e., within the bandwidth used in most of the paper, h=0.142); the parties are ranked according to the number of mayors. (2) Ideology categories=Far-left and Center-left (left-wing parties to the left and to the right of the PSOE, which is the main party on the left, which is labelled just as Left), Far-right and Center-right (right-wing parties to the right and to the left of the PP, which is the main party on the right, which is labelled just as Right), Regionalist = parties for which the Regional-National dimension is important (in addition to the Left-Right one) and that are willing to enter alliances both with left and right-wing parties (depending on the context). (3) Scope = whether the party runs in all country or only in some regions.

Section A.III: Additional figures

Figure A.1:
Intensity of Coastal development, 1956 v. 2012 (Examples)

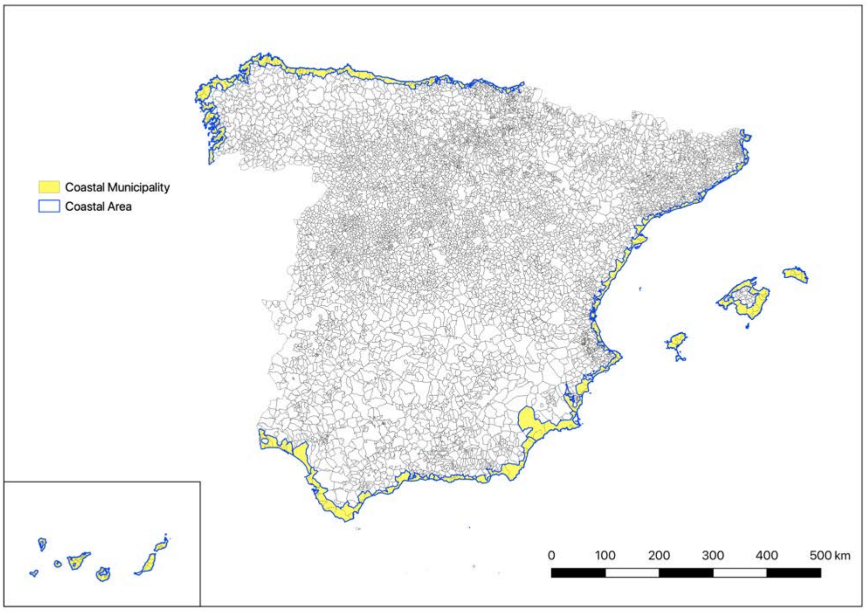
Sources: PNOA Americano Serie B for 1956. Google Earth for 2012.

Figure A.2:
*Evolution of the amount of Built land,*1979-2015



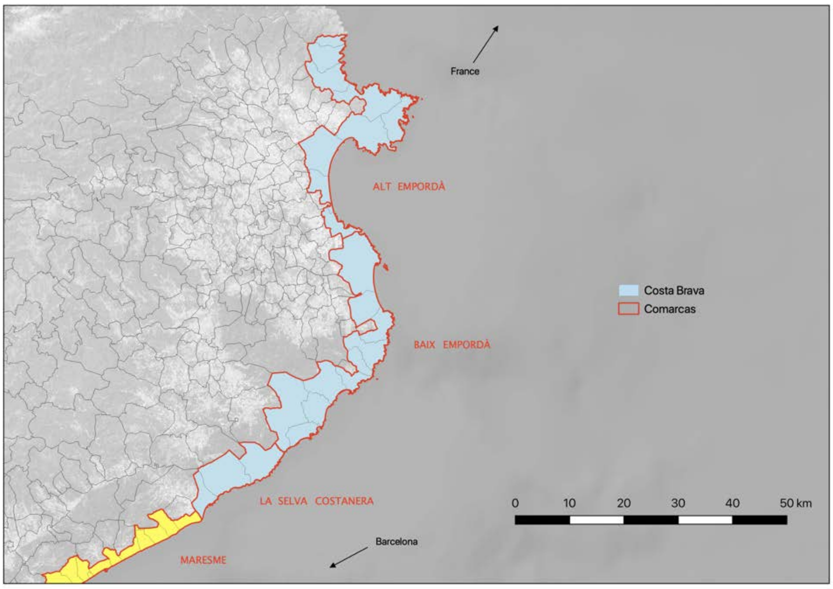
Notes: (1) Average amount of Built land (Ha) during per municipality and term in all Spanish coastal municipalities. (2) We report data for three overlapping fringes: less than 1km from shore, less than 500m and less than 200m. (3) Data from the Spanish cadaster (Dir. Gral. del Catastro).

Figure A.3: *Map of Spain's Coastal municipalities*



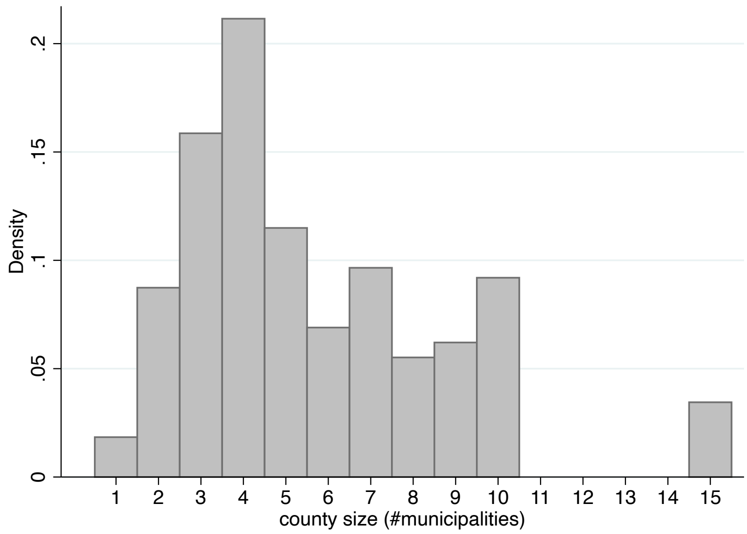
Note: (1) The map depicts in Yellow the municipalities located along the Spanish coastline. (2) Source: own elaboration.

Figure A.4:
Example of Coastal denomination ('Costa Brava') and its Counties



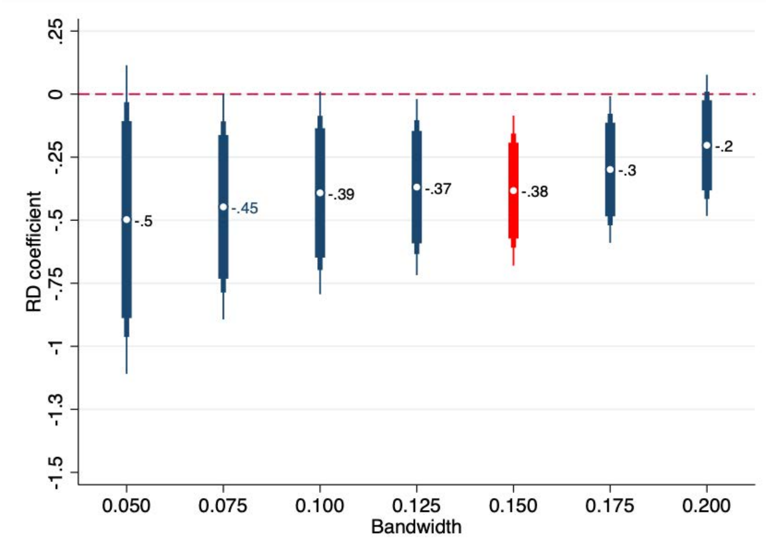
Note: (1) The map the Coastal denomination called 'Costa Brava' (in light blue) and is three Counties ('Comarcas'), named 'Alt Empordà', 'Baix Empordà' & 'La Selva Costanera'; in Yellow there is a county ('Maresme') located in a different 'Coastal denomination' ('Costa del Maresme'). (2) Source: own elaboration.

Figure A.5:
Distribution of Municipalities by County size



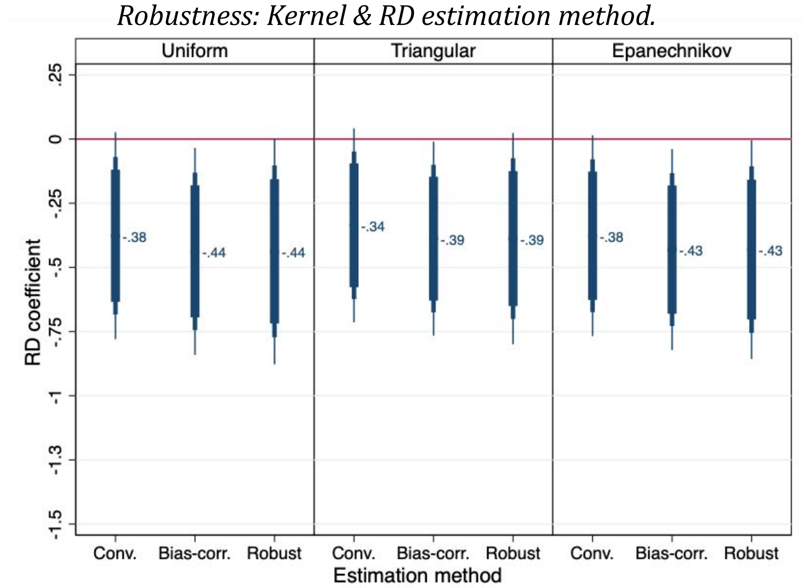
Notes: (1) The figure shows the density of municipalities by county size, that runs from one municipality to fifteen. The County definition used corresponds to geographical Counties or 'Comarcas'. (2) Source: www.Geosoc.udl.cat.

Figure A.6:
Robustness: Results by bandwidth.



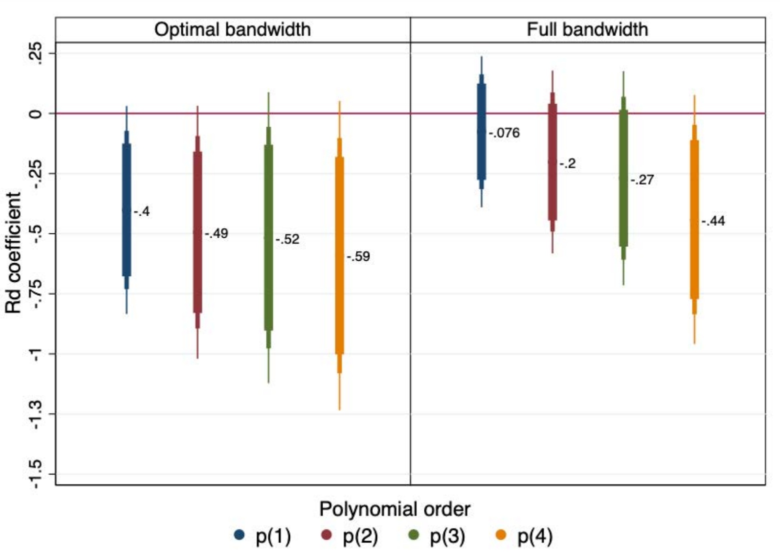
Notes: (1) 2SLS estimates. (2) Dependent variable measured as $\widetilde{Built} = \log(Built + \sqrt{Built^2 + 1})$. Estimation by Local linear regression with the band-width selected as per Cattaneo *et al.* (2014), controlling for $\log(Vacant)$ and region and year f.e.. (3) In red we show the results for the bandwidth that is closest to the optimal one. (4) We show the point estimate and the 90, 95 and 99% c.i. Standard errors are clustered at the County level.

Figure A.7:
Robustness: Kernel & RD estimation method.



Notes: (1) We show the RD estimates using different kernels: Uniform, Triangular and Epanechnikov. For each kernel we report the Conventional, Bias-corrected and Robust estimates. (2) We show the point estimate and the 90, 95 and 99% c.i. Standard errors are clustered at the County level. (3) We show the 2SLS estimates. Dependent variable measured as $\widetilde{Built} = \log(Built + \sqrt{Built^2 + 1})$. Estimation by Local linear regression with the bandwidth selected as per Cattaneo *et al.* (2014), controlling for $\log(Vacant)$ and region and year f.e..

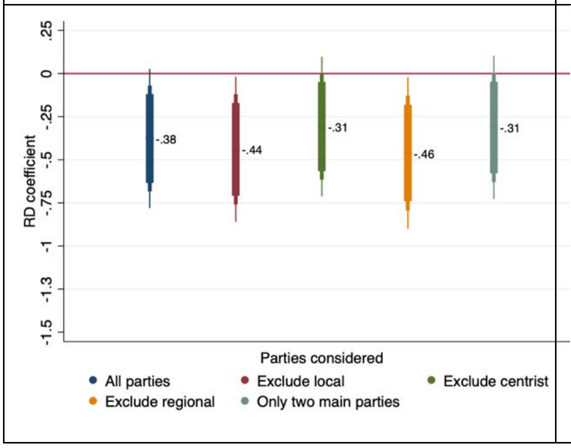
Figure A.8: *Robustness: Polynomial order.*

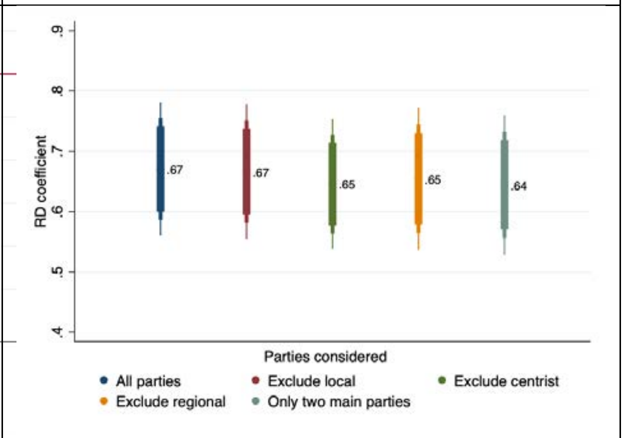


Notes: (1) We show the RD estimates using polynomials of orders 1 to 4. In the left panel we use the optimal bandwidth and we change the polynomial order; in the right panel we use the full bandwidth. (2) We show the point estimate and the 90, 95 and 99% c.i. Standard errors are clustered at the County level. (3) We show the 2SLS estimates. Dependent variable measured as $\widetilde{Built} = \log(Built + \sqrt{Built^2 + 1})$. Estimation by Local linear regression with the bandwidth selected as per Cattaneo *et al*. (2014), controlling for $\log(Vacant)$ and region and year f.e..

Figure A.9: *Robustness: Close elections sample.*

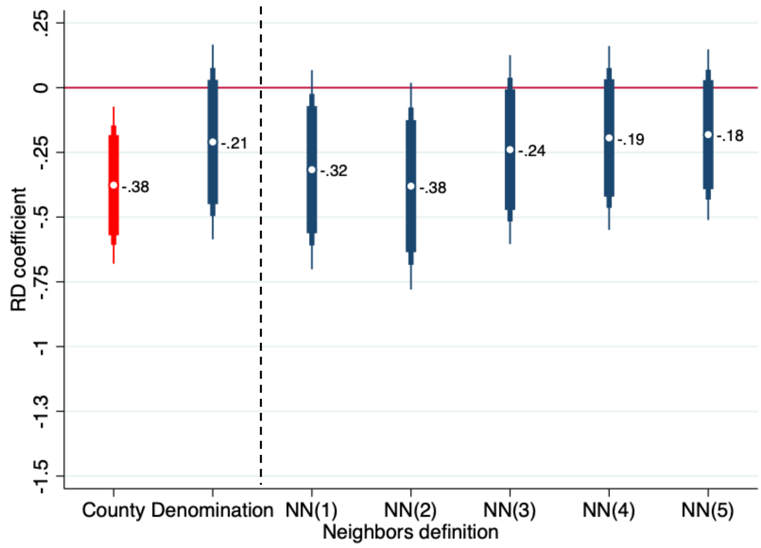
(a) 2SLS results	(b) First stage results





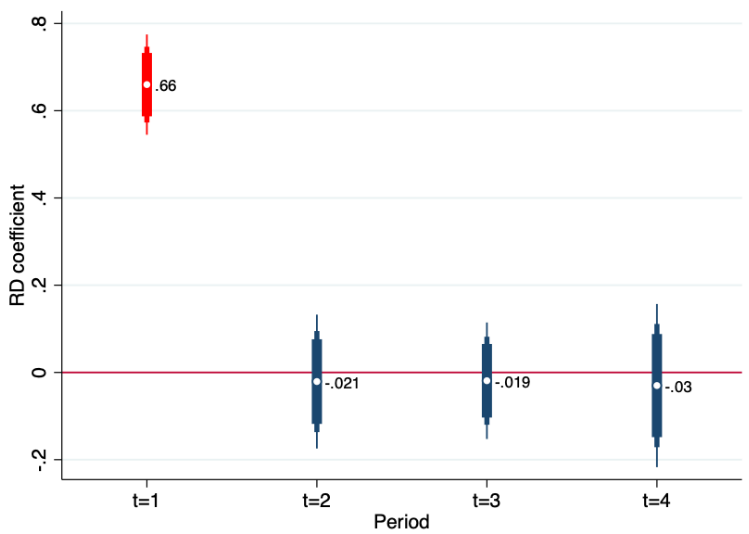
Notes: (1) We show the RD estimates using different dropping different sets of municipalities from the computation of the forcing variable and from the estimation of the RD equations. (2) First, we show the results for the whole sample, and then we exclude: the municipalities with Local party mayors, with Centrist parties (either from the Left or the Right bloc), with mayors belong to regionally-based parties (as e.g., CiU in Catalunya) or with mayors that do not belong to the main two parties (PSOE and PP). (3) In Panel (a) we report the 2SLS coefficient and in Panel (b) the First stage one. (4) We show the point estimate and the 90, 95 and 99% c.i. Standard errors are clustered at the County level. Estimation by Local linear regression with the bandwidth selected as per Cattaneo *et al.* (2014), controlling for $\log(Vacant)$and region and year f.e..

Figure A.10: *Robustness: Neighbors definition.*



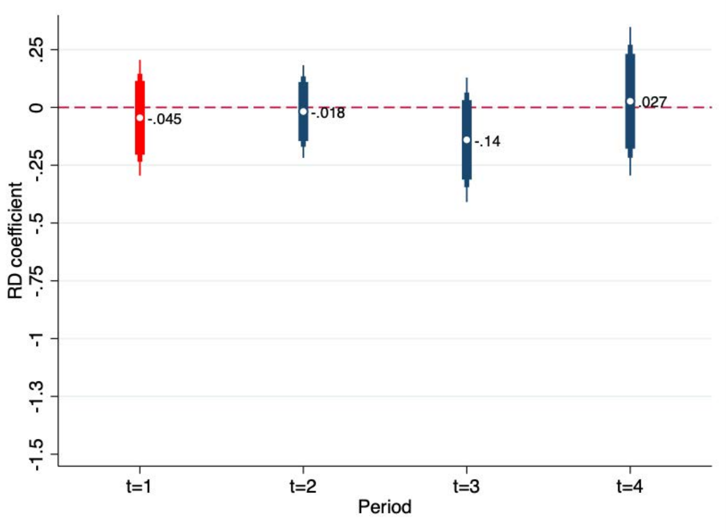
Notes: (1) We show the RD estimates using different neighbors' definitions. We show first the two definitions using fixed areas: Counties and Coastal denominations, and second the Nearest Neighbor definitions, denoted by NN(J) and where J is the order of the farther away neighbor considered (e.g. J=1 includes the first order contiguous municipalities, J=2 includes those plus the municipalities that are contiguous to them, and so on. (2) We show the point estimate and the 90, 95 and 99% c.i. Standard errors are clustered at the County level. (3) We show the 2SLS estimates. Dependent variable measured as $\widetilde{\mathcal{B}uilt} = \log(\mathcal{B}uilt + \sqrt{\mathcal{B}uilt^2 + 1})$. Estimation by Local linear regression with the bandwidth selected as per Cattaneo *et al.* (2014), control-ling for $\log(\mathcal{V}acant)$ and region and year f.e.. (4) Standard errors are clustered at the County and Coastal denomination levels in the first two cases, respectively; in the NN specification we account for spatial correlation of the error term (up to 5, 10, 20, 25 and 30km) and for time correlation up to 8 periods

Figure A.11: *Dynamic effects: Alignment persistence.*



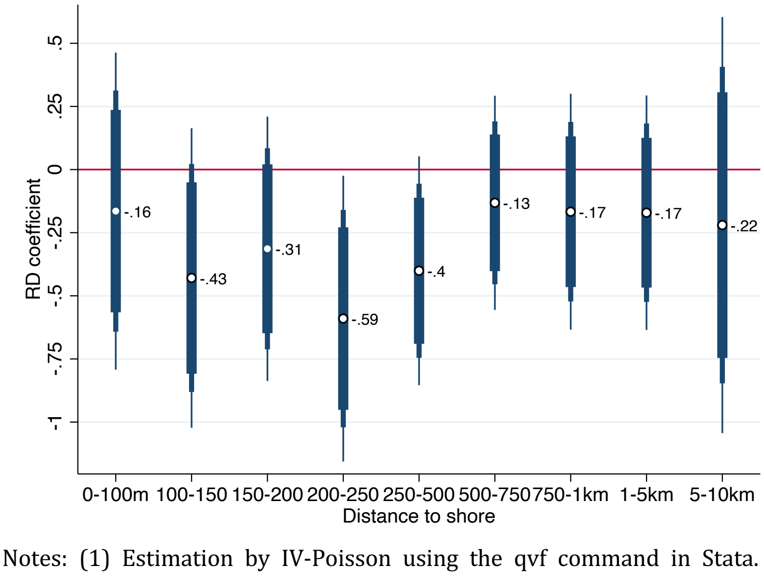
Notes: (1) First stage regression using alignment in different periods as dependent variable and $\mathbb{1}(v^0 > 0)$ as treatment. Period: t=1 is the contem-poraneous term and t=2 to t=4 are the future terms. (2) We show the point estimate and the 90, 95 and 99% c.i. Standard errors are clustered at the County level.

Figure A.12: *Dynamic effects on neighbors*



Notes: (1) 2SLS estimates. Dependent variable is the average amount of built up land in the rest of municipalities in the County, and has been measured as as $\widehat{Built} = \log\left(Built + \sqrt{Built^2 + 1}\right)$. Estimation by Local linear regression with the bandwidth selected as per Cattaneo *et al.* (2014), controlling for $\log(Vacant)$ and region and year f.e. (2) The figure reports the coefficients estimated for the current term-of-office (t=1, in red) and for three terms in the future (t=2, t=3 and t=4, in navy). We show the point estimate and the 90, 95 and 99% c.i. Standard errors are clustered at the County level

Figure A.13:
Distance from shore. Non-Overlapping distance bands
Dependent variable: *Built land.*



Notes: (1) Estimation by IV-Poisson using the qvf command in Stata. Dependent variable is the amount of Built land during the term. (2) Parametric RD using a polynomial of order one and the bandwidth selected as per Cattaneo *et al*. (2014). (3) We control for $\log(Vacant)$ and region and year fixed effects. (4) The left panel shows the results for overlapping distance bands in meters (in red we show the 1km band, which is the one we use in the main analysis). In the right panel we show the results for non-overlapping distance bands. (5) We show the point estimate and the 90, 95 and 99% c.i.. Standard errors are clustered at the County level.

Section A.IV: Additional tables

Table A.4: *Covariate balance. Municipality*

Variable:	Coef.	p-value	Bw	#Obs.
(a) Lagged dependent variable				
$\widetilde{Built}_{t-1}$ (<1Km)	-0.067	0.670	0.193	1,345
(b) Geographic variables				
$\log(\mathcal{V}acant)_{t-1}$ (<1Km)	0.037	0.836	0.201	1,544
$\log(\mathcal{L}and)_{t-1}$	0.024	0.893	0.182	1,415
%Env. valuable land $_{t-1}$	-0.022	0.868	0.184	1,430
Coast length $_{t-1}$	0.049	0.790	0.315	2,186
%Beach $_{t-1}$	0.045	0.801	0.262	1,180
#Rainy days $_{t-1}$	0.116	0.530	0.177	1,377
Av. Temperature $_{t-1}$	-0.083	0.645	0.163	1,293
Mediterranean	-0.046	0.609	0.215	1,640
Island	-0.004	0.958	0.222	1,687
(c) Socio-economic variables				
%Unemployed $_{t-1}$	0.031	0.788	0.178	1,381
%Low education $_{t-1}$	0.017	0.869	0.206	1,589
%High education $_{t-1}$	-0.024	0.849	0.216	1,650
%Employed agriculture $_{t-1}$	-0.086	0.502	0.163	1,288
%Employed industry $_{t-1}$	0.055	0.743	0.183	1,419
%Employed services$_{t-1}$	-0.015	0.911	0.190	1,454
%Employed construction$_{t-1}$	-0.139	0.299	0.215	1,645
Tourist index $_{t-1}$	0.010	0.924	0.196	1,459
%Commuters $_{t-1}$	0.058	0.809	0.175	146
%Population growth $_{t-1}$	0.055	0.674	0.188	1,283
Population $_{t-1}$	0.077	0.707	0.327	2,241
(d) Political variables				
Left-wing mayor $_{t-1}$	0.064	0.286	0.144	1,064
Left-wing regional gov. $_{t-1}$	0.027	0.655	0.200	1,368
Left-wing central gov. $_{t-1}$	0.010	0.850	0.179	1,253
Local-regional alignment $_{t-1}$	-0.050	0.308	0.198	1,356
Local-central alignment $_{t-1}$	0.034	0.545	0.155	1,119
Majority council $_{t-1}$	0.093	0.413	0.213	1,466

Notes: (1) Variables measured as z-scores, except those that are binary or expressed. (2) Coef. = RDD coefficient, bw=bandwidth used, selected as per Calonico *et al.* (2014). #obs.=number of observations within bandwidth, at the left and right of the cutoff. (3) Estimation method=Local Linear Regression.

Table A.5: *Balance of pre-determined covariates. County neighbors*

Variable:	Coef.	p-value	Bw	#Obs.
(a) Lagged dependent variable				
$\widetilde{Built}_{t-1}$ (<1Km)	0.049	0.782	0.259	1,710
(b) Geographic variables				
log($Vacant$)$_{t-1}$ (<1Km)	0.102	0.434	0.219	1,667
log($Land$)$_{t-1}$	0.059	0.687	0.222	1,692
%Env. valuable land $_{t-1}$	0.038	0.833	0.174	1,360
Coast length $_{t-1}$	0.039	0.815	0.226	1,711
%Beach $_{t-1}$	-0.022	0.898	0.220	1,654
#Rainy days $_{t-1}$	0.117	0.528	0.178	1,385
Av. Temperature $_{t-1}$	-0.073	0.698	0.163	1,286
Mediterranean	-0.103	0.609	0.215	1,640
Island	-0.009	0.958	0.222	1,687
(c) Socio-economic variables				
%Unemployed $_{t-1}$	0.098	0.394	0.195	1,493
%Low education $_{t-1}$	0.017	0.869	0.206	1,589
%High education $_{t-1}$	-0.024	0.849	0.216	1,650
%Employed agriculture $_{t-1}$	-0.087	0.502	0.163	1,288
%Employed industry $_{t-1}$	0.055	0.743	0.183	1,419
%Employed services$_{t-1}$	-0.015	0.911	0.190	1,464
%Employed construction$_{t-1}$	-0.139	0.299	0.215	1,645
Tourist index $_{t-1}$	0.002	0.983	0.159	1,231
%Commuters $_{t-1}$	0.027	0.953	0.169	140
%Population growth $_{t-1}$	-0.103	0.806	0.152	1,090
Population $_{t-1}$	-0.009	0.844	0.209	1,606
(d) Political variables				
Left-wing mayor $_{t-1}$	0.024	0.634	0.182	1,274
Left-wing regional gov. $_{t-1}$	0.027	0.655	0.200	1,368
Left-wing central gov. $_{t-1}$	0.009	0.830	0.179	1,253
Local-regional alignment $_{t-1}$	-0.023	0.576	0.155	1,104
Local-central alignment $_{t-1}$	0.024	0.603	0.193	1,340
Majority council $_{t-1}$	0.003	0.953	0.198	1,471

Notes: See Table A.4.

Table A.6: *Effect on potentially confounded treatments.*

Variable:	Coef.	p-value	Bw	#Obs.
(a) Municipality				
Left-wing mayor $_t$	-0.075	0.186	0.252	1,856
Left-wing regional gov. $_t$	0.029	0.621	0.173	1,354
Left-wing national gov. $_t$	0.041	0.374	0.143	1,172
Local-regional alignment $_t$	0.151	0.013	0.181	1,402
Local-national alignment $_t$	0.051	0.256	0.190	1,460
Majority council $_{t-1}$	-0.005	0.936	0.174	1,367
(b) County neighbors				
Left-wing mayor $_t$	0.061	0.194	0.205	1,572
Left-wing regional gov. $_t$	0.029	0.621	0.173	1,355
Left-wing national gov. $_t$	0.064	0.235	0.216	1,638
Local-regional alignment $_t$	0.041	0.374	0.143	1,172
Local-national alignment $_t$	0.037	0.193	0.162	1,283
Majority council $_t$	0.023	0.637	0.176	1,371

Notes: See Table A.4.

Table A.7: *Robustness check. Alternative estimation methods. Built land.*

	(1)	(2)	(3)	(4)
	2SLS		IV-Poisson	IV-Negative Binomial
Sample	Full	Built land>0	Full	Full
Alignment (A)	-0.379*** (0.119)	-0.511*** (0.190)	-0.365** (0.169)	-0.420*** (0.152)
Bandwidth (MSE)	0.140	0.140	0.140	0.140
Controls:				
log($\mathcal{Vacant\ Land}$)	YES	YES	YES	YES
Region & year f.e.	YES	YES	YES	YES
Effective Obs.	1,165	1,165	1,165	1,165

Notes: (1) In column 1 we reproduce the main results using the Inverse hyperbolic sine transformation to be able to keep the zeros. In column 2 we use log ($\mathcal{Built}$) dropping the zeros. In column 3 we estimate an IV-Poisson model by glm; in this case the dependent variable is not transformed, and we keep the zeros. In column 4 we estimate an IV-Negative Binomial model also by glm. (2) In all the cases the RD relies on a polynomial of order 1 and we use the optimal bandwidth selected as per Cattaneo *et al.* (2014) in the main analysis. (3) Standard errors clustered at the county level in parenthesis and p-values in brackets; ***, ***, and * indicate that the coefficient is significant at the 1%, 5% and 10% levels.

Table A.8: *Sub-group analysis*

	(a) Majority size				*(b) Negative externalities*				*(c) Positive ext.*		*(d) Preferences*				*(e) Multilayer gov.*	
	(a.1) *#Aligned*		(a.2) % *Party*		(b.1) *%Env. land*		(b.2) *Tourism index*		*%Commuters*		(c.2) *%Unemployed*		(d.2) *Left-wing mayor*		*Local-Reg. Align.*	
	Low	High	Low	High	Low	High	NO	YES	Low	High	Low	High	NO	YES	NO	YES
	Unweighted															
Alignment (a)	-0.119 (0.175)	-0.570*** (0.235)	-0.235 (0.184)	-0.455*** (0.197)	-0.172 (0.146)	-0.629*** (0.190)	-0.247* (0.136)	-0.513** (0.218)	-0.649*** (0.187)	-0.317** (0.138)	-0.439*** (0.144)	-0.211 (0.194)	-0.316* (0.189)	-0.594*** (0.197)	-0.413* (0.208)	-0.402** (0.183)
Diff. test	-0.450 [0.105]		-0.220 [0.476]		-0.457 [0.059]		-0.261 [0.338]		0.331 [0.163]		-0.228 [0.356]		-0.227 [0.343]		0.011 [0.971]	
Bandwidth	0.142		0.142		0.142		0.142		0.142		0.142		0.142		0.142	
# Effective Obs.	1,199		1,199		1,199		1,199		1,199		1,199		1,199		1,199	
Mean abs(std_diff)	0.108		0.148		0.169		0.166		0.174		0.119		0.110		0.161	
F-stat. [global p-value]	0.009 [0.999]		8.915 [0.000]		13.441 [0.999]		21.421 [0.000]		11.987 [0.000]		7.161 [0.000]		5.675 [0.000]		12.338 [0.000]	
	IPS weights															
Alignment (a)	-0.094 (0.206)	-0.581*** (0.096)	-0.241 (0.170)	-0.530*** (0.202)	-0.180 (0.159)	-0.561** (0.152)	-0.251 (0.149)	-0.512*** (0.281)	-0.610*** (0.175)	-0.231 (0.147)	-0.542*** (0.149)	-0.084 (0.202)	-0.320* (0.165)	-0.620** (0.273)	-0.472* (0.175)	-0.382** (0.186)
Diff. test	-0.486 [0.048]		-0.290 [0.298]		-0.380 [0.045]		-0.263 [0.268]		0.379 [0.112]		-0.458 [0.038]		-0.300 [0.245]		0.091 [0.857]	
Bandwidth	0.142		0.142		0.142		0.142		0.142		0.142		0.142		0.142	
# Effective Obs.	1,162		1,135		1,153		1,145		1,136		1,136		1,136		1,137	
Mean abs(std_diff)	0.005		0.030		0.108		0.001		0.021		0.004		0.013		0.016	
F-stat. [global p-value]	0.009 [0.999]		0.405 [0.996]		0.156 [0.999]		0.317 [0.999]		0.296 [0.999]		0.211 [0.999]		0.080 [0.999]		0.128 [0.998]	

Notes: (1) High/Low = variable used to define the subgroups above/below median; YES/NO=dummy used to define the subgroups equal to one/zero. Diff. [p-value] = t-test of whether the difference between the High/Low (or YES/NO) coefficients is zero and corresponding p-value. (2) Single parametric local linear regression fully interacted with the subgroup dummy (High/Low). Optimal bandwidth selected as per Calonico *et al.* (2014) using the whole sample. Controls: log of vacant land and year and region fixed effects. (3) Dependent variable is the average amount of built up land in the rest of municipalities in the County, and has been measured as $\widetilde{Built} = \log(Built + \sqrt{Built^2 + 1})$. (2) IPS weighting: estimation of the equation using 'inverse propensity score' weights, following the method proposed by Carril *et al.* (2019). Mean abs(std_diff): mean standardized difference in the variables used to estimate the propensity score in High vs. Low units before (Unweighted) and after the reweighting (IPS weighting); F-stat: test of joint significance of these variables. (4) Standard errors clustered at the county level in parenthesis and p-values in brackets; ***, ***, and * indicate that the coefficient is significant at the 1%, 5% and 10% levels.