Voter Preferences for Neighbourhood Change and Political Planning Cycles

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Abstract

We study how voters' attitudes towards neighbourhood change shape urban planning and land use policies. Using a dynamic political selection model, we show that differences in voter preferences can lead to different paths of planning decisions across the electoral cycle. We then use data on planning applications submitted to English local planning authorities between 2000 and 2020 to document an electoral cycle in these planning decisions. Rejection rates for major applications increase abruptly in the quarter before a local election takes place. Guided by our selection model, we interpret this as evidence of local voter opposition to neighbourhood change. We show that this opposition is strongest against residential development in areas of high socioeconomic status.

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1. Introduction

Land markets are regulated markets. In most jurisdictions, urban planning, environmental and building regulations impose significant constraints on both the use of land and the intensity of that use. These policies can be justified on normative grounds in contexts in which local externalities in the use of land are common. However, there is a growing consensus according to which the current level of restrictions is imposing large costs on households and firms, via rising housing costs and barriers to the development of new infrastructure.[1] It is unlikely that these costs can be justified by the benefits that the policies are meant to produce. What motivates these governments to select these policies in practice?

A popular hypothesis is that voters oppose development and neighbourhood change and this opposition leads politicians to select restrictive policies. Our paper tests this hypothesis by using a novel approach that relies on studying the path of policy over time to learn about voter preferences for new development and their consequences. We begin by presenting a dynamic political selection model in which planning decisions by local governments feature an electoral cycle: office-seeking politicians select policies that are more in line with voter preferences in pre-election periods. The specific shape of the electoral cycle in planning decisions depends on voter preferences for new development. If voters see new development as desirable, restrictions to development will ease in pre-election periods. Conversely, if voters see new development as undesirable, restrictiveness will increase in pre-election periods.

Informed by this model, our empirical analysis is designed to detect electoral cycles in planning application decisions made by English Local Authorities (LAs). We use a quarterly panel covering two decades of planning decisions by over 200 planning authorities. The advantage of focusing on England lies in that it is a context in which planning decisions are made on a case-by-case basis. As a result, a substantial amount of discretion is exercised by planning authorities when making these decisions, which are rarely made on purely technical grounds, especially for major applications. Moreover, the fact that these decisions are carried out routinely allows us to measure policy choices at a high frequency, something that is critical

[1] Recent studies documenting the welfare and economic implications of strict land use regulations include Glaeser and Gyourko (2018), Hsieh and Moretti (2019),Parkhomenko (2023), and Jarvis (2025).

for a dynamic analysis of planning policy.[2]

Our empirical strategy relies on the fact that the election calendar is different across different groups of English LAs. This allows to study the electoral cycle in our outcomes of interest while dealing with aggregate time-series patterns shaped by business cycles and other national trends. In doing this, we follow much of the contemporary literature on political budget cycles (see e.g., Repetto 2018; Bracco, De Benedetto and Lisciandra 2023). Estimation relies on a simple specification that can be easily modified to produce a large number of placebo tests which we use to further bolster the credibility of our findings.

The main contribution of our empirical analysis is to show that there are electoral cycles in the decisions made by planning authorities. Major applications – those corresponding to developments that result in observable and significant local changes in a neighbourhood – are more likely to be rejected in the quarter before an election. In light of the insights of our theoretical model, these empirical results lead us to conclude that voters are on average opposed to neighbourhood change and that this opposition translates into planning decisions by the corresponding local officials. To show that planning cycles are not driven by administrative pressures to complete applications ahead of an election, we show that there is no cycle in decisions on minor of householder applications – those corresponding to small modifications to existing properties or changes in land use with limited scale. Additional information on both the frequency of filings and the judgements made after a local decision is appealed to national authorities are consistent with our interpretation that the cycle in planning decisions is driven by efforts from politicians to better comply with voter preferences.

We then modify our strategy to identify which voters are more likely to oppose neighbourhood change. We first document that cycles are more pronounced in area with high home-ownership rates, higher housing prices and lower density (i.e., suburbs). These findings are consistent with the results in, for example, the literature on the home-voter hypothesis (Fischel, 2001). We then use the panel structure of our data to produce unit-level estimates of planning cycles. We then employ a lasso approach to identify which demographic variables are predictive of more opposition to new development. We find that neighbourhoods populated with high

[2]Our baseline analysis relies on observing the outcome of decisions made on over 170K planning applications.

socio-economic status, older voters are those where opposition to development is strongest.

Our paper contributes to the literature on the impact of regulation on housing affordability. A recent review of studies in this literature can be found in Molloy et al. (2020). Glaeser, Gyourko and Saks (2005) shows widening gaps in the evolution of construction costs and housing prices in large US metropolitan areas to argue that the increase in housing prices in many US metropolitan areas since 1970s was driven in large part by regulatory constraints to new building. Hilber and Vermeulen (2016) and Saiz (2010) document a significant effect of land use regulation on housing prices in England and the United States, respectively. Li, Qin and Wu (2020) show supply shortages can also explain housing affordability problems in large Chinese cities. The consequences of supply constraints on welfare can be substantial: Hsieh and Moretti (2019) find extraordinarily large welfare losses from misallocation arising from housing supply restrictions in high productivity locations in the United States. Our contribution to this literature is to explain the origin of policy-induced supply restrictions by characterizing voter preferences for new development and, simultaneously, showing policy responds to these preferences.

Naturally, our paper fits in the literature on the intersection between urban and political economics. Several studies have documented that home-owners are likely to oppose neighbourhood change and to favour land use regulation (see e.g., Dehring, Depken II and Ward 2008; Cheung and Meltzer 2013; Fang, Stewart and Tyndall 2023; Ahlfeldt and Maennig 2015).[3] Rather than using on cross-sectional variation across locations or constituents, our analysis relies on election timing to observe a link between voter preferences and policy choices. This approach has advantages in terms of identification, as it avoids the difficult problem of obtaining exogenous variation in socio-economic characteristics. Our approach also allows us to test explicitly whether local opposition to development is driven mainly by home-owners. Recent work in urban theory models city size as shaped by decisions by local governments (Albouy et al., 2019) or by incumbent residents (Duranton and Puga, 2023). The purpose of our paper is to document explicitly the role that voting in competitive elections has on the decisions by local governments to oppose or promote new development.

[3]Much of this work relates to the the homevoter hypothesis (Fischel, 2001), according to which incumbent residents vote in local elections to maximize the value of their homes.

Our paper is also related to wider literature in planning and urban studies exploring opposition to development, particularly new housing, by local residents Monkkonen and Manville (2019). There is evidence that preventing the construction of new dwellings might, by increasing local house prices, increase segregation and exacerbate gentrification patterns (Glaeser and Ward 2009; Kok, Monkkonen and Quigley 2014; Lens and Monkkonen 2016). However, voters tend to justify their aversion to development with a variety of reasons (lower values, congestion, competition for local services or schools, increased traffic, changes in the community, etc.), without much attention to supply and demand implications (Nall, Elmendorf and Oklobdzija, 2022). Our paper provides conclusive quantitative evidence that local politicians respond to this opposition by adjusting their actions ahead of elections.

Finally, our paper contributes to the literature on political cycles. The most renowned work in this literature focuses on political budget cycles specifically. It is there we can find the theoretical models in Rogoff (1990) and Rogoff and Sibert (1988) which have had a decisive influence in subsequent work. The model presented here shares many key features with those models, with a few significant differences. The purpose of our model is to illustrate how differences in voter preferences affect the shape of the resulting cycle rather than understanding the welfare implications of a known cycle. Moreover, rather than a model of intertemporal budget allocation, our model emphasizes differences in policy preferences between voters and elected officials. On the empirical front, a variety of studies have documented electoral cycles in public spending (Shi and Svensson, 2006), investment spending (Drazen and Eslava, 2010), macroprudential policy (Müller, 2023) and even traffic fines (Bertoli and Grembi, 2021). Our main contribution here is not so much to document a cycle in yet another policy variable of interest but in showing how these cycles inform our understanding of voter preferences when those preferences are not unknown.

The rest of this paper is structured as follows: Section 2 presents our dynamic political selection model. Section 3 presents institutional aspects of the English planning system and section 4 describes the dataset used in estimation. Section 5.1 presents the empirical strategy used to identify electoral planning cycles and section 5.2 presents the econometric evidence indicating these cycles exist. Finally, section 8 concludes.

2. Theoretical Framework

We develop an political selection model in which both voters and politicians have preferences over new development. Our setup follows on the tradition of the canonical electoral budget cycle models in Rogoff and Sibert (1988) and Rogoff (1990).[4] Incumbents select a point in the policy space in each period, given their policy preferences and their endogenous probability for re-election. Voters form expectations over future policy, and vote following their own preferences and an idiosyncratic popularity shock. In equilibrium, the shape of the average path of policy choices over the cycle is determined by voter preferences.

2.1. Voters

There is a unit mass of atomistic voters. Preferences for future neighbourhood change in time t are represented by $V_t = \nu \mathbb{E}_t \left(\sum_{s=t}^{T} \beta^{s-t} h_{s+1} \right)$, where h_s is the construction of new structures taking place at time s, $\beta < 0$ is a discount factor and $T \geq 2$ determines the (potentially infinite) time horizon of voter preferences. The expectation is taken over the distribution of beliefs about future values of h given information available to voters at t. Parameter ν governs the value voters put on the discounted value of future new structures and is the object of interest in most of our analysis below.

Elections take place at the end of even periods ($t \in 2\mathbb{N}$). Voters choose their preferred candidate between the incumbent and a challenger, given V_t and an additive challenger popularity shock δ_t. This period-specific shock is drawn at the time of the election from a continuous and symmetric distribution $f_\delta(.)$ with a mean of zero and positive density on the compact set $[-\bar{\delta}, \bar{\delta}]$. Given this description, we can write the probability that the incumbent is re-elected at the end of period t evaluated before δ_t is revealed as $p_t = F_\delta(V_t^I - V_t^C)$ where $F_\delta(.)$ is the cdf of δ, and V_t^I and V_t^C are the expected utility from new structures if the incumbent or challenger wins the election, respectively. [5]

When $\nu > 0$, voters will on average prefer the incumbent if the expected amount of new development when the incumbent is in power is higher than that expected under the challenger. When $\nu < 0$ voters will prefer the incumbent if their expected

[4] One difference with those models is that politician types are defined not in terms of competence, but in terms of policy preferences. The assumption that politicians are heterogeneous in their policy preferences is an element in common with Drazen and Eslava (2010).

[5] Note that V_t^I and V_t^C contain expectations taken over voters' beliefs around future actions of each type of politician.

amount of new development is lower than those of the challenger. If $\nu = 0$, elections are solely determined by the popularity shock. Below, we will show that the sign of ν determines the shape of the electoral cycle in equilibrium.

2.2. *Incumbents*

At the beginning of each period, local governments receive a unit mass of new development proposals. Incumbent politicians choose the fraction $r_t \in [0,1]$ of the proposals they refuse, meaning that total new development each period corresponds to $h_t = (1 - r_t)$. Incumbents obtain utility $u(r_t) = \omega - c(r_t, \eta_t)$ in each period while in office. Parameter $\omega > 0$ represents direct gains from being in office and function $c(.)$ represents the cost of choosing a refusal rate different from the politician's bliss point η_t. We will assume that $c(.)$ is a strictly increasing and convex function of $|r_t - \eta_t|$, with first derivative equal to 0 when $r_t = \eta_t$.

Given these preferences, the inter-temporal problem of the politician in odd period t is to choose r_t to maximize:

$$\mathbb{E}_t(U_t) = \sum_{k=0}^{1} \beta^k \mathbb{E}_t(\omega - c(r_{t+k}, \eta_{t+k})) + \mathbb{E}_t(p_{t+1}\beta^2 U_{t+2})$$

where the expectations are taken over the distribution of future types, which we discuss below. The term p_{t+1} corresponds to the probability that the incumbent wins the election taking place at the end of period $t+1$ which may depend on r_t and r_{t+1}.[6]

Incumbent Types

Incumbents have private information on their time-varying type. Specifically, the policy bliss point of an ongoing incumbent is given by η and follows the MA(1) process:

$$\eta_t = \overline{\eta} + \alpha\varepsilon_{t-1} + \varepsilon_t \tag{1}$$

where ε_t is an independent and identically distributed shock drawn from a distribution with mean 0 and support in $\left[\frac{-\overline{\eta}}{2}, \frac{1-\overline{\eta}}{2}\right]$ and $\overline{\eta} \in (0,1)$.[7] The MA(1)

[6] In $t+1 \in 2\mathbb{N}$, the objective function is $\mathbb{E}_{t+1}(U_{t+1}) = \omega - c(r_{t+1}, \eta_{t+1}) + \mathbb{E}_{t+1}(p_{t+1}\beta U_{t+2})$.

[7] The assumptions on $\overline{\eta}$ and the distribution of ε ensure that $\eta_t \in [0,1]$ is required to interpret η as a preferred rejection rate. This assumption is also convenient in that it will allow us to rule out pooling equilibria. The use of continuous politician types is an element in common with Shi and Svensson (2006).

assumption is a standard feature of many electoral cycle models since Rogoff and Sibert (1988) and Rogoff (1990) and it allows us to separate the incumbent's problem into a series of static problems.

For new incumbents, in which there is no history of past policy experience, the type boils down to $\eta_t = \overline{\eta} + \varepsilon_t$. This assumption is convenient because it simplifies the expressions below by simplifying voter forecasts.[8]

2.3. *Equilibrium*

Given the process in 1, the equilibrium decisions by politicians can be characterized in terms of the incumbent's type and whether the period is even (election periods) or odd (non-election periods). Thus, equilibrium rejection rates are characterized by a decision rule $r^*_{t+k}(\eta_{t+k})$ for each odd t with $k \in \{0, 1\}$ that solves the incumbent's problem. The ex-ante probability of re-election at the end of the period before an election is determined by the voter's problem. Voter beliefs about types $\mu(\eta_t)$ are consistent with the incumbent's equilibrium decision rules.

Lemma 1

Equilibrium decision rules are $r^*_t = \eta_t$ in odd periods. That is, incumbents choose their preferred rejection rates in the period after an election.

Proof: Voting in period $t+1$ is sensitive to refusal rates if these contain information on future types. That is, if voter beliefs about incumbent types $\mu(\eta_{t+2})$ are themselves a function of r_t. However, the iid assumption on the shocks in equation 1 implies that $\eta_t \perp \eta_{t+2}$. which, in turn, means that $\mu(\eta_{t+2})$ is not a function of $r^*_t(\eta_t)$ by definition of independence. This means that in off-election periods, the incumbent problem boils down to maximizing $\omega - c(r_t, \eta_t)$ which leads to $r_t = \eta_t$.

Lemma 2

There is no pooling equilibrium in which $r^*(\eta_{t+1}) = \overline{r}\, \forall \eta_{t+1}$. That is, there is no equilibrium in which all incumbent types choose the same refusal rate.

Proof: See theoretical appendix.

Proposition 1

For even periods, there exists a separating equilibrium in which the chosen refusal rate $r^*_t(\varepsilon_t)$ is one-to-one with ε_t.

[8] In the case of Rogoff and Sibert (1988) and Rogoff (1990), the chosen simplification is that types are revealed to voters with a one period lag.

Proof: See theoretical appendix.

Proposition 2

In a separating equilibrium, for election period t, the sign of the difference $r_t^* - \eta_t$ depends on the sign of ν. If $\nu > 0$, then $r_t^* < \eta_t$. If $\nu < 0$, then $r_t^* > \eta_t$. Finally, if $\nu = 0$, then $r_t^* = \eta_t$.

Proof: See theoretical appendix.

Proposition 2 has two implications. The first is that, if voters care about rejection rates, there will be an electoral cycle in this policy variable.[9] A second implication is that the shape of this cycle will itself depend on the sign of ν. If voters value planning approvals positively ($\nu < 0$), then refusal rates will decline in the period before elections. If voters value planning approvals negatively ($\nu > 0$), then refusal rates will increase before elections. This is the key result that allows us to relate voter preferences for new development with electoral planning cycles. Documenting the existence of these cycles is the purpose of the next sections of the paper.

Corollary 1 – Heterogeneity

If f_δ is uniform, the equilibrium difference $|r_t^* - \rho_t|$ is increasing in $|\nu|$. That is, when $\nu > 0$, higher values of ν lead to lower equilibrium values of r_t^*. When $\nu < 0$, lower values of ν lead to higher values of r_t^*.

Proof: Follows from the proof of Proposition 2. See theoretical appendix.

This result will be useful when interpreting our heterogeneity results in Section 6, where we relate voter characteristics to the size of the cycle in planning decisions.

3. Institutional Setting

3.1. Planning Decisions in England

The foundations of the modern British planning system were set out in the 1947 Town and Country Planning Act. Two related innovations introduced by this Act are important for our purposes here: the nationalisation of land development rights and the requirement of planning approval for changes in land use, new construction and even modifications to existing property. All new development of any size

[9] The expected value of η is equal to $\overline{\eta}$ in every period. This will be the expected value of refusal rates for periods $t \in \mathcal{E}$ and $t+1$ given lemma 1. The expected refusal rate will be different from this value in pre-election periods (i.e., period $t+2$).

requires planning approval from a planning authority. One implication of this that will matter for the analysis below is that hundreds of thousands of planning applications are submitted and decided on every year.[10]

The vast majority of planning applications are handled by Local Planning Authorities which, in most cases, are aligned spatially and overseen politically by Local Authority Districts (henceforth, LAs).[11] Decisions on planning applications are either made by planning committees composed of elected LA councillors or delegated to planning officers. Typically, local authority planning officers make decisions on smaller-scale planning applications such as those submitted by households for small modifications to their properties. Only about 12.5% of all planning decisions made by planning committees which often handle applications related to major developments and contentious projects.[12] Elected councillors are supposed to represent the perspectives and aspirations of residents in the planning process, especially when planning applications affect the wards they represent in the council. Local planning authorities also appoint planning officers to support the functioning of the planning system.

Following the submission of a planning application planning officers or committee members must evaluate diverse arguments for or against the proposed development. This evaluation relies on an array of documents and information, including those featured in the application itself. Planning authorities have a duty to publicise the applications (using methods such as site notices, local newspapers and online announcements) so that residents have a chance to express their views about the application (Greed and Johnson, 2022). The publicity requirements will depend on the type of application. The formal consultation period associated to this process will normally last for 21 days. Comments on an application will be taken into account when making a decision, as long as they raise considerations that are relevant to the proposal and "material" to planning. These consultations make planning decisions visible to the public. It is this visibility that motivates our analysis of political planning cycles because it opens the space for voters to respond to planning decisions.

[10]Data from the Office of National Statistics indicates that an average of 510 thousand planning applications of all types were submitted every year between 2000 and 2019.

[11]The term Local Authority District is a generic term that is used to refer to unitary authorities, metropolitan boroughs, London boroughs, non-metropolitan districts, the city of London Corporation and the Council of the Isles of Scilly.

[12]The 12.5% number is an average across local planning authorities for the 2000-2019 period based on the delegated decisions numbers available on the PS1 District Planning Application Statistics table from the Office of National Statistics.

Local authorities are required to make decisions within 8 weeks of the application being received though it is relatively common for decisions to take longer Greed and Johnson (2022). Despite objections from residents, the LA might still grant planning permission if other material considerations warrant it. In practice, this means that LAs have a substantial degree of discretion in determining the ultimate outcome of planning applications. Applicants that are unhappy with a decision made on their application – e.g., because the application was refused – have six months to appeal the decision to the Secretary of State Greed and Johnson (2022). These appeals are typically processed by the planning inspectorate.[13]

3.2. Major, Minor, and Householder Applications

Upon submission, applications are classified into different types depending on their scale and the nature of the modifications they propose. For our purposes, the relevant classifications are major, minor, and householder developments.[14]

A *major development* is one involving any one or more of the following: (i) residential developments in which the number of new units is 10 or more; or (ii) residential developments on a site having an area of 0.5 hectares or more when the number of dwellings is unknown, (iii) the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or, iv) development carried out on a site having an area of 1 hectare or more.

A *minor development* is one where the number of dwellings to be provided is between 1 and 9 inclusive on a site having an area of less than 1 hectare. When the number of dwelling/houses to be provided is not known, the development is classified as minor if the site area is less than 0.5 hectares. For non-residential uses, a minor development is one where the floor space to be created is less than 1,000 square metres and the site area is less than 1 hectare.

A *householder development* refers to a development in a dwelling which modifies the dwelling or the land attached to it without either changing the number of dwellings or changing the use of the space that is modified (i.e., the area is still used for residential purposes). As their name suggests, these applications are typically

[13]In exceptional circumstances, the Secretary of State has the authority to "call in" a planning application for personal determination. This option is available only until the Local Planning Authority has officially issued its decision. The Secretary of State oversees the entire planning system but has a more active role in the handling of appeals.

[14]The definition for major planning applications is made in the Development Management Procedure (England) Order 2015 (section 2). These definitions are identical to those that existed before 2015. See e.g., Development Management Procedure Order 2010.

submitted by households themselves in order to introduce minimal modifications to their property.

We focus most of our analysis below on major applications. Due to their scale, these applications generate larger local externalities and, therefore, will be more consequential to local voters. In addition, major applications are typically discussed by planning committees directly which means that decisions on these applications are made with direct input from elected officials. Finally, major applications are usually submitted by corporations (i.e., developers) which themselves have no voting rights. This stands in obvious contrast with householder applications in particular, which are often submitted by local voters.

3.3. Local Authority Districts

Our analysis is going to focus on decisions on planning applications made by LAs. LAs have roles roughly comparable to the ones played by municipalities in other jurisdictions. They are arguably the most important units in British local government and are in charge of waste collection, recycling, social housing and, of course, town and country planning. LAs are also in charge of collecting council taxes (akin to a property tax paid by a residence's occupier). There were 326 LAs in England in 2015, with small changes in numbers occurring due to the creation of 9 new LAs in 2009.[15]

LAs are governed by councils elected directly by the public in local elections via a first-past-the-post system. Councillors are appointed for 4 year terms and represent wards within each LA. The number of councillors varies depending on the LA, from less than 20 councillors (e.g., Isles of Scilly) to over 100 (Birmingham). The frequency and timing of local elections varies by LA. In some LAs all council seats are up for election every four years while in others elections are staggered so that half or a third of the council is at stake in each election. This feature will be important when determining our sample below (see Section 5.1 below for details).

4. Data and Descriptives

4.1. Sample Definition

Our empirical analysis of political cycles in planning decisions uses a panel of Local Authority Districts covering the period 1998-2021. We exclude from our analysis LAs that elect their councils by thirds. This exclusion is motivated by the fact

[15]Data on changes to LA numbers arising from local government restructuring can be found here.

that an analysis of electoral cycles is difficult to perform in a context in which elections are happening almost every year.[16] We also exclude from our analysis the *sui generis* LAs of the City of London and Isle of Scilly, due to intrinsic differences between these and other Local Authorities.[17] Finally, we restrict our sample to LAs for which we observe a full election cycle (i.e., at least 2 elections). This leaves us with a sample of 203 LAs and 18,513 quarter-LA observations. Our main analysis will use data on the 20 years between 2000-2019, for which we have 15,554 quarter-LA observations. A map of English LAs included in our sample can be found in Appendix Figure B.1.

4.2. Data Sources and Assembly

Information on the electoral calendar of different British LAs is collated from the Local government election timetable in England published and updated regularly by the British Government.[18] This includes, for each English LA, the date of the last election, the frequency and the share of the council which is up for election in each instance. Local elections usually take place in the second quarter of the year, typically at the beginning of the month of May. Exceptionally, some councils changed type and frequency, information which we incorporate in our dataset as appropriate.

Data on the outcome of planning applications and decisions is obtained from the Live Tables on Planning Application Statistics published by the Department for Levelling Up, Housing and Communities. This statistical release presents National Statistics on all authorities that undertake district and county level planning activities in England. Specifically, we use information from PS1 and PS2 forms on 'district matters'. The PS1 form includes data on *applications* including the number outstanding, received, or withdrawn during the quarter; as well as the total number of decisions and delegated decisions by LA. The PS2 form includes information on *decisions* made during the quarter by development type (i.e., major, minor, householder, other) and the decision that was made (granted or refused).

[16] Non-metropolitan district councils in particular have county-council elections in the year in which no district-level elections takes place. These LAs effectively have local elections *every year*.

[17] The City of London Corporation has a peculiar election system in which local businesses and their workers have voting rights and command significant more votes in total than residents. The Isles of Scilly are an archipelago off the Cornish coast, populated by some 2,000 inhabitants, making it the smallest LA in the United Kingdom. The whole archipelago is classified as an Area of Outstanding Natural Beauty, which severely constraints development there.

[18] The updated version of the timetable can be found here.

Our estimation dataset also includes information on 1999 LA age distribution variables and disposable incomes from the Office of National Statistics. Home-ownership rates, household size, and fraction of population by social grade (an occupation-based measure of socio-economic status) are obtained from the 2001 population census. Data on average housing sale prices for 1996 are obtained for the Land Registry Price Paid data. Data on political council control at the LA level is obtained from OpenCouncil Data UK. Electoral outcomes for the period 1998-2020 is obtained from the Local Elections Archive Project and the British Local Election Database.

TABLE 1

DESCRIPTIVE STATISTICS

Panel A: Cross-Sectional Characteristics of LAs

	Mean	Sd	Min	Q1	Median	Q3	Max
Area (in km2)	504.0	648.6	12.1	80.1	337.7	657.0	5026.1
Population (000s)	137.9	78.9	33.5	85.0	110.9	167.1	496.1
Av. HH Size	2.4	0.1	1.9	2.3	2.4	2.4	2.6
Av. Age	39.2	2.6	31.7	37.9	39.3	40.7	46.6
Home Owners (%)	71.8	10.6	28.8	70.7	74.0	77.2	87.0
High Social Grade (%)	23.2	5.9	11.4	19.0	22.6	26.7	41.1
Income p.c. (000s)	11.3	4.0	1.6	9.6	11.4	13.1	35.8
Election Quarters (%)	6.5	1.2	5.2	6.2	6.2	6.2	12.5
Cross-Sectional Units				203			

Panel B: Planning Applications & Decisions

	Mean	Sd	Min	Q1	Median	Q3	Max
Major Decisions	10.9	8.0	0	6.0	9.0	14.0	91.0
Maj. Refusal Rate (%)	19.4	18.4	0	0.0	16.7	28.6	100.0
Major Refused	2.1	2.6	0	0.0	1.0	3.0	42.0
Minor Decisions	106.0	78.5	0	61.0	89.0	128.0	1100.0
Min. Refusal Rate (%)	19.6	9.4	0	12.7	18.4	25.4	65.4
Minor Refused	21.4	18.2	0	9.0	16.0	28.0	156.0
HH Decisions	179.8	113.4	0	98.0	154.0	234.0	887.0
HH Refusal Rate (%)	10.8	7.7	0	5.2	9.0	14.4	59.5
Panel Observations				15554			

Notes: Panel A provides basic descriptive statistics for LA characteristics. All variables measured in 1999, the year before the start of our baseline estimation sample period. Panel B provides descriptive statistics for planning decisions in the period 2000-2019.

4.3. Descriptives

Table 1 depicts summary statistics for the main variables used in the empirical analysis. Panel A displays a series of cross-sectional characteristics, as measured in

1999. These will be used either as pre-determined controls or determinants of planning cycle heterogeneity in the analysis below. The average LA has a population of roughly 140 thousand inhabitants and occupies an area of 500km ^{2}. On average, 6% of the LADs have an election in a given quarter over the sample. Panel B provides descriptives on planning decisions made over the period 2000-2019. The refusal rate for major and minor applications, constructed as the ratio of refused over decisions, had an average of 19% across LAs and period. For householder decisions this rate is much lower, at roughly 11%. Note that the number of decisions made is inversely related to the size of the corresponding applications.[19]

Panel A of Figure 1 illustrates the aggregate time series of the total number of applications received by LAs in our sample and the number of decisions made by LAs on these applications. We can see that the total number of decisions is slightly lower than the number of applications in every period. Moreover, decisions follow applications with a slight lag of one quarter. Panel B of Figure 1 displays the time series of aggregate major and minor refusal rates for applications. Both series follow each other quite closely, displaying a sting increase in refusal rates during the housing boom years (2000-2005) before a sharp reduction during the Great Recession. Refusal rates for both types of applications stabilized around 15% after 2012. The correlation between these aggregate series and macro developments in British housing markets underscore the need to deal with aggregate trends in our empirical analysis of planning decisions.

5. Detecting Political Planning Cycles

5.1. Empirical Strategy

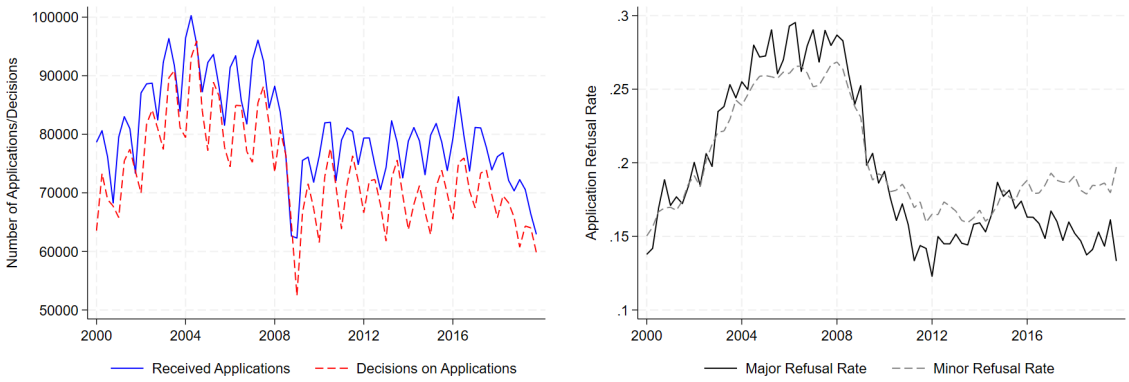
The theoretical framework in Section 2 links voter preferences for new development with the shape of planning decisions across the election cycle. We now turn to the estimation of political planning cycles across elections.

The contemporary empirical literature on electoral cycles describes policy outcomes using distributed lag models specified for periods around election years.[20] To deal with the confounding role of aggregate shocks that may be correlated with

[19] Appendix Figure B.2 illustrates the cross-sectional correlations between the refusal rate in major applications averaged over the 2000-2019 period, and different LA characteristics. The average refusal rate on these applications is higher in high socio-economic status, high price and high homeownership LAs.

[20] Recent examples of papers using this approach include Bircan and Saka (2021); Müller (2023); Balboni et al. (2021); Bueno (2023).

FIGURE 1
PLANNING DECISIONS: RECEIVED, DECIDED AND REFUSAL RATES



(A) APPLICATIONS & DECISIONS (B) APPLICATION REFUSAL RATE

Notes: In Panel A we report the total number of applications received and decided by LAs in our sample in every quarter between 2000 and 2019. In Panel B we report the aggregate refusal rate on major and minor planning applications decided by the LAs in our sample in the period between 2000 and 2019.

policy shifters we rely on the asynchronous timing of elections across LAs to generate our estimating variation. Table 2 illustrates the electoral calendar for the units in our sample. The staggered electoral calendar allows us to flexibly control for (potentially heterogeneous) time-effects in our model.

We use our quarterly panel of LAs to estimate relative differences in planning decisions for a window of periods around elections. For this purpose, our baseline estimates are obtained from variations of following linear specification:

$$RR_{it} = \alpha_i + \sum_{l=t+1-\overline{L}}^{t+1+\overline{L}} \phi_l E_{il} + \Gamma(t,i) + \gamma' X_{it} + v_{it} \tag{2}$$

where RR_{it} is the standardized refusal rate on applications decided by local authority i in time t. Our baseline estimates will focus on the refusal rate on major applications. The sum in the right-hand side corresponds to a distributed lag model specified in terms of lags and leads of E_{it}, a dummy taking value 1 in the quarter of an election. E_{it+1} will then take value one in the period *before* an election takes place. The sum is centred at the quarter before the election and extends for $\overline{L}$ periods in each direction from this period. Cross-sectional fixed effects α_i are included to deal

TABLE 2

ELECTION CALENDAR BY LA GROUP

Group	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
London Boroughs			32				32			
Orig. '79 Calendar	1			147				148		
Reforms '95 '07		1				1				6
Rotating Councils	6		7		7		7		7	
Total	7	1	39	147	7	1	39	148	7	6

Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
London Boroughs	32				32				32	
Orig. '79 Calendar		157				158				146
Reforms '95 '07				6				6		
Rotating Councils	7		7		7		7		7	
Total	39	157	7	6	39	158	7	6	39	146

Notes: Our sample includes 4 groups of LAs with different electoral calendars. The largest group corresponds to authorities with a calendar that was established in the 1972 Local Government Act. The second largest group corresponds to the 32 London Boroughs. The third largest group corresponds to rotating councils that elect half of their members each term. These councils have elections every two years. Finally, the 4th largest group corresponds to LAs that have a separate calendar as a result of the creation of new Unitary Authorities in 1995 and 2009.

with differences in the frequency of elections across LAs.[21] We control for aggregate shocks to the outcome of interest using function $\Gamma(t, i)$. We will consider several alternative versions of this function: a second-degree polynomial in t, separate time dummies for each of quarter in our sample and a combination of time dummies and interactions between time dummies and 1999 local authority populations. We also include time-varying political controls X_{it} in some specifications: dummies for councils controlled by the Labour and Conservative parties and a dummy identifying councils where no party commands an overall majority of seats, all measured at the start of the corresponding year.

The object of interest in Equation 2 is the sequence $\{\phi_l\}$ which will capture the dynamics of the outcome in the periods around elections. $\overline{L}$ determines the length of that sequence. We will use $\overline{L} = 0$ – the pre-election quarter is compared to all other periods – and $\overline{L} = 3$, which will allow us to evaluate the cycle around the election period more flexibly.

We complement our analysis of refusal rates by focusing on the count of refusals

[21] There are two sources of cross-sectional differences in the frequency of elections: 7 out of the 203 LAs in our final sample have elections every two rather than 4 years, and differences in the timing of elections relative to the sample's start and end points across LAs induce variation in the average value of E_{it} within the group of LAs that hold elections every 4 years.

on major applications NR_{it} as the outcome. In this case we use a Poisson model specified as:

$$E(NR_{it}) = \alpha_i exp\left(\sum_{l=t+1-\overline{L}}^{t+1+\overline{L}} \phi_l E_{il} + \Gamma(t,i) + \gamma' X_{it}\right) \tag{3}$$

where most elements are defined as above. In this case, small values of ϕ parameters can be approximately interpreted as percentage changes of the associated outcome.[22]

One key identifying assumption in our context is that seasonality in the outcomes of interest does not vary across the groups described in Table 2. The need for this assumption follows from the fact that all elections take place in Q2. If a group of LAs has differential seasonality relative to others, this will generate bias of unknown sign in the estimates of ϕ. Fortunately, we can use our data to test for differential seasonality in non-election years. Details of the associated tests are provided in Appendix Table B.1. Reassuringly, we find no evidence of differential seasonality across groups.

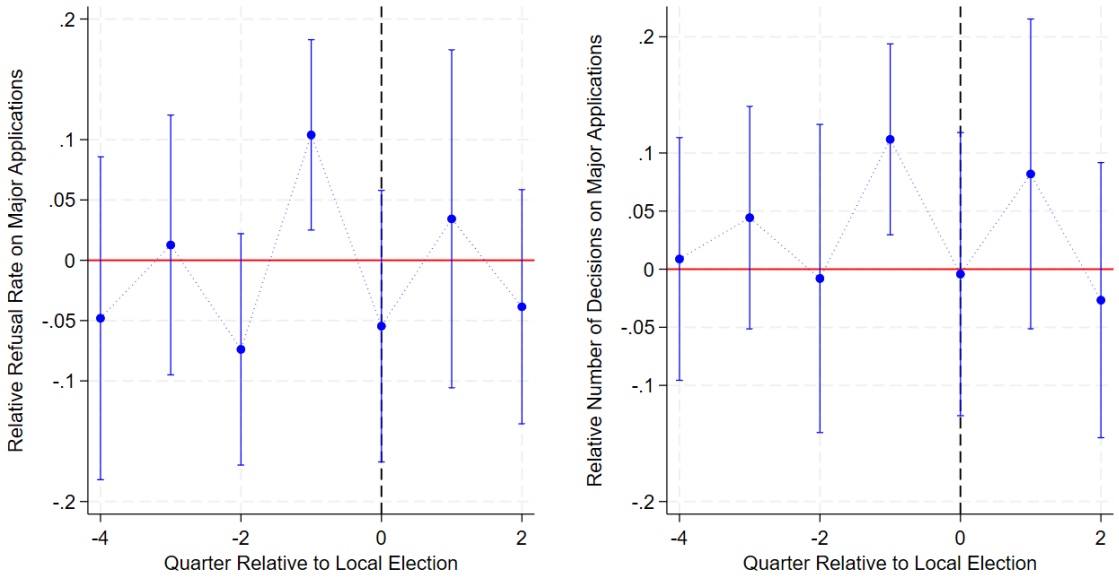
5.2. Evidence of Political Planning Cycles

Figure 2 shows how refusals on major applications vary in periods around local elections. In panel A, we display estimates of ϕs obtained when using the refusal rate on major applications as the outcome of interest. We can observe that there is a positive spike in refusal rates in the quarter that immediately precedes an election. Refusal rates are one-tenth of a standard deviation higher in that period than in the reference group, corresponding here to periods outside the window. This corresponds to an increase in refusal rate of roughly 2 percentage points. All other coefficients in the window are statistically insignificant and smaller in absolute value. In panel B of Figure 2, we display the electoral cycle in the count of refusals on major applications. Again, we find a significant increase in the relative number of planning refusals taking place in the quarter before a local election. This corresponds to an increase in the number of refusals of roughly 10%. Other coefficients in the window are again insignificant and smaller in absolute value.

In Table 3, we provide estimates of differential refusals by focusing exclusively on the quarter before elections. This is motivated by the results in Figure 2 and

[22] Estimation is carried out using the popular routine described in Correia, Guimarães and Zylkin (2020).

FIGURE 2
POLITICAL PLANNING CYCLE FOR MAJOR DEVELOPMENTS



(A) REFUSAL RATE (B) NUMBER OF REFUSALS

Notes: Round markers correspond to estimates of coefficients in the distributed lag model for different periods around a local election as indicated in the horizontal axis in both panels. Vertical segments correspond to 95% confidence intervals. In panel A, we report estimates of a specification where the dependent variable is the standardized refusal rate of major applications. In panel B, we report estimates of a specification where the dependent variable is the standardized number of major applications refused by the local government.

effectively amounts to changing the reference group to include all periods with $E_{it+1} = 0$. In panel A, we report estimates using the refusal rate on major applications as the dependent variable. In panel B, we report estimates using the count of rejected applications is used as the dependent variable. We find positive coefficients for the pre-election quarter in all specifications. When accounting for potential heterogeneity in trends across the population distribution and political controls, the coefficient in Panel A indicates an increase in refusal rates of a tenth of a standard deviation, in line with results reported in Figure 2. Panel B estimates in column 4 show an increase of roughly 10% in the number of refusals in pre-election quarters. Section 7 provides a battery of robustness checks that consolidate our confidence on these results.

Figure 2 and Table 3 show that there are political planning cycles on major decisions by local planning authorities. We can interpret these qualitative patterns in through the lens of our theoretical framework. From this perspective, the shape of

TABLE 3
DIFFERENTIAL DECISIONS IN PRE-ELECTION QUARTER

	(1)	(2)	(3)	(4)
A. Major Application Refusal Rate				
Pre-Election Quarter	0.06*	0.08**	0.11***	0.11***
	(0.03)	(0.04)	(0.04)	(0.04)
Obs.	16160	16160	16160	16141
B. Major Applications Refused				
Pre-Election Quarter	0.10***	0.08**	0.11**	0.11***
	(0.03)	(0.03)	(0.04)	(0.04)
Time Trend	Yes	No	No	No
Time Effects	No	Yes	Yes	Yes
Time Effects $\times$ Ln(Pop_{1999})	No	No	Yes	Yes
Pol. Controls	No	No	No	Yes
Obs.	16289	16289	16289	16270

Notes: In panel A, the dependent variable is the standardized rejection rate in that quarter. In panel B, the dependent variable is the standardized number of major applications refused by the LA. Estimates correspond to the coefficient on the pre-election quarter in all specifications. All specifications include local authority fixed effects. Column 1 includes an time trend and the time trend squared. Columns 2 through 4 include a set of time dummies. Columns 3 and 4 include interactions between $Log(pop_{1999})$ and time effects for every period. Column 4 includes political controls corresponding to characteristics of the LA government at the beginning of each year (dummies for Labour, Conservative and Liberal Democrat Governments) and a dummy identifying LAs where no party has overall control of the council. Standard errors clustered at the LA level.

the observed cycle shows that local opposition to development exists and it influences the actions of elected officials ahead of elections. We now turn to provide additional evidence that political planning cycles are driven by electoral concerns and not by other factors that could affect planning decisions around election periods.

5.3. Origins of Political Planning Cycles

In this Section, we present complementary evidence to support the notion that the political planning cycles reported above are, as in our theoretical framework, a policy response to voter preferences. In the first place, we show that the cycle is more pronounced in electorally competitive LAs, where we would expect electoral outcomes to be more sensitive to policy choices. Next, we show the cycle is absent in minor and householder applications with limited local spillovers. The political planning cycles are only detected for major applications which are associated with more significant local effects on voters. Finally, we show that the cycle in major

refusals is not induced by changes in the volume or type of applications submitted by developers and other applicants.

Planning Cycles and Electoral Competitiveness

Elected officials are expected to be more sensitive to voter demands in constituencies with tighter electoral competition. It is in these competitive contexts where policy decisions can affect whether officials win or loose their elections. Conversely, in constituencies where candidates (or parties) typically enjoy comfortable majorities in votes and seats, electoral outcomes may be fairly insensitive to policy choices.[23] This simple intuition on the effects of electoral competitiveness on accountability has implications for our analysis of political planning cycles: cycles should be more pronounced in LAs which are more electorally competitive.

To measure the tightness of electoral competition at the LA level we use data on electoral outcomes to measure the party-level vote shares in local elections at the LA level, compute victory margins in each election (i.e., the difference in vote shares between the most voted and second most voter party in an election) and then average out those margins across elections in our sample period. This gives us a cross-sectional measure of electoral competitiveness at the LA level EC_i.

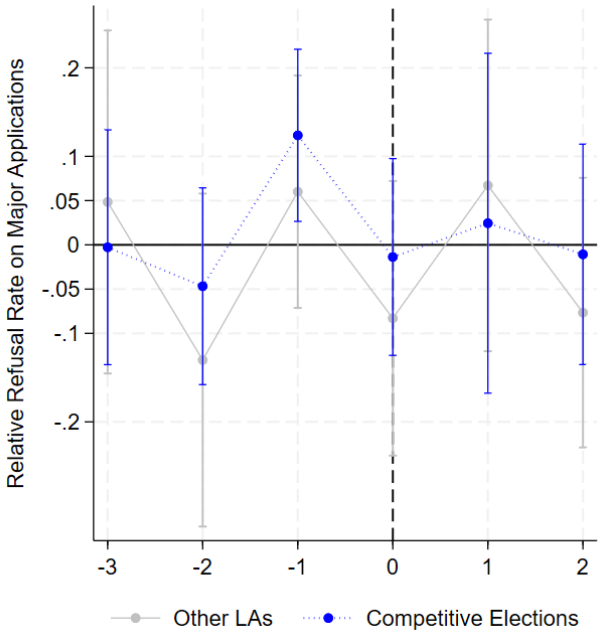
We illustrate our test for differences in political planning cycles across levels of electoral competitiveness in Figure 3. To produce this Figure, we estimate the parameters in Equation 2 for the two sub-samples resulting from splitting LAs in our sample by the median level of average electoral competitiveness defined above. As we can see in the figure, the cycle in planning applications appears to be more pronounced in electorally competitive LAs. The point estimates of relative refusal rates in the quarter before an election is twice is large in competitive LAs than in uncompetitive LAs. That said, Figure 3 does not allow us to properly evaluate whether the differences in cycles are significant at conventional levels. More importantly, splitting the sample in this way ignores variation in electoral competitiveness within each half of the distribution.

To overcome these issues, we estimate a modified version of Equation 2 with $\overline{L} = 0$ in which we add an interaction term between a standardized version of EC_i

[23] A long literature has emphasized the role of electoral competition in bringing policies closer to voters' preferred choices. See e.g., Barro (1973) for early theoretical work in economics on this matter. A contemporary review on the role of political accountability in shaping policy can be found in Ashworth (2012).

and the pre-election quarter dummy.[24] Table 4 presents the key estimates for this exercise. The coefficient on the pre-election quarter is positive, significant and in line with the main estimates reported in Table 3. The coefficient on the interaction term is negative, indicating that LAs in which winners command more comfortable vote margins have less of an electoral cycle. The implication is that the political planning cycle is more pronounced in more competitive LAs.

FIGURE 3
POLITICAL PLANNING CYCLES AND ELECTORAL COMPETITIVENESS



Notes: Distributed-lag model estimates obtained for LAs with average electoral victory margins above the median (dotted dark line) and below the median (solid light line). The specification used to produce these estimates include flexible time effects by population and political controls. Round markets correspond to estimates of coefficients in the distributed lag model for different periods around a local election as indicated in the horizontal axis in both panels. Vertical segments correspond to 95% confidence intervals.

Political Planning Cycle in Minor & Householder Applications

If local opposition to neighbourhood change motivates local politicians to modify planning decisions ahead of elections, it stands to reason that the degree to which this happens is a function of the scale of the changes being proposed. This is one of the interpretations of Corollary 1 of our theoretical framework: the size of

[24] We also add interactions between time effects and EC_i to the specification, in order to adjust for heterogeneous effects of electoral competitiveness over time.

TABLE 4

PLANNING CYCLES AND ELECTORAL COMPETITION

	(1) Maj. Ref. Rate	(2) Maj. Ref. Rate	(3) Maj. Ref. Rate
Pre-Elect. Quart. × Vsh. Margin	-0.07**	-0.07**	-0.07**
	(0.03)	(0.03)	(0.03)
Pre-Elect. Quart.	0.06*	0.09**	0.09**
	(0.04)	(0.04)	(0.04)
Time Effects	Yes	Yes	Yes
Time Effects × Ln(Pop_{1999})	No	Yes	Yes
Pol. Controls	No	No	Yes
Obs.	15420	15420	15405

Notes: In all specifications, the dependent variable is the major refusal rate. Both the dependent variable and the vote share margin variable used to create the interaction term are normalized to have a mean of 0 and a standard deviation of 1. All specifications include LA fixed effects, time effects and interactions between average vote share margins and time effects. Additional interactions and fixed effects included as indicated in the bottom section of the table. Standard errors clustered at the LA level.

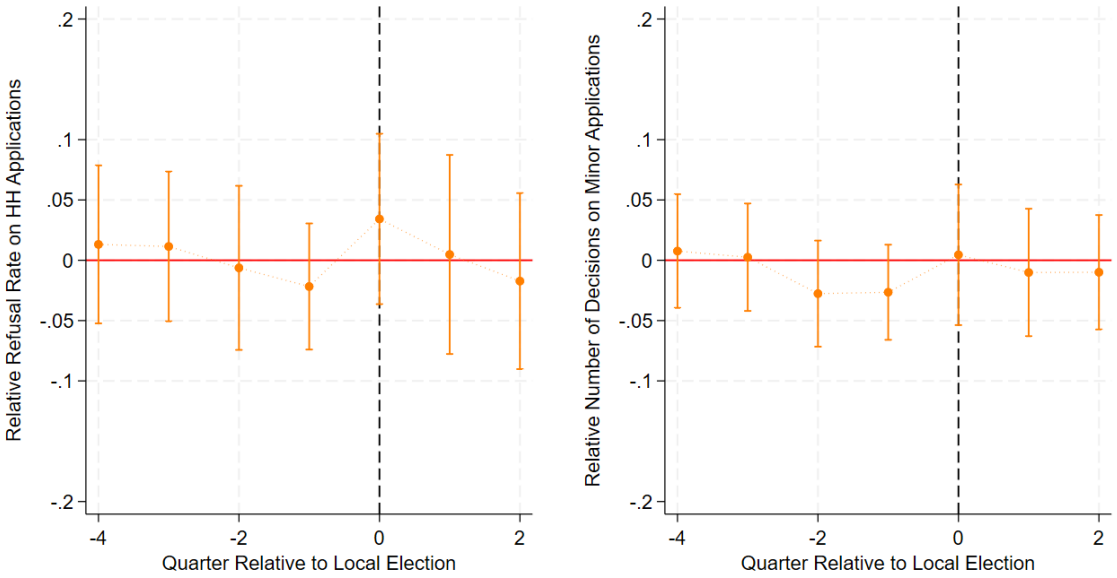
the cycle is a function of the impact of new construction on voters. It is this insight that motivates us to focus on major applications in our main analysis. An implication is that planning applications of a smaller scale should feature either a smaller observed cycle or no cycle at all.

In order to evaluate whether this is the case, we reproduce our empirical analysis focusing on householder and minor applications. The case of householder applications is especially relevant as these correspond to changes of a very small scale, typically focusing on refurbishments or partial expansions to existing residential units. In many cases, the changes being proposed would be imperceptible to other households in the neighbourhood. If the cycle in major applications is motivated by local opposition neighbourhood change, then we should observe no cycle in householder applications which typically have no material impact on neighbourhoods.

Figure 4 we show estimates of the cycle of householder applications around election quarters. In panel A, we represent the relative refusal rates for these applications across the cycle. We can observe that the point estimate is *negative* and small in the quarter before an election, and statistically insignificant in all periods. A similar, pattern is observed for the count of householder application refusals in panel B.[25]

[25]Appendix Table B.2 provides estimates of the coefficient on the pre-election quarter dummy

FIGURE 4
POLITICAL CYCLE FOR HOUSEHOLDER APPLICATIONS



(A) REFUSAL RATE ON HH APPL. (B) REFUSALS ON HH APPL.

Notes: Round markets correspond to estimates of coefficients in the distributed lag model for different periods around a local election as indicated in the horizontal axis in both panels. Vertical segments correspond to 95% confidence intervals. In panel A, we report estimates of a specification where the dependent variable is the standardized number of householder applications processed by the local government. In panel B, we report estimates of a specification where the dependent variable is the standardized refusal rate of minor applications.

Absence of a Filing Cycle & Decisions on Planning Appeals

We interpret political planning cycle as the result of changes in the incentives of decision-makers around election periods. Both in our theoretical framework and our empirical analysis thus far we have abstracted from differences in the applications themselves across the cycle.[26] Changes in filings over time could induce themselves induce a planning cycle via the number or the type of applications being put forward.

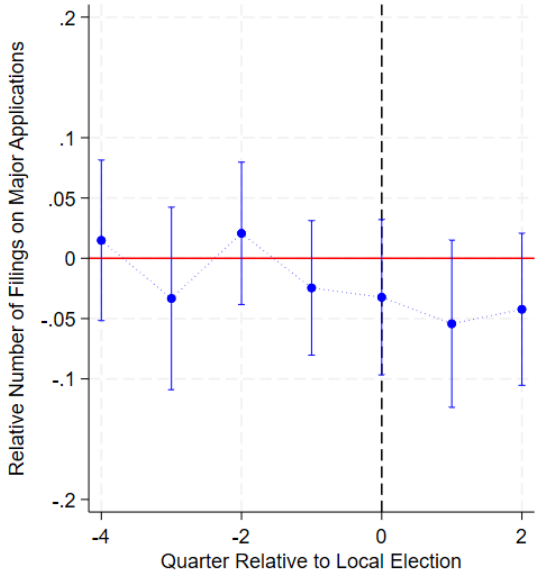
We will briefly discuss the number of filings first. Planning application statistics published by the ONS do not include the number of filings disaggregated by application type so we cannot directly observe the number of major applications submitted each quarter in that source. Instead, we use data from Badii et al. (2024*a*)

for different sets of controls. When time effects are included to deal with aggregate trends, all the resulting coefficients are small and statistically insignificant at conventional levels.

[26] In the model in Section 2, the number of applications arriving each period is fixed and the applications themselves are homogeneous.

who processed text from individual applications using a machine-learning classifier and provided us with tabulations for the number of filed applications by type for each LA.[27]

FIGURE 5
FILING CYCLE FOR MAJOR APPLICATIONS



Notes: Estimates of coefficients from the Poisson model specified in equation 3. The outcome variable in the specification is the number of filings of major applications. Round markers correspond to estimates of coefficients in the distributed lag model for different periods around a local election as indicated in the horizontal axis in both panels. Vertical segments correspond to 95% confidence intervals.

In Table 5, we show that the fraction of refused planning applications that lead to a successful appeal by the applicant is highest when the refusal took place in the quarter before a local election. We interpret this as evidence that local planning authorities are refusing more merit-worthy applications ahead of local elections.

6. Who Opposes Neighbourhood Change?

In this section we show that the presence and magnitude of electoral planning cycles is shaped by both the characteristics of different neighbourhoods and local governments. First, we document some key dimensions of heterogeneity in our effects of interest as informed by the current state of the literature on planning constraints. Next, we use machine-learning methods to study which demographic

[27] Technical details in Badii et al. (2024*b*).

TABLE 5
POLITICAL CYCLE IN PLANNING APPEAL DECISIONS

	(1) Appeal Accepted	(2) Appeal Accepted	(3) Appeal Accepted
Pre-Election Quarter	0.07**	0.08**	0.08**
	(0.03)	(0.04)	(0.04)
Time Effects	Yes	Yes	Yes
Time Eff. $\times$ Ln(Pop_{1999})	No	Yes	Yes
Pol. Controls	No	No	Yes
Obs.	5618	5618	5617

Notes: Estimates based on a dataset of appeals on refusals on mayor planning applications for the period 2010-2019. Dependent variable is a dummy taking value 1 if the appeal is accepted and 0 otherwise. Estimates correspond to the coefficient on a dummy taking value 1 if the original planning application was submitted in a pre-election quarter. All specifications include local authority fixed effects. All columns include time and LA fixed effects. Columns 2 and 3 include interactions between $Log(pop_{1999})$ and time effects for every period. Column 3 includes political controls corresponding to characteristics of the LA government at the beginning of each year (dummies for Labour, Conservative and Liberal Democrat Governments) and a dummy identifying LAs where no party had overall control of the council in the previous year. Standard errors clustered at the LA level (202 clusters in total).

characteristics of a LA's inhabitants are associated with large cycles. Given the result in Corollary 1 of our theoretical section, we can interpret these characteristics as indicating which voters are more strongly opposed to new construction and neighbourhood change.

6.1. Heterogeneity in Planning Cycles

Previous studies on planning restrictiveness and neighbourhood preferences give us insights into where we expect to find more opposition to urban development. We can use sample splits in the estimation of the parameters in equation 2 to explore the heterogeneity in planning cycles across LAs.

The homevoter hypothesis (Fischel 2001) – and the extensive empirical literature that provides support to it – states home-owners are more sensitive to policies that affect housing prices and are therefore more inclined to oppose development in their area. We would therefore expect more pronounced cycles in high home-ownership areas. We show that this is the case in panel A of Figure 6, in which we provide separate estimates of relative refusal rates around the election quarter for high and low home-ownership LAs, split by the median home-ownership rate in 2001 census. This result helps link our findings with the cross-sectional studies looking at the impact of home-ownership rates on planning policies.

The identity of the party in power at the local level is also an important determinant of the size of political planning cycles. Voters who are more sensitive to new development may be more likely to vote for certain parties. In addition, some parties may be more sensitive to opposition to development. Conservative parties in particular are often seen as the parties of home-owners (see Lund 2013; Kohl 2020). Previous empirical work by Hilber and Vermeulen (2016) and Jarvis (2025) have shown that Conservative local governments in Britain are associated with higher refusal rates in applications. We confirm this apparent opposition of Conservative local governments to new development in our analysis of planning cycles. Panel B of Figure 6 shows that cycle is only a feature of Conservative (or *Tory*) councils. It is important to highlight that this is not conclusive evidence of a pure party effect as we cannot separate out the role played by the demographic characteristics of voters in this exercise. Yet these results are, at a descriptive level, consistent with insights from the literature on the British political system and planning policy.

We finally turn to studying the heterogeneity of planning cycles across locations with high and low demand for land. This is motivated by two observations. In the first place, the economic consequences of voter opposition to new development and land use restrictions will be arguably more severe if concentrated in high demand areas.[28] In the second place, empirical studies on land use regulation have shown that it tends to be stricter in high demand locations (see e.g., Hilber and Robert-Nicoud 2013, Bartik, Gupta and Milo 2025). We can use our political cycles approach to evaluate whether this is the case. Results are shown in the Panels C and D of Figure 6. We use two proxies for high demand LAs, disposable income and average price of sold homes, both measured in 1999. Both panels indicate that political planning cycles are only observed in high demand locations, suggesting voter opposition to development is stronger in these LAs, in line with extant cross-sectional evidence.

A critical limitation of this analysis of heterogeneity is that the four dimensions of heterogeneity featured in Figure 6 are correlated with each other. This is most obvious when looking at the two proxies of local demand but is also true in other pairs of variables.[29] While we believe these descriptive patterns continue to have

[28] In contemporary models of land use regulation, welfare losses often follow from misallocation of labour across locations, which is more acute if land use regulation is stricter in high demand (i.e., high productivity or high amenity) locations. See e.g., Hsieh and Moretti (2019); Parkhomenko (2023).

[29] When splitting LAs by their median levels of home-ownership, income and housing prices, all

analytical value, they do not allow us to isolate the specific channel that causes larger planning cycles. In the next section, we use an alternative approach that allows us to identify the key demographic drivers associated with these cycles.

6.2. Demographic Characteristics of Voters and Planning Cycles

We can use an alternative approach to the study of heterogeneity in planning cycles that avoid the single variable analyses presented in the previous section. Our goal in the analysis is to identify which cross-sectional characteristics of LAs are best predictors of the size of political planning cycles. We will be focusing specifically on the demographic characteristics of the local population, in line with the intuition in Corollary 1, where the size of the cycle is linked to a characteristic of voters (i.e., their preference parameter ν). Note that this is a predictive exercise and not, strictly speaking, an analysis of how one or several characteristics *affect* the size of the planning cycle. While identifying the causal effect of demographic characteristics on the cycle would be desirable in principle, this is almost impossible in practice without suitable cross sectional instruments for all demographic characteristics or strong assumptions on the role of unobservables. Our predictive exercise does not suffer from these issues because it is more modest in its goals. That said, we still believe it can be informative regarding the mechanisms that are more likely to explain existing variation in voter preferences.

Our heterogeneity analysis relies on the use of least absolute shrinkage and selection operator (lasso) to identify the key demographic predictors among a large set of possible variables. We use two different predictor vectors. We begin by using a vector of continuous predictors including the share of high social grade households, the average age of the population, the fraction of the population over 50 years of age, the home-ownership share, average disposable income and average household size, and all their pairwise interactions.[30] This yields a vector of 21 socio-demographic predictors. We use this vector to predict LA-level estimates of planning cycles in major refusal rates. On a first stage, we estimate:

$$RR_{it} = \alpha_i + \phi_i E_{it+1} + \Gamma(t,i) + \gamma' X_{it} + v_{it}$$

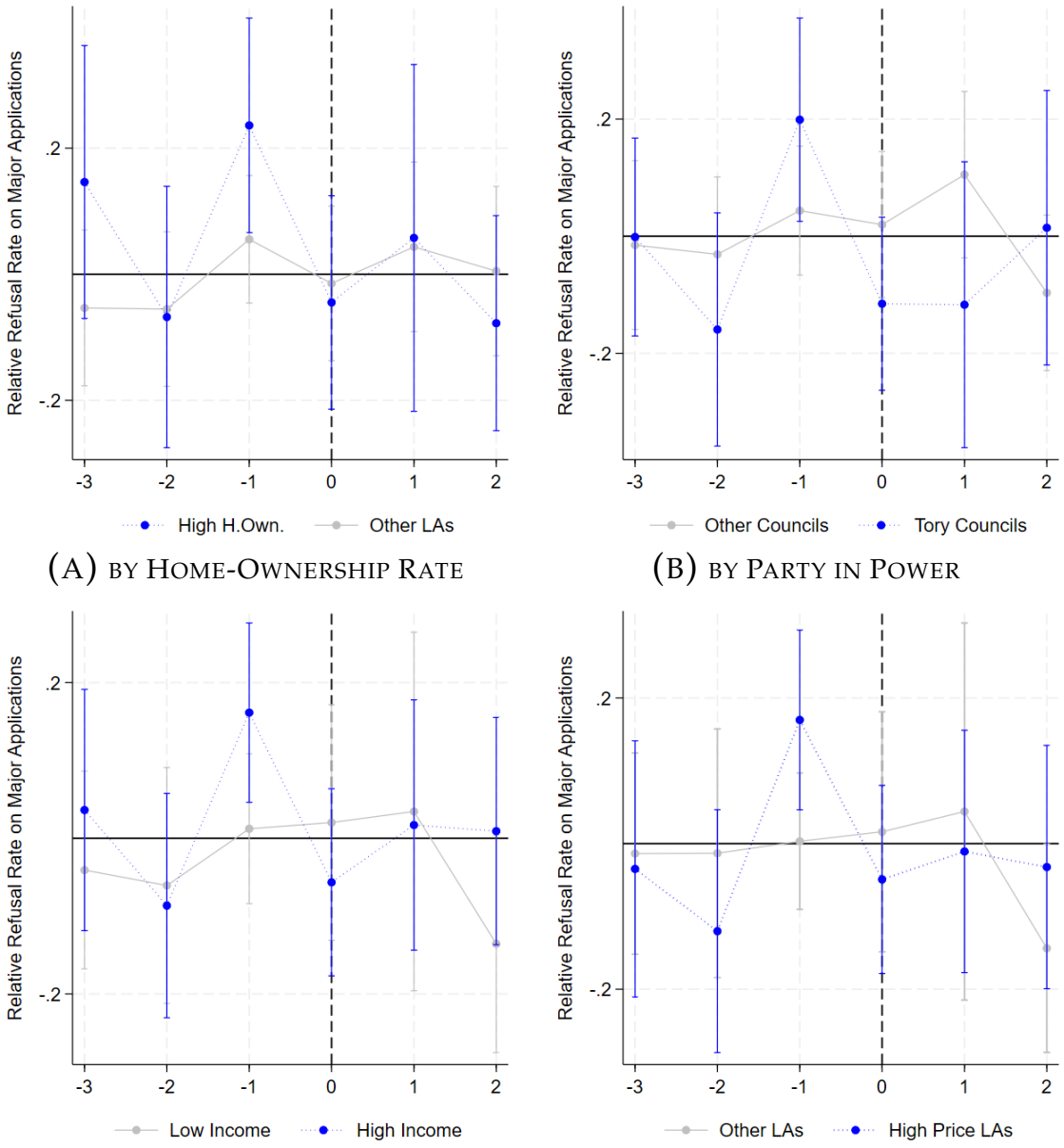
where all variables are defined as in equation 2 above. Note that ϕ_i is heterogeneous by LA resulting in 203 individual estimates. The histogram of these estimates

the correlations between the associated dummies are positive and significant at conventional levels.

[30]Pairwise interactions include the squares of all variables.

FIGURE 6

HETEROGENEITY IN PLANNING CYCLE FOR MAJOR APPLICATIONS



(A) BY HOME-OWNERSHIP RATE

(B) BY PARTY IN POWER

(C) BY DISP. INCOME

(D) BY HOUSING PRICE LEVEL

Notes: In panel A, we report separate estimates of the distributed lag model for LAs in the upper quartile of the price distribution and all other LAs. In panel B, we report separate estimates of the distributed lag model for LAs ruled by the Conservative party and all other LAs. In panel C, we report separate estimates of the distributed lag model for LAs in the upper quartile of the homeownership rate distribution and all other LAs. In panel D, we report separate estimates of the distributed lag model for LAs in the lower quartile of the seat share distribution and all other LAs. For all panels, the dependent variable of the estimating equation is the standardized refusal rate in planning applications. In all panels, round markets correspond to estimates of coefficients in the distributed lag model for different periods around a local election as indicated in the horizontal axis. Vertical segments correspond to 95% confidence intervals.

is reported in Appendix Figure B.4. While individual estimates will reflect information about the true heterogeneity in planning cycles they will also contain a significant amount of sampling variation, as individual estimates are based on a handful of election periods.[31] We then want to predict ϕ_i using our full vector of predictors W_i using lasso to penalize non-zero β_k coefficients in equation $\phi_i = \beta_0 + \beta' W_i + \varepsilon$. We weigh each local authority by the inverse of the square of the standard error for its estimates ϕ_i in order to account for imprecision in these estimates.

In Table 6, we report the predictors that are selected for different value of the lasso penalization parameter λ. Specifically, we report the largest value of λ for which a given number of predictors is selected for 1, 2 and 3 predictors, alongside the predictors themselves. In this way, we summarize the sets of selected predictors at different points along the regularization path. Across values of λ reported here, one predictor appears consistently: the interaction between the fraction of high social grade households in an LA and the fraction of population above 50 years of age. This indicates that mature, high socio-economic status voters are those most sensitive to neighbourhood change.[32] For lower values of λ we find that the square of the home-ownership rate is selected as a predictor. The third predictor to appear in the regularization path is the square of household size.

In the next section, we briefly present alternative methods to identify the main demographic predictors of political planning cycles. There, as here, the main message that emerges is that planning cycles are strongest in areas with high socio economic status. This has two related implications. The first is that political opposition to development is strongest in high-demand locations, where it is likely to generate more significant impacts on the misallocation of labour. The second is that not-in-my-backyard (NIMBY) voters tend to have high socio-economic status and be older than average. Whether this heterogeneity in voter preferences is reflective of differences in awareness of the consequences of neighbourhood change (e.g., more sophisticated voters), higher home-ownership rates in this group (i.e., more invested voters), or some other mechanism is something that cannot be easily identified with our empirical strategy.

[31] In the 2000-2020 sample, the modal LA has a total of 5 election quarters. The average number of election periods in our sample across LAs is 4.96.

[32] The cross-validated value of λ is equal to 36, leading to only this predictor to be selected as having a non-zero value of β_k. This suggests that additional variables do not improve predictive performance substantively.

TABLE 6
DEMOGRAPHIC PREDICTORS OF POLITICAL PLANNING CYCLES (LASSO)

λ	1st Predictor	2nd Predictor	3rd Predictor
82	Age>50$\times$ SES (.2)		
24	Age>50$\times$ SES (.19)	Own^2 (.05)	
14	Age>50$\times$ SES (.21)	Own^2 (.02)	HSize^2 (.05)

Notes: Basic standardized variables used to create the predictors for LA estimates of planning cycles are average disposable income (Inc), the share of home-owners (Own), the share of population of high social grade (SES), average household size (HSize), average age (AvAge), and the share of population over 50 years of age (Age>50).

7. Robustness Checks

7.1. Identifying Political Planning Cycles: Iterative Approach

Estimates reported in Figure 2 are obtained for different periods around the election keeping the reference comparison group fixed. We can alternatively estimate individual coefficients for each period in the window, changing the reference group in each step. The key advantage of this approach is that it leads to more precise estimates for each period. Implementation is carried out by estimating different versions of equation 2 in which the sum is replaced by ϕE_{it+j} for different values of $j \in [-4, 4]$.

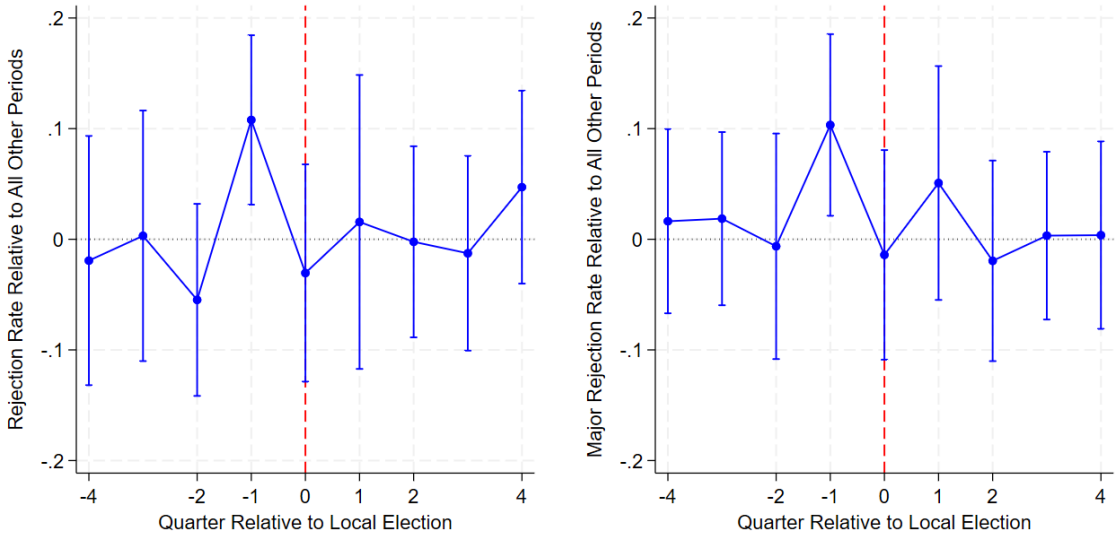
The resulting estimates are reported in Figure 7. For both refusal rates and the number of refusals we observe a spike in the pre-election period that is more pronounced than that observed in other periods. To further illustrate this point, Appendix Figures B.6 and B.5 show point estimates for different periods under different specifications of $\Gamma(t, i)$ and different sets of controls. In all cases, the point estimate is largest in the case of $j = -1$.

7.2. Robustness to Sample Definition

Our main estimates are obtained using a panel that covers the period 2000-2020. As is often the case, the start and end point of the sample are somewhat arbitrary.[33] That said, the main estimates in the paper are robust to changes in these end points. Appendix Table B.3 shows the range of estimates obtained when modifying sample

[33]The start point is selected because it is associated to the early 2000s boom. The final point is selected because the first quarter of 2021 happened almost entirely under lock-down conditions associated to the Covid-19 epidemic.

FIGURE 7
POLITICAL PLANNING CYCLE – ITERATIVE APPROACH



(A) REFUSAL RATE ON MAJOR APPL. (B) DECISIONS ON MAJOR APPL.

Notes: Figures report coefficients from separate regressions of the outcome of interest on a dummy corresponding to lags and leads of E_{it} as indicated in the horizontal axis. All specifications include LA and time effects, as well as time varying government characteristics. Standard error clustered at the Local Authority level.

end points by one year in each direction. These estimates are obtained with the same specification to produce our headline estimates, reported in column 4 of Panel A in Table 3. For all 8 combinations of start and end points reported there, point estimates lie in the [0.94,0.108] range, around our main estimate of 0.104.[34] This shows our main results are not specific to our chosen sample period.

Our empirical analysis uses information on planning decisions made by 203 LAs. This is a small number of cross-sectional units, making it reasonable to worry about the role that any individual unit may play on determining our findings. In order to deal with these concerns, we show that our main results on the presence of a political planning cycle are not driven by any single cross-sectional unit in the dataset. We obtain 203 estimates corresponding to column 4 of Table 3 obtained after excluding each cross-sectional unit. The histogram of the associated estimates are reported in Appendix Figure B.7. These show point estimates that are tightly

[34]Estimates obtained when using the number of refusals as the outcome of interest are reported in Appendix Table B.4.

distributed around our main estimates. The most extreme coefficients continue to be of comparable size and significant at conventional levels in all cases. Our results are not driven by the out-sized contribution of individual units.

7.3. Demographic Characteristics and Planning Cycles: Alternative Approach

We can show that our qualitative findings about the heterogeneity of cycles across demographic characteristics of voters are robust to the use of an alternative method relying on the calculation of an out-of-sample R^2 to identify key drivers. We proceed as follows. We obtain individual LA estimates ϕ_i as in Section 6.2. We then create 500 random splits of our cross-sectional LA dataset, with 70% of observations kept for the estimation sample and 30% of observations assigned to the hold-out sample in each case. For each estimation sub-sample, we obtain regressions of the LA-specific cycle estimates ϕ on individual variables or pairs of variables included in the vector of demographic predictors and interactions described in Section 6.2. Equipped with these estimates, we use the hold-out sub-sample to compute an out of sample (OOS) R^2 for each predictor or pair of predictors. Note this is simply the square of the correlation between the estimated ϕ_is and the fitted values in the hold-out sample. Finally, we obtain the average OOS R^2 across samples for each set of predictors.

The 5 sets of predictors achieving the highest average OOS R^2 (in decreasing order) are reported in Appendix Table B.5. The best predictor of individual planning cycles estimates is the same as in the lasso analysis in Section 6.2: the interaction between social grade and the the fraction of population above 50 years of age. The average OOS R^2 is 5.4% in that case. The second best predictor is the interaction between social grade and home-ownership rate. Other predictors are featured in the table. It is worth noting that all 5 groups of predictors include the fraction of households of high social grade. This shows our conclusion that NIMBY voters are disproportionately coming from households with high socio-economic status is robust to the method used to explore heterogeneity in planning cycles.

8. Conclusions

The operation of land markets is, in most contexts, constrained by different types of administrative and regulatory restrictions. These are usually motivated by the presence of substantial externalities between land uses and the need to share infrastructure and local public goods. In practice, many land use restrictions also

heavily restrict urban development, either by limiting its density, its type or by outright banning it in certain locations. What motivates this restrictive use of planning policy? We show that this restrictiveness emerges, at least in part, from the policy preferences of voters. While these preferences are themselves unobservable, we use electoral cycles in planning decisions as a way of characterizing those preferences qualitatively. The intuition behind this approach is based the notion that policy is more responsive to voters' preferences in periods close to elections. Therefore, we can use changes in policy ahead of elections to learn something about voter preferences for these policies.

Our empirical analysis relies on this intuition to show elected officials make planning decisions taking into account voters' opposition to neighbourhood change in their local area. This is especially the case in high amenity locations with higher housing prices, something that is consistent with voters' being more sensitive to planning decisions in this areas. Moreover, the fact that policy is more responsive to voters' opposition to development in high price areas is particularly problematic as it increases restrictions in high-demand locations. Complementary results indicate that this opposition is focused on neighbourhood changes which generate substantial local externalities. These results are consistent with anecdotal evidence on not-in-my-backyard opposition to urban development.

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Appendices

A. Theoretical Appendix

Proof of Lemma 2

We can rule out pooling equilibria by using our assumptions on $c(.)$ and showing that no structure of beliefs can sustain this behaviour by incumbents. To show this is suffices to show even under the most unfavourable beliefs associated to deviations from $\bar{r}$ we will have deviation by some incumbent types.

Consider the case of $\nu < 0$, such that voters dislike new development and prefer politicians with high values of η, all else equal (the case of $\nu > 0$ follows a similar argument redefining beliefs as suitable). The most unfavourable beliefs for deviations from $\bar{r}$ in this case can be written as:

$$\mu(\eta_{t+2}|r_{t+1}) = \begin{cases} f_\eta(\eta_{t+2}) & \text{if } r_{t+1} = \bar{r}, \\ \delta^{\text{Dirac}}(\eta_{t+2}) & \text{if } r_{t+1} \neq \bar{r} \end{cases}$$

where $\delta^{\text{Dirac}}(.)$ indicates a mass point at zero. In this context, the value from selecting $r_{t+1} = \bar{r}$ can be written as:

$$U^p_{t+1} = \omega - c(\bar{r}, \eta_{t+1}) + \frac{1}{2}\beta \mathbb{E}_{t+1}(U^p_{t+2}) \tag{A.1}$$

Note that the probability of re-election in this case is $1/2$ as the choice $\bar{r}$ provides no useful information to forecast η_{t+2}. Given the result in Lemma 1, we can write out the expected value at $t+2$ as

$$\mathbb{E}_{t+1}(U^p_{t+2}) = \mathbb{E}_{t+1}((1+\beta)\omega - c(\bar{r}, \eta_{t+2}) + 1/2\beta \mathbb{E}_{t+3}(U^p_{t+4}))$$

It is straightforward to show that $\mathbb{E}_{t+1}(U^p_{t+2}) = \mathbb{E}_{t+1}(U^p_{t+4}) \equiv U_k$, which allows us to solve for U_k. The payoff from deviating from the pooling equilibrium and selecting $r_{t+1} = \bar{r}$ is bounded by below by ω. Therefore, using the solved value of U_k and after some simplification, it suffices to show that for at least some values of η_{t+1} the following condition holds:

$$\omega \geq (1+\beta)\omega - c(\bar{r}, \eta_{t+1}) - \frac{\beta^2}{1+\beta}\mathbb{E}_{t+1}(c(\bar{r}, \eta_{t+3})$$

Condition $c(0, 1/2) > \beta\omega$ suffices to show this is true for at least some value of

η_{t+1} which means even under most unfavourable beliefs incumbents may deviate from $\bar{r}$. This completes the proof.

Proof of Proposition 1

A separating equilibrium implies that, $r_t^*(\varepsilon_t)$ is invertible and, therefore, posterior beliefs around types after observing r_t are such that $\exists\, m(.) : m(r_t^*) = \varepsilon_t$. Finally, equilibrium actions of the incumbent need to be incentive compatible given the expected response of voters.

To prove a separating equilibrium exists in these conditions, it suffices to show that $\dfrac{\partial r_t^*}{\partial \eta_t}$ is either strictly positive or strictly negative. We can write the probability of re-election at time $t \in 2\mathbb{N}$ before the election as:

$$p_t = F_\delta\left(\mathbb{E}_t\left(\nu \sum_{s=t}^{T} \beta^{s-t}(h_{s+1}^I - h_{s+1}^C)\right)\right) = F_\delta\left(\nu \mathbb{E}_t(r_{t+1}^C - r_{t+1}^I)\right) = F_\delta\left(-\nu m(r_t)\right)$$

where the first quality follows from the definition of voter preferences, indices I and C correspond to outcomes if the incumbent is re-elected or a challenger replaces them, and expectations are taken given the voter information set.[35] The second equality results from the fact that, at time t, the expected future path of actions $\{r_s\}_{s=t+2}^{T}$ is the same for incumbents and ongoing challengers, itself a result of the MA(1) assumption for politician types. Finally, the third equality results from Lemma 1 and the definition of $m(r_t)$. Replacing p_t in the problem of the incumbent in election period t we obtain:

$$\max_{r_t} \quad \omega - c(r_t, \eta_t) + \beta F_\delta\left(-\nu m(r_t)\right) \overline{U}$$

where $\overline{U} \equiv \mathbb{E}_t(U_{t+1})$, which does not depend on r_t or η_t, which follows from Lemma 1 and the fact that $\eta_t \perp \eta_{t+2}$. The first order condition of the incumbent's problem is given by:

$$\frac{d\, U_t}{d\, r_t} = -c_1(r_t, \eta_t) - \beta \overline{U} \nu f_\delta\left(-\nu m(r_t)\right) m'(r_t) = 0 \tag{A.2}$$

We can use this first order condition and the implicit function theorem to obtain the conditions under which $r_t^*(\eta_t)$ is strictly monotonic. Notice that

[35] Note that $h_s^P = (1 - r_t^P)L \;\; \forall t, O \in \{C, I\}$.

$$\frac{dr_t^*}{d\eta_t} = -\frac{\frac{d^2\,U_t}{dr_t\,d\eta_t}}{\frac{d^2\,U_t}{d^2\,r_t}}$$

Given the second-order condition implies $\frac{d^2U_t}{d^2r_t} < 0$, this boils down to showing that $\left|\frac{d^2U_t}{dr_t d\eta_t}\right| > 0$. This is the typical single-crossing Spence-Mirrlees condition. It follows from the assumption of strict convexity of $c(.)$.

■

Proof of Proposition 2

The first order condition in A.2 determines the relationship between voter preferences and politician's choice of r_t^*. Equilibrium beliefs are such that $m'(r_t) > 0$. This follows from the fact that, in the separating equilibrium, $\frac{d\,r_t^*(\eta_t)}{d\,\varepsilon_t} > 0$. Keeping in mind that $f_\delta(.)$ is positive, and that the cost of deviations from $r_t = \eta_t$ is increasing in $|r_t - \eta_t|$, we can use the expression in A.2 to show that:

$$\text{sign}(r_t - \eta_t) = -\text{sign}(\nu)$$

Where the left-hand side term follows from the sign of $c_1(r_t, \eta_t)$ and assumptions on $c(.)$. When $\nu = 0$, $r_t^* = \eta_t$ follows from the fact that in this case the second term in expression A.2 is zero.

■

Proof of Corollary 1

Note that if $F_\delta(.)$ is uniform, the first order condition in A.2 boils down to:

$$-c_1(r_t, \eta_t) = \nu\Omega m'(r_t) \tag{A.3}$$

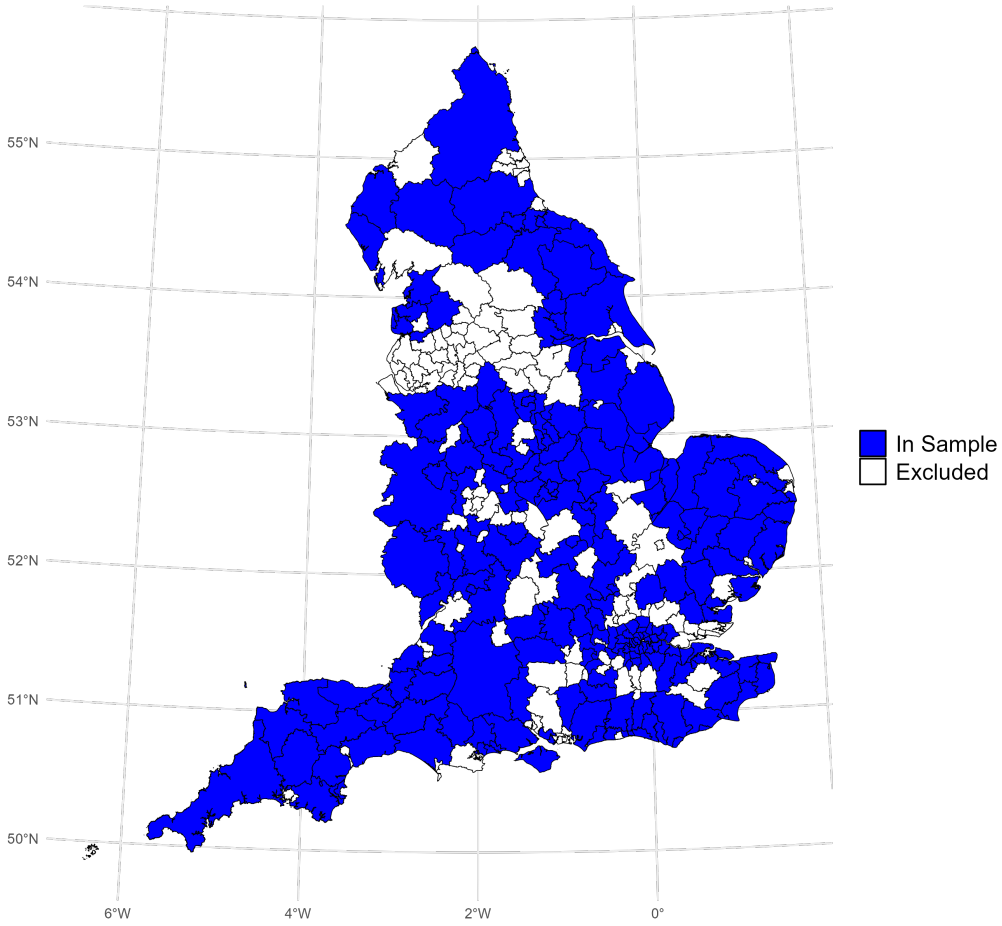
where Ω is a positive constant. Consider the case in which $\nu > 0$, so voters like neighbourhood change (the proof for the case of $\nu < 0$ is analogous). Define $\nu' > \nu$ and define $r_t^{*'}$ as the equilibrium refusal rate under that value of the preference parameter. We can then prove that $r_t^{*'} < r_t^*$ by contradiction. Suppose $r_t^{*'} = r_t^*$. This cannot be an equilibrium because the right hand side term of the first order condition would change while the left hand side remains constant. Now suppose

that $r_t^{*'} > r_t^*$. In this case, we would have that the term in the left hand side of equation 1 would decrease, as the distance between $r_t^{*'}$ and η_t is reduced and $c(.)$ is convex.[36] The right hand side would *increase* though, as $\nu' > \nu$. This cannot be an equilibrium. Therefore, higher values of ν lead to lower equilibrium values of r_t^*.

[36]Here we can see why the assumption of uniform δ is important for the proof. For non-uniform distributions, the right-hand side of equation A.3 will depend on both ν and $f_\delta(-\nu m(r_t))$ which also changes with ν non-monotonically. The uniform assumption is sufficient but not necessary though. The key is that the curvature in the distribution is low enough for the change in the multiplying parameter to dominate the change in the pdf at the equilibrium point.

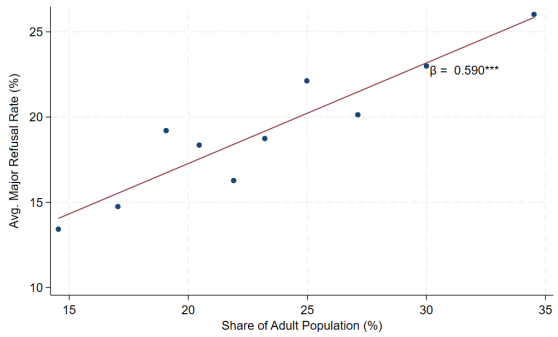
B. Additional Figures and Tables

FIGURE B.1
LOCAL AUTHORITIES & SAMPLE DEFINITION

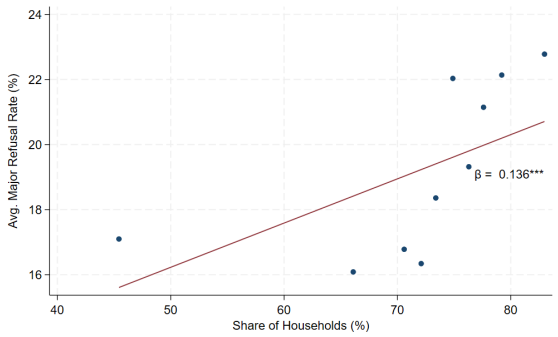


Notes: Map illustrates local authorities in England shaded to illustrate which LAs are included in the sample and which are not. An LA is included in the sample if it appears in the sample at any point in the 2000-2019 period.

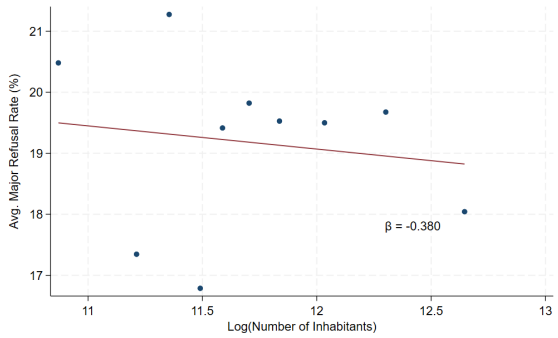
FIGURE B.2
CORRELATIONS BTW. REFUSAL RATES & LA CHARACTERISTICS



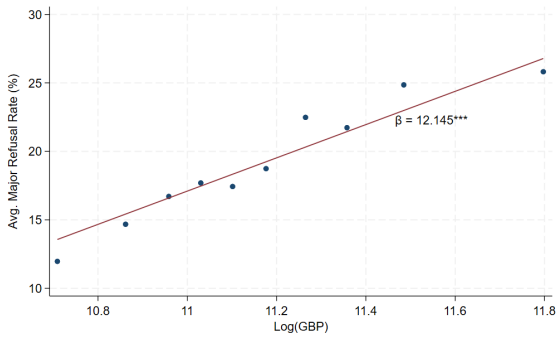
(A) SHARE OF HIGH SOCIAL GRADE



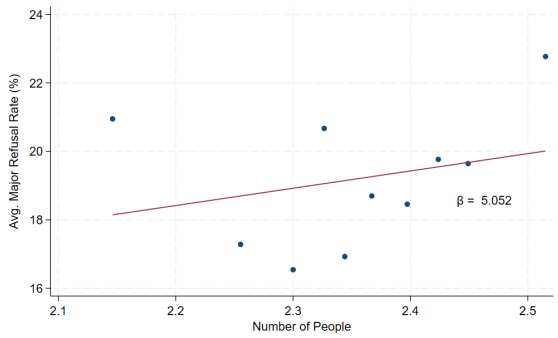
(B) HOME OWNERSHIP RATE



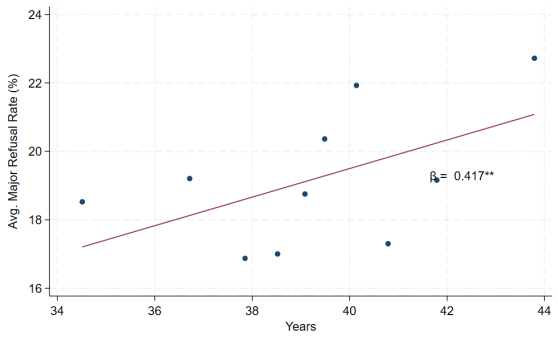
(C) LA POPULATION



(D) HOUSING PRICES (1996)



(E) AVERAGE HOUSEHOLD SIZE



(F) AVERAGE AGE OF POPULATION

Notes: Binned scatter plots of cross-sectional correlation between LA predetermined characteristics and the refusal rate in major applications taken over the 2000-2019 period. Univariate slope estimated over the underlying data indicated in each panel.

TABLE B.1
DIFFERENTIAL SEASONALITY TESTS FOR NON-ELECTION YEARS

	(1)	(2)	(3)	(4)
A. Major Application Refusal Rate				
F Test Statistic	.4	.47	.3	.3
Test p-value	.73	.7	.82	.82
Observations	12189	12189	12189	12174
B. Major Applications Refused				
χ^2 Test Statistic	3.47	.37	.79	.76
Test p-value	.32	.9	.85	.86
Quadratic Trend	Yes	No	No	No
Time Effects	No	Yes	Yes	Yes
Time Effects $\times$ Ln(Pop_{1999})	No	No	Yes	Yes
Pol. Controls	No	No	No	Yes
Observations	12283	12283	12283	12268

Notes: Summary of tests for differential seasonality across groups. These correspond to joint significance tests of coefficients for interactions between calendar group dummies (see Table 2) and a Q2 dummy replacing the sums in estimating equations 2 and 3. Sample restricted to non-election years. All specifications include local authority fixed effects. Column 1 includes an time trend and the time trend squared. Columns 2 through 4 include a set of time dummies. Columns 3 and 4 include interactions between $Log(pop_{1999})$ and time effects for every period. Column 4 includes political controls corresponding to characteristics of the LA government at the beginning of each year (dummies for Labour, Conservative and Liberal Democrat Governments) and a dummy identifying LAs where no party has overall control of the council. Standard errors clustered at the LA level.

TABLE B.2
DECISIONS IN PRE-ELECTION QUARTER FOR HOUSEHOLDER APPLICATIONS

	(1)	(2)	(3)	(4)
A. Householder Application Refusal Rate				
Pre-Election Quarter	0.03**	-0.04	-0.02	-0.03
	(0.02)	(0.03)	(0.03)	(0.03)
Obs.	16278	16278	16278	16259
B. Householder Applications Refused				
Pre-Election Quarter	-0.09***	-0.03	-0.03	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)
Time Trend	Yes	No	No	No
Time Effects	No	Yes	Yes	Yes
Time Effects $\times$ Ln(Pop_{1999})	No	No	Yes	Yes
Pol. Controls	No	No	No	Yes
Obs.	16280	16280	16280	16261

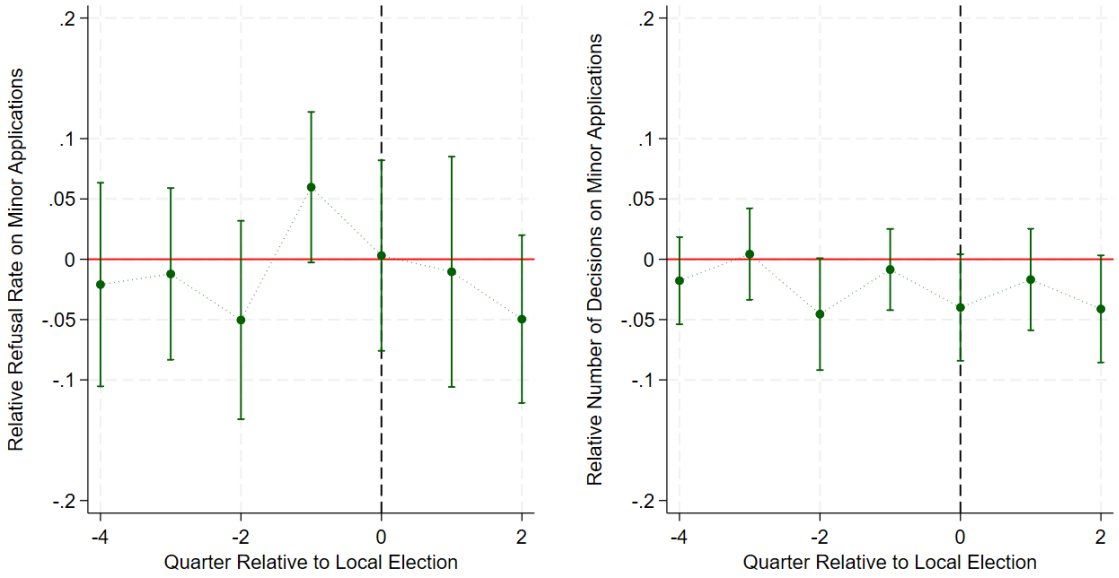
Notes: Dependent variables indicated in the top of each panel. Estimates correspond to the coefficient on the pre-election quarter in all specifications. All specifications include local authority fixed effects. Columns 2 and 3 include a set of time dummies. Columns 3 and 4 include interactions between $Log(pop_{1999})$ and time effects for and political controls corresponding to characteristics of the LA government at the beginning of each year (dummies for Labour, Conservative and Liberal Democrat Governments) and a dummy identifying LAs where no party has overall control of the council. Standard errors clustered at the LA level.

TABLE B.3
ROBUSTNESS: CHANGING SAMPLE END POINTS (MAJOR REFUSAL RATES)

	(1) R.Rate	(2) R.Rate	(3) R.Rate	(4) R.Rate	(5) R.Rate	(6) R.Rate	(7) R.Rate	(8) R.Rate
Pre-Elect.	0.094**	0.097***	0.097***	0.104***	0.108***	0.102**	0.106***	0.106***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Start Year	1999	1999	1999	2000	2000	2001	2001	2001
End Year	2019	2020	2021	2019	2021	2019	2020	2021
Obs.	16132	16868	16868	15405	16141	14681	15417	15417

Notes: Estimates of relative refusal rates in the quarter before an election obtain from estimating equation 2 with $\overline{L} = 0$. Different estimates correspond to samples with different start and end years as indicated in the bottom section of the table. Only whole years included. All specifications have the full set of controls and fixed effects as in column 4 of Table 3. Standard errors clustered at the LA level.

FIGURE B.3
CYCLE IN MINOR APPLICATIONS



(A) REFUSAL RATE ON MINOR APPL. (B) REFUSALS ON MINOR APPL.

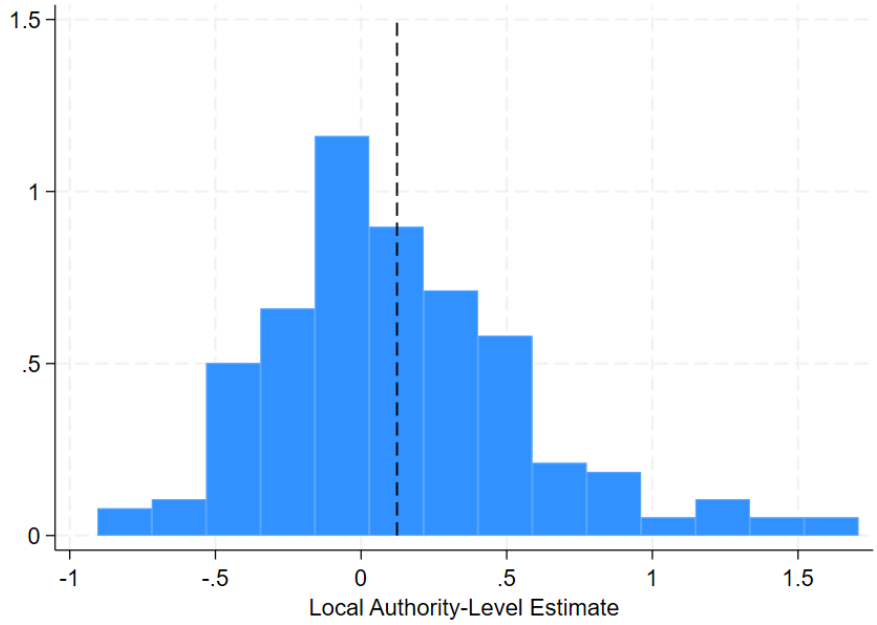
Notes: Round markets correspond to estimates of coefficients in the distributed lag model for different periods around a local election as indicated in the horizontal axis in both panels. Vertical segments correspond to 95% confidence intervals. In panel A, we report estimates of a specification where the dependent variable is the standardized refusal rate of minor applications. In panel B, we report estimates of a specification where the dependent variable is the number of householder applications processed by the local government.

TABLE B.4
ROBUSTNESS: CHANGING SAMPLE END POINTS (NUMBER OF REFUSALS)

	(1) R.Num	(2) R.Num	(3) R.Num	(4) R.Num	(5) R.Num	(6) R.Num	(7) R.Num	(8) R.Num
Pre-Elect.	0.080*	0.097**	0.098**	0.091**	0.110***	0.092**	0.110***	0.112***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
First Year	1999	1999	1999	2000	2000	2001	2001	2001
Last Year	2019	2020	2021	2019	2021	2019	2020	2021
Obs.	15510	16270	17014	14766	16270	14024	14784	15528

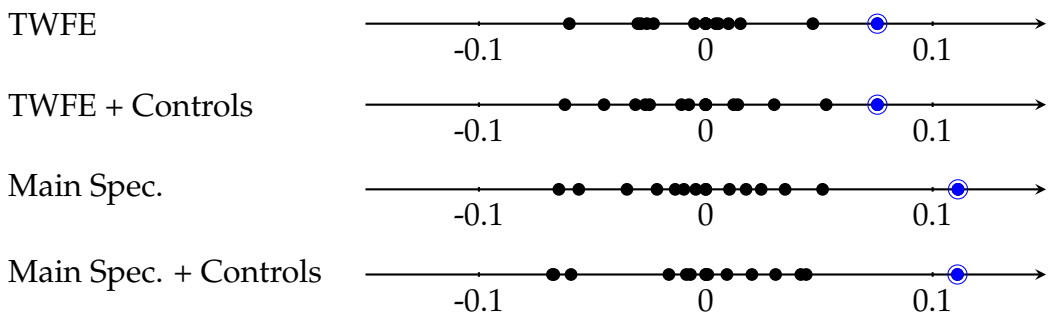
Notes: Estimates of differences in refusals in the quarter before an election obtained from estimating equation 3 with $\overline{L} = 0$. Different estimates correspond to samples with different start and end years as indicated in the bottom section of the table. Only whole years included. All specifications have the full set of controls and fixed effects as in column 4 of Table 3. Standard errors clustered at the LA level.

FIGURE B.4
HISTOGRAM OF LA CYCLE ESTIMATES



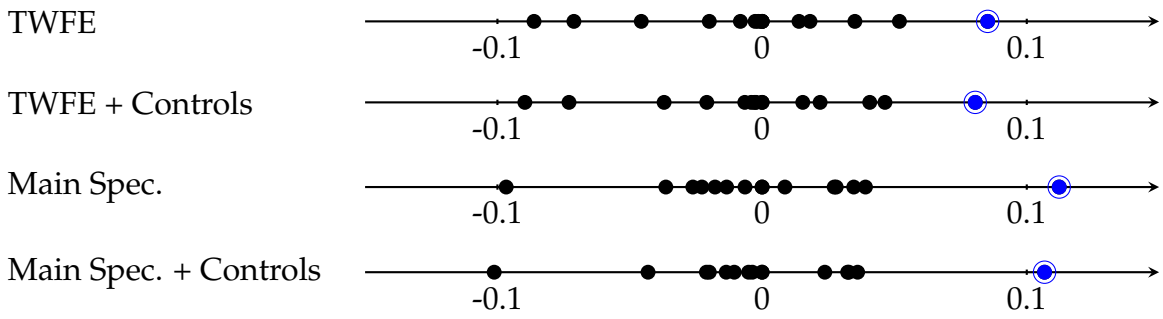
Notes: Histogram of individual local-authority level estimates of planning cycles obtained using the full specification (see column 4 of Table 3). Dashed line corresponds to the average estimate of 0.11.

FIGURE B.5
REFUSAL RATE CYCLE – ITERATIVE APPROACH: POINT ESTIMATES



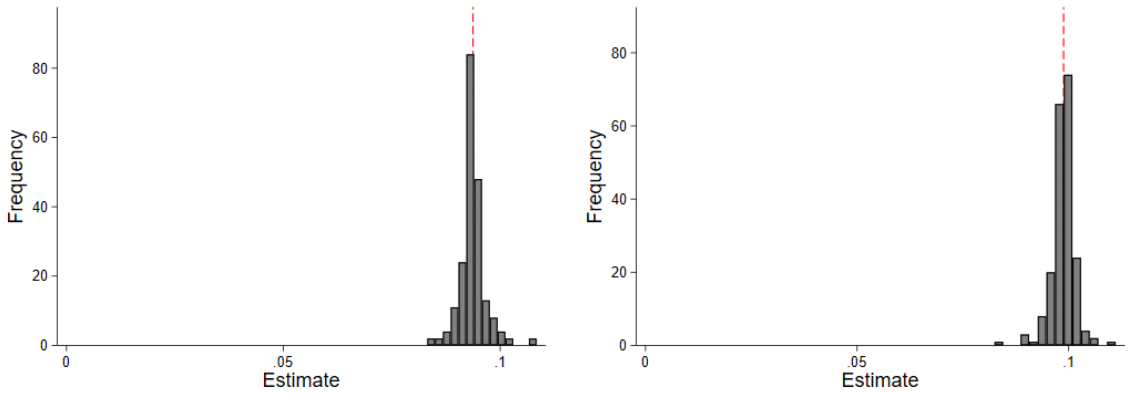
Note: Point estimates of the coefficient on election dummy E_{it-j} in a regression of refusal rates on this dummy and different sets of fixed effects and controls as indicated in each row. Highlighted coefficient corresponds to that with $j = -1$.

FIGURE B.6
REFUSALS CYCLE – ITERATIVE APPROACH: POINT ESTIMATES



Note: Point estimates of the coefficient on election dummy E_{it-j} in a regression of the number of refusals on this dummy and different sets of fixed effects and controls as indicated in each row. Highlighted coefficient corresponds to that with $j = -1$.

FIGURE B.7
POLITICAL PLANNING CYCLE ROBUSTNESS: REMOVING LAS



(A) NUMBER OF MAJOR REFUSALS (B) REFUSAL RATE ON MAJOR APPL.

Notes: Both panels represent histograms of the main estimates of interest (ϕ_{t+1} in equation 2) obtained after removing one LA from the sample. Panel A corresponds to estimates for the normalized number of refusals and panel B corresponds to estimates for the normalized refusal rate. In all cases, estimates are obtained using the specification including cross sectional and time-effects as well as controls (see column 4 of Table 3). Vertical dashed lines correspond to full sample estimates.

TABLE B.5
R2 HETEROGENEITY

Predictor 1 (OLS β)	Predictor 2 (OLS β)	Out-of-Sample R^2
Age>50× SEG (.2)		.056
Age>50× SEG (.3)	Inc× Own (-.13)	.055
Age>50× SEG (.27)	Age>50× Inc (-.1)	.051
SEG× Own (.18)		.051
Avg.Age× SEG (.17)		.05

Notes: Basic standardized variables used to create the predictors for LA estimates of planning cycles are average disposable income (Inc), the share of home-owners (Own), the share of population of high social grade (SES), average household size (HSize), average age (AvAge), and the share of population over 50 years of age (Age>50).