Proportionality and Turnout: Evidence from French Municipalities

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Many studies find that voter turnout is higher in PR elections than in plurality elections, but because the two systems differ in multiple ways and are used in different contexts it is difficult to know precisely why. I focus on municipal elections in France, where cities above a certain population threshold are required to use PR while those below use plurality; this setting allows me to compare political outcomes across electoral systems while holding fixed a large set of social and political features. I find that PR noticeably increases turnout compared to plurality. I provide evidence suggesting that it does so in part by encouraging turnout in lopsided races and in part by inducing entry of new candidates. The findings highlight the importance of electoral proportionality in explaining cross-national differences in voter turnout.

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I. Introduction: voter turnout and electoral systems

What explains voter turnout? Few questions have attracted more attention, both theoretical and empirical, in political science. Early efforts to explain turnout from a rational choice perspective (Downs 1957, Riker & Ordeshook 1968) treated voters as strategic actors who vote in order to influence election outcomes. More recently, attention has shifted to political parties as the locus of strategic activity: citizens' voting decisions may be driven largely by social norms such as a sense of duty, but strategic elites decide whether to activate those norms based in part on the probability that their mobilization efforts will tip the outcome (Aldrich 1993, Cox et al. 1999). Both approaches imply that turnout should be higher when the marginal voter has a higher probability of casting the pivotal vote, a prediction that has largely been borne out in studies showing higher turnout in smaller electorates and in closer elections.[1]

The idea that turnout depends on pivotality has also been used to explain the consistent finding that turnout is higher in systems using proportional representation (PR) than in systems using plurality or majoritarian formulas.[2] Intuitively, the idea is that voters in a plurality election only stand a chance of affecting the outcome when the race is very close between the top two candidates, whereas voters in a multi-member PR district can affect which party wins a seat in a variety of possible competitive scenarios.[3] Depending on competitiveness, then, the *ex ante* probability of being pivotal may (all else equal) be higher on average under PR, which would tend to boost the incentives for citizens to vote and for parties to mobilize voters.

Although the higher probability of being pivotal under a more proportional electoral formula may well account for higher turnout in PR, prior empirical studies leave considerable doubt that proportionality is in fact an important part of the explanation. The

[1] See Blais (2006) and Geys (2006) for references.

[2] For reviews of the evidence linking higher turnout to PR, see Blais (2006) and Geys (2006). Higher turnout in PR is attributed to pivotality most clearly in Cox et al. (1999).

[3] For example, given two parties x and y in competition in a single-member plurality contest (SMP), a voter can only cast a decisive vote if party x's vote share is 1/2; with the same two parties competing under the Sainte-Laguë electoral formula and four seats at stake, a voter can be pivotal if party x's vote share is 1/8, 3/8, 5/8, or 7/8.

fundamental problem is that proportionality is typically just one of many factors that differ between PR and plurality systems. PR elections typically involve voters choosing among party lists that compete in geographically large districts (sometimes as large as the entire country) within systems with multiple parties and frequent coalition governments; plurality elections, by contrast, typically involve voters choosing among individual candidates who compete in relatively small districts within systems with few parties and less frequent coalition governments. With the two types of elections occurring in settings that differ in these and other ways (including e.g. citizens' attitudes toward the fairness of the electoral system (Banducci et al. 1999)), it is difficult to know which specific factors explain differences in turnout. This concern is echoed in Blais (2006), who summarizes the literature on electoral systems and turnout by saying that "Most of the literature supports the view that PR fosters turnout, but there is no compelling explanation of how and why."

More troubling still, there is reason to question the usual causal interpretation of the positive correlation between the use of PR and voter turnout. It is widely appreciated that electoral systems are chosen strategically (Rokkan 1970, Boix 1999, Colomer 2005) and it is reasonable to think that voter turnout may be related to the factors (strategic and otherwise) that affect a given political system's electoral rules. This suggests that PR and plurality systems may differ not just in ways that are either *integral to* the electoral system (e.g. party lists vs. individual candidates, large vs. small districts) or *effects of* the electoral system (e.g. many vs. few parties, frequent vs. infrequent coalition governments, perceptions of fairness) but also in features that are fundamental *causes of* the electoral system (e.g. the nature of social cleavages, the type of party system, the prevalence of norms of inclusion). The fact that it is difficult if not impossible to adequately control for these factors, and that they all could affect turnout, casts doubt on our ability to infer from observational data what would happen to turnout if a given system were to change from plurality to PR, let alone which aspect of the electoral system accounts for any effects we find.[4]

[4]Other recent empirical papers on the effects of electoral systems expressing similar concerns include Blais et al. (2011) and Barone & De Blasio (2013).

In this paper I examine a setting in which I can address many of these problems and thus provide unusually clear answers about how and why PR increases turnout. French electoral law prescribes a PR electoral system for municipal council elections in municipalities of at least 3,500 inhabitants and a plurality system for smaller municipalities. I use a regression discontinuity design to compare turnout in municipalities near this threshold as a way of measuring the effect of the electoral formula while holding other important factors constant. This research design has two clear advantages compared to the usual observational study of turnout and electoral systems. First, because the electoral system employed in each municipality is imposed based on an arbitrary population cutoff, I can credibly estimate the effect of the electoral system on turnout (for cities near the population threshold at least) without worrying about unobserved factors that may have led one city to adopt PR while another did not. Second, the plurality and PR systems used in these cities are similar to each other in ways in which plurality and PR systems often differ (notably the arrangement of districts and the prevalence of coalition government), which allows me to focus on a smaller set of possible channels through which the electoral formula could affect turnout.

What I find in French municipal elections is that PR increases turnout compared to plurality by about one percentage point (from about 69% to 70%). This effect is small in comparison to cross-national turnout differences but substantial given how many factors are held constant. Consistent with theoretical predictions, the effect is concentrated in less competitive settings (where the more proportional formula does most to increase the chances that a voter will affect the outcome). I also find that PR reduces the variance of turnout across municipalities, again consistent with predictions. I show that the PR system seems to increase the number of lists in competition, as suggested by Duverger's psychological effect. Although the unusual setting I examine allows me to sidestep many of the typical problems of cross-sectional turnout studies, there is the important shortcoming that other municipal policies change at the same threshold. I provide evidence suggestion that these other policy changes are not responsible for the effects I see: the heterogeneity

in treatment effects across municipalities is less consistent with the idea that these other policies play a role, and similar effects are not seen at other population thresholds where some of these same policies change. Although no test can completely rule out the possibility that one or more of these other policy changes accounts for the jump in turnout I see, these tests cast doubt on such alternative explanations.

The findings of this study are clearly of most direct relevance to French local elections. Over the past two decades there have been periodic proposals to apply the PR system to smaller municipalities,[5] and in May of 2013 a reform was finally passed changing the relevant threshold from 3,500 to 1,000.[6] My analysis suggests that, in addition to the other benefits usually attributed to PR in debates over these proposals, applying the PR system to smaller cities will promote both participation and competition in local elections. More broadly, the findings provide strong evidence that greater proportionality increases turnout even in the absence of changes to the arrangement of districts and the format of the ballot. I return in the conclusion to assessing how relevant these findings are for researchers who are primarily interested in explaining cross-country variation in political participation.

II. French municipal electoral systems and implications for turnout

The *commune*, or municipality, is the lowest level of French government. Municipalities in France maintain roads and schools, manage local development, and administer cultural programs and some social welfare functions (Loughlin 2007, pp. 90-91). They are responsible for almost a quarter of all public expenditure, amounting to about 6% of GDP (Loughlin 2007, pp. 184-185). Each municipality is governed by a municipal council, ranging in size from 9 in the smallest municipalities to 163 in Paris; the council is in turn led by a mayor, who is a member of the council and ordinarily the leader of the party or list that

[5]Since the late-1990s, at least four proposals have surfaced to apply the list-PR system to smaller cities, with proposed thresholds including 2,500, 2,000, 1,500, and 500. See debates in the Senate on 1 March 2000 for proposals to reduce the threshold to either 2000 or 2,500; a proposal "tendant à abaisser le seuil d'application du scrutin proportionnel de liste aux communes de plus de 1 500 habitants" registered in the Senate on 31 July 2012; and a proposal "relative au passage au scrutin proportionnel de liste pour les communes de 500 habitants et plus" registered on 10 October 2012 in the National Assembly.

[6]See law 2013-403, 17 May 2013, and decree 2013-938, 18 October 2013.

won the previous election. Municipal elections are held approximately once every six years simultaneously in each of the more than 36,000 municipalities of France.[7]

Since 1946, French electoral law has specified a different system of elections for large and small cities, with the population threshold that separates the two groups of cities varying over time. The current electoral law, enacted in 1982, prescribes a single-district, multi-member plurality system for municipalities with fewer than 3,500 inhabitants and a form of proportional representation for those with 3,500 or more inhabitants. In particular, in the larger cities the council is elected using a list-PR system with a 50% winner's bonus: the list with the most votes is awarded half of the seats on the council, and the remaining seats are distributed proportionally among all of the lists including the winning list.[8] In the smaller cities, candidates appear on lists with as many members as there are seats on the council and voters can vote for a whole list, a subset of the candidates from one list, or candidates from more than one list;[9] seats are awarded to the top individual vote-getters. In both systems the election can take up to two rounds.[10] From the standpoint of the electoral rules, then, what differs between cities above and below the 3,500 population threshold is whether voters are permitted to express candidate-level preferences (yes in smaller cities, no in larger cities) and whether seats are allocated to candidates using a *plurality* formula (as is the case in smaller cities) or a *proportional* formula (as is the case in larger cities).

Figure 1 depicts the typical relationship between vote shares (horizontal axis) and seat shares (vertical axis) for cities just above and below the 3,500 population threshold that divides plurality and PR cities. (In the figure I assume two lists are competing, which is the modal case.) In both sets of cities around 25 seats are at stake. In the PR system

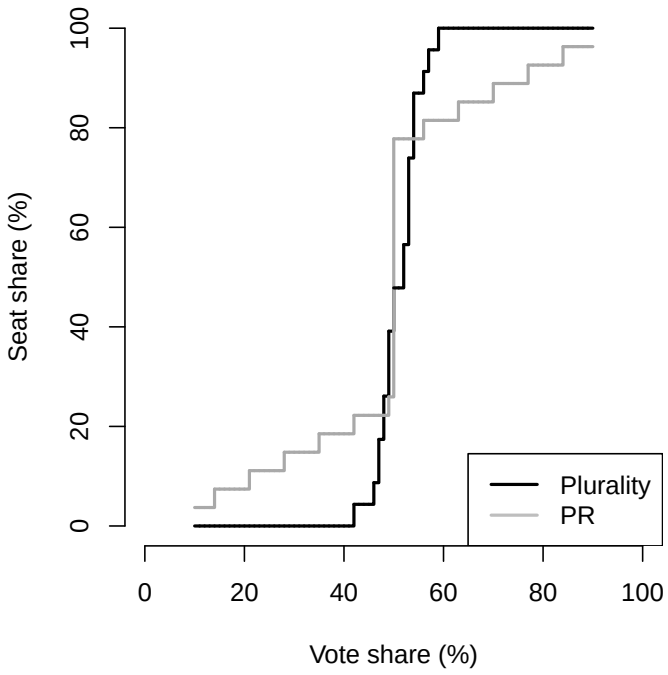
[7]The 2008 election was held seven years after the 2001 elections in order to avoid coinciding with the 2007 presidential elections. In both 2001 and 2008 the municipal elections coincided with cantonal elections.

[8]For example, given a 27-seat council and a narrow margin of victory of one list over a single other list, the winning list should win 21 seats – a winner's bonus of 14 plus 7 of the remaining 13 seats. The proportional seats are distributed according to a quota system equivalent to the d'Hondt method.

[9]Given council size m, each voter can vote for only m candidates.

[10]In the PR system, the election ends in the first round if one list wins more than 50% of the vote, and otherwise parties receiving less than 10% of the vote are disqualified and others continue to the second round; in the plurality system, any candidate winning the support of more than 50% of voters in the first round is elected to the council, and if seats remain to be filled a second round is held in which the seats are awarded to the top finishers.

Figure 1: Proportionality in French municipal electoral systems



NOTE: The black line plots the votes-seats relationship in the plurality system given the typical dispersion of vote totals within lists; the gray line plots the votes-seat relationship based on the PR electoral formula employed. I assume two lists and a city population near 3,500.

(gray line), a party can win a seat with just over 10% of the vote; as a party's vote share increases from there, its seat share rises at regular intervals before jumping at 50%, where it receives the winner's bonus. In the plurality system (black line), it is very unusual for a party to win any seats with less than 40% of the overall vote; if one list wins at least 60% of the vote, it typically wins all of the seats.

As noted in the introduction, the proportionality of an electoral system can be linked to turnout through both a direct and indirect channel. By "direct channel" I refer to the fact that the proportionality of the electoral system shapes beliefs about how likely a voter is to cast a decisive vote. As highlighted by Figure 1, different electoral formulas imply different hypothetical vote shares at which a voter could cast a decisive vote. Under the plurality system used in the smaller cities, for example, in a two-party contest a voter could plausibly only cast a decisive vote if party x wins between 40% and 60% of the vote; under the PR

system, by contrast, the hypothetical vote shares at which a voter could cast a decisive vote are spread more evenly from under 20% to over 80%. Whether the *ex ante* probability of casting a decisive vote is higher under the plurality system or the PR system depends on expectations about likely electoral outcomes: the probability may be higher under plurality if the election is likely to be close, whereas it might be higher under PR if one party is likely to win easily. This implies two predictions about the effect of proportionality on turnout. First, if PR boosts turnout relative to plurality, the effect should be concentrated in less competitive municipalities, because these are the ones in which the PR electoral rule most increases the probability of casting a pivotal vote. Second, whether or not PR boosts turnout on average, it should reduce the *variance* of turnout across municipalities, because the *ex ante* probability of casting a decisive vote depends less on the competitive context in PR than in plurality elections.[11]

Some of the effect of proportionality on turnout may operate through indirect channels: a more proportional system may lead more lists to enter the election, which could in turn affect turnout by increasing aggregate mobilization efforts and by providing voters with a more compelling set of options. The idea that proportional representation favors the entry of more parties (compared to plurality systems) has a long history; it is notably a component of the "psychological effect" described by Duverger (1954).[12] Given that lists can win seats with far less support under the PR system (as indicated by Figure 1), we should expect more lists to enter in cities just above the 3,500 population threshold. We might also expect the leaders and members of non-dominant lists to be of higher "quality" in the PR system, given that the top members of a modestly successful list can only expect to win seats under the PR system. Thus we have a third prediction: the PR system should lead to more lists in competition.

[11]The relationship between the electoral rule and the variance of turnout is discussed in Cox et al. (1999) but has scarcely been tested since. Note that my argument here depends on voters (and candidates) caring about how many seats each list wins, and not just which list wins the majority of the seats. If we restrict attention to the pivotal event in which the voter determines which party wins the majority of seats, then the electoral rule should not affect voters' probability of being pivotal.

[12]For recent empirical papers producing within-country evidence of the effect of the electoral system on the number of parties in competition, see Blais et al. (2011) and Fiva & Folke (2013).

What is unusual about the setting I examine is that while electoral proportionality differs between cities just above and below the 3,500 population threshold, other important features of the electoral environment that typically go along with the electoral formula remain fixed. As noted above, the district magnitude and the arrangement of districts is basically the same in the two sets of cities. The size of the electorate in each district is obviously essentially the same when we focus on cities very close to the population threshold. Given the winner's bonus in the PR system and the essentially winner-take-all nature of the multimember plurality elections, coalition government in both sets of municipalities is basically unknown: the list that wins the plurality of votes always chooses the mayor and deputy mayors in the PR system and essentially always does so under the plurality system as well. The organization of the municipal council and the benefits of holding a council seat are comparable in the two systems.[13] Campaign regulations that would affect the effectiveness of mobilization efforts are also essentially the same in the two sets of municipalities.[14] These similarities between the PR and plurality cities suggest that in comparing them I can rather narrowly measure the effect of electoral proportionality on turnout while holding other important factors fixed; by looking for the effect of the electoral rule on competitive outcomes I can also provide suggestive evidence about some of the channels through which this effect might operate.

It is of course possible to think of other channels through which the electoral system may affect turnout in these cities. For example, voters may find the PR system to be normatively superior from a fairness perspective, or they may prefer to vote in the plurality system where they have the opportunity to vote for individuals; the incentives of candidates to devote effort to mobilization may also be higher or lower in the PR system depending on where they stand on the list and how much they care about their individual vote total.[15] These

[13]Non-executive members of municipal councils are unpaid in both sets of cities.

[14]Limits on the production and distribution of mailings and posters, for example, are the same in cities on both sides of the population threshold. One exception is that the cost of printing posters, mailings, and ballot papers is reimbursable in municipalities above the threshold, but in a city of around 3,500 inhabitants the cost of printing the maximum allowable set of materials is small (conservatively, about 20 euros per list member).

[15]A candidate's efforts to mobilize support under PR *only* benefit the marginal member of her list whereas in the plurality system those efforts boost her own vote total and thus improve her chances of

channels cannot be dismissed in analyzing the effect of the electoral system in this setting. To the extent that electoral proportionality affects turnout through strategic mobilization and entry decisions, however (i.e. the direct and indirect channels introduced above), I may be able to uncover evidence of these effects empirically. As noted above, for a fixed set of lists in competition we expect PR to increase mobilization efforts especially in less competitive contests, which can be tested; to the extent that PR increases turnout through encouraging entry, we should also see an effect of PR on the number of lists, which again can be tested. I now turn to empirical analysis in which I test these predictions.

III. Turnout and the 3,500 population threshold

In order to measure the effect of the electoral system on voter turnout in small French cities, I apply a regression discontinuity design or RDD (Thistlethwaite & Campbell 1960, Hahn et al. 2001, Lee 2008), taking advantage of the fact that the electoral system is determined at a population cutoff.[16] Before presenting results, I describe my implementation of RDD and provide evidence that it will produce credible estimates in this setting.

A. Preliminaries

My approach to regression discontinuity is to use local linear regression and to emphasize the robustness of results to various modeling choices. In order to estimate the discontinuity at the 3,500 threshold, I define a sample of cities close to the threshold and regress the dependent variable on the log of population within that sample[17] (recentered at the population threshold) interacted with an indicator for whether the city is above the threshold (Imbens & Lemieux 2008). In some specifications I include as covariates the municipality's turnout in a previous presidential election (1995 or 2002) as well as a set of socioeconomic factors (proportion retired, proportion unemployed, proportion possessing a baccalaureate

winning a seat, as well as her status among those who pay attention to the voting results.

[16]For other examples of the use of population thresholds in regression discontinuity designs, see Egger & Koethenbuerger (2010), Pettersson-Lidbom (2012), Fujiwara (2011), Gagliarducci & Nannicini (2013), Brollo et al. (forthcoming).

[17]My analysis indicates that the turnout rate decreases roughly linearly in log population. Geys (2006) recommends using log population for turnout studies and provides examples.

degree, proportion employed in agriculture, population in the previous census), the area of the municipality, and the region; given that cities just above or below the 3,500 threshold should be similar on average in these and other dimensions, the purpose of including covariates is primarily to increase precision rather than to control for confounding factors.

One key choice parameter is the window within which one conducts the local linear regression. In principle the RDD should depend exclusively on cities very close to the threshold, such that whether a given city holds its elections under PR or plurality might be decided by arbitrary factors such as whether a family moves into a newly-built house before or after the census is taken. In practice, carrying out a regression using a wider window may improve estimates of the conditional expectation at the threshold. One widely-used method for choosing a window within which to carry out analysis is a cross-validation procedure described by Imbens & Lemieux (2008) that searches for a window that minimizes mean squared error in the vicinity of the threshold; another algorithm suggested by Imbens & Kalyanaraman (2012) approximates the optimal bandwidth by estimating the curvature of the conditional expectation in the neighborhood of the threshold.[18] Using either procedure I obtain surprisingly wide optimal windows, the majority of which are above 50% of population (i.e. a window of 1,750 to 5,250 for a threshold of 3,500).[19] The reason why the optimal bandwidths are so large appears to be that most of the outcomes I examine are quite linear in log population, such that the bias resulting from using a larger bandwidth is minimal. As explained below, I present the results in a variety of ways in order to show how my findings depend on the bandwidth and procedure chosen.

The validity of the RDD could be called into question if mayors of cities near the population threshold can manipulate their official population numbers (for example by allowing or disallowing housing permits) and thus effectively choose their electoral system; if that were the case, then cities on either side of the threshold may differ not just in their

[18]The Imbens & Kalyanaraman (2012) algorithm also uses a triangular kernel instead of a rectangular kernel.

[19]Although my running variable is log population, for clarity of communication I define bandwidths in terms of a percentage of the population threshold (e.g. 50% above and below 3,500). The substantive results are the same if I determine bandwidths based on log population. See for example Table 8, which is based on that approach.

electoral system but also in other (possibly unobservable) features such as their preferences for one system or another. One standard way of checking the validity of the RDD, due to McCrary (2008), involves testing for a jump in the density of the forcing variable at the threshold; in this case, McCrary (2008)'s test fails to reject the null (p = .127). Another standard validity check is to carry out RDD analysis in which pre-treatment covariates serve as outcome variables. Table 6 in the appendix reports RD effect estimates at varying population windows (25%, 50%, and 75%), showing that there is (as one would expect) no "effect" of crossing the 3,500 population threshold on the vast majority of placebo outcomes. These tests suggest that cities just above and below the population threshold are indeed comparable in not just observed but also unobservable features (e.g. local political culture). For robustness, in the analysis that follows I show results both with and without covariates.

B. Results: turnout overall

The top three rows of Table 1 report RDD estimates of the effect of crossing the 3,500 population threshold on turnout in the 2001 and 2008 municipal elections.[20] In each case we report the estimated coefficient $\hat{\tau}$ from a regression like

$$\text{Turnout}_i = \beta_0 + \tau \mathbb{1}\{\text{Pop}_i \geq 3500\} + \beta_1 \ln(\text{Pop})_i + \beta_2 \mathbb{1}\{\text{Pop}_i \geq 3500\} \times \ln(\text{Pop})_i + \epsilon_i;$$

in columns 4, 5, and 6 we add municipal covariates[21] and in row 3 we pool the results for 2001 and 2008. Standard errors are robust in all cases and clustered in the pooled regressions. Within columns 1-3 and 4-6, each column reports estimation for a different bandwidth of population. The results indicate an effect of crossing the threshold on turnout that ranges between about 1 percentage point and 1.5 percentage points. The effect is generally statistically significant when the threshold is 50% or higher; in the pooled sample including covariates the effect significant at the .1 level.

To give a sense of how the estimated effect depends on modeling assumptions, Panel

[20] Municipal election data for small municipalities was not systematically collected by the Ministry of the Interior before the 2001 elections.

[21] The covariates included are percent retired (1999), percent working in agriculture (1999), percent with a baccalaureate degree (1999), percent unemployed (2001), the log of population in the 1990 census, area in square kilometers, region dummies, and turnout in the previous presidential election (1995 or 2002).

Table 1: Effect of crossing 3,500 population threshold on turnout in municipal and higher-level elections

Outcome	**Mean turnout**	**Effect estimates**					
		(1)	(2)	(3)	(4)	(5)	(6)
Municipal, 2001	70.73	0.989	1.537**	1.525***	1.075†	1.685***	1.525***
		(0.778)	(0.538)	(0.433)	(0.598)	(0.413)	(0.33)
Municipal, 2008	69.14	0.763	0.929†	1.476***	0.71	1.128**	1.504***
		(0.765)	(0.523)	(0.423)	(0.582)	(0.414)	(0.338)
Municipal, 2001 & 2008	69.96	0.878	1.242**	1.502***	0.946†	1.346***	1.518***
		(0.71)	(0.481)	(0.385)	(0.528)	(0.359)	(0.285)
Presidential, 2002	74.95	-0.04	-0.189	-0.038	0.11	-0.121	0.012
		(0.413)	(0.29)	(0.241)	(0.265)	(0.184)	(0.153)
Regional, 2004	63.38	-0.448	-0.7†	-0.241	-0.384	-0.401	-0.177
		(0.583)	(0.414)	(0.341)	(0.398)	(0.288)	(0.239)
Presidential, 2007	86.33	-0.248	-0.439†	-0.253	-0.099	-0.13	-0.095
		(0.326)	(0.224)	(0.185)	(0.18)	(0.124)	(0.103)
Window:	25%	25%	50%	75%	25%	50%	75%
Covariates?					✓	✓	✓

NOTE: RD estimates are shown for the effect of crossing the 3,500 population threshold on turnout in two municipal election-years (2001 and 2008, separately and pooled) and three higher-level elections. Robust standard errors are shown in parentheses; for the pooled regression standard errors are clustered at the municipality level. Sample sizes depend on bandwidth: about 1400 at 25%; 3200 at 50%; and 7500 at 75% (double those for the pooled regressions). Guide to significance codes: *** indicates $p < .001$; ** indicates $.001 < p < .01$; * indicates $.01 < p < .05$; and † indicates $.05 < p < .1$.

A of Figure 2 depicts the non-parametric relationship between population and turnout around the 3,500 population threshold (left plot) and the estimated jump as a function of bandwidth (right plot) for the 2008 municipal elections. The left plot shows the local linear regression line using a 50% bandwidth; in the right plots, a vertical gray line identifies the bandwidth chosen by cross-validation. The left plot indicates that the conditional expectation seems to be shifted slightly upward at 3,500; the right-hand plots show that the point estimate does not depend much on the bandwidth chosen. (See Table 7 in the appendix for the RD estimates at the optimal bandwidths for this and all other analysis in the paper; see Table 8 for estimates using the algorithm proposed by Imbens & Kalyanaraman (2012).[22]) For comparison, in Panel B I show the same analysis for the 2001 elections, showing results that are similar and if anything stronger than the results for 2008.

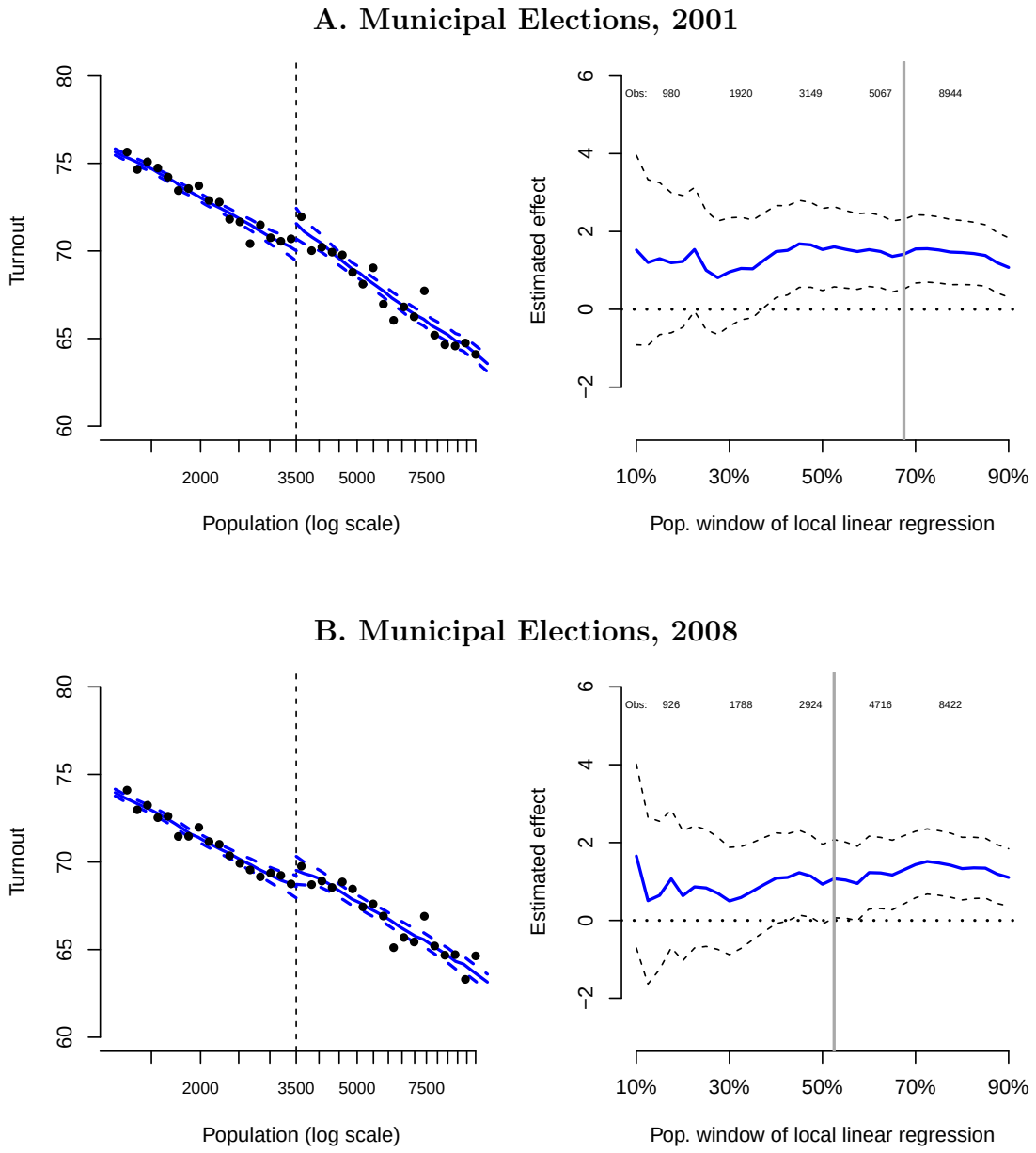
C. Results: turnout in higher-level elections

The bottom three rows of Table 1 look at the average effect of crossing the 3,500 threshold on turnout in higher-level elections between 2002 and 2007 using the same procedures used to estimate the effect on municipal election turnout. Because the only electoral rule that changes at the 3,500 population threshold is the municipal electoral rule, we would not expect turnout to increase in higher-level elections at this threshold. This is in fact what we find. In the presidential elections of 2002 and 2007 and the regional elections of 2004, we do not see higher turnout in cities just above the 3,500 population threshold; when covariates are included none of the effects is significant.

The absence of a positive effect on turnout in higher-level elections is particularly noteworthy in light of Ladner & Milner (1999), whose main finding is that turnout in municipal elections is higher in Swiss municipalities that adopt PR than in those that use plurality methods. Remarkably, Ladner & Milner (1999) also find that PR cities have higher turnout in higher-level elections (even though all cities use the same system for these higher-level elections), which they interpret as evidence that PR is adopted in municipalities that are

[22]In both cases, the bandwidths indicated by the algorithm are often very large. In the cross-validation analysis I set a maximum bandwidth of 90% of population (350-6,650) and in the optimal bandwidth algorithm I set a maximum of 1.25 of log population (1,003-12,216).

Figure 2: The effect of crossing the 3,500 population threshold on 2001 & 2008 municipal turnout



NOTE: The left plot in each panel shows turnout (y-axis) and population (x-axis, log scale) in municipal elections. Each black dot reports the mean turnout within a population bin; the blue line is the local regression line using a population window of 50%. The right plot shows the RD estimate as a function of the bandwidth chosen; numbers along the top indicate the sample size at each bandwidth and the vertical line indicates the bandwidth chosen by Imbens & Lemieux (2008)'s cross-validation procedure (in a range of 10% to 90%). In all plots, dotted lines indicate robust point-wise .95 confidence intervals.

"culturally predisposed toward higher political participation" (pg. 248).[23] The absence of a higher-level "effect" of the electoral system in the French context highlights the uniqueness of this setting: because French cities did not choose their electoral system, we can be confident that the turnout differences we see in municipal elections are the result of the municipal electoral system rather than other underlying differences between cities.

D. Results: turnout and competitiveness

As discussed in the previous section, the votes-to-seats relationship under the two electoral systems used in French municipalities suggests that PR should especially increase turnout in less closely-contested elections. To test that prediction, I divide municipalities into terciles based on predicted competitiveness[24] and separately estimate the effect of crossing the 3,500 threshold on turnout for these different groups. Figure 3 depicts the change in turnout in 2008 separately for the most competitive (panel A, top) and least competitive (panel B, bottom) terciles of municipalities, using the presentation method of Figure 2. (The analysis is restricted to 2008 because candidate-level vote totals in the 2001 election were not collected by the Ministry of the Interior.) These plots indeed suggest that the turnout jump is concentrated in less competitive municipalities: there is a clear level shift in turnout at 3,500 in less competitive municipalities (bottom left) but not in the more competitive municipalities (top left). The bandwidth sensitivity plot at the top right of Figure 3 indicates that the effect of crossing the 3,500 threshold in competitive cities is about zero for most bandwidths and does not approach significance at any bandwidth; the bottom right plot indicates that in the least competitive cities the estimated effect is at or above 1 percentage point for all bandwidths, with an effect that is at least borderline

[23] As the authors suggest, it could also be that the habit of participating in municipality elections spills over into higher-level elections.

[24] In particular, I compute the average vote share of winning candidates in cities below the 3,500 threshold in 2008 and regress that on socioeconomic indicators plus voting results in the 2007 presidential election. The predicted values from this model are then used to generate a competitiveness measure for cities on both sides of the 3,500 population threshold. This approach yields a noisier measure of competitiveness than using actual voting outcomes from 2008, but it avoids the possibility of post-treatment bias; the results are substantively the same, however, when I define competitiveness based on actual rather than predicted support for the winning list/candidates.

statistically significant (even without covariates) for all bandwidths above 40%.

In separate analysis I carry out a regression in which I interact tercile indicators with the treatment. When including covariates I find a significant difference (at the .1 level) between the effect estimated for the least competitive tercile and the most competitive tercile; the estimated effect for competitive municipalities is basically zero. These analyses are consistent with the theoretical predictions that proportionality should increase turnout in this setting by increasing the probability of casting a pivotal vote in contests in which one list is very likely to win.

E. Results: Variance in turnout across municipalities

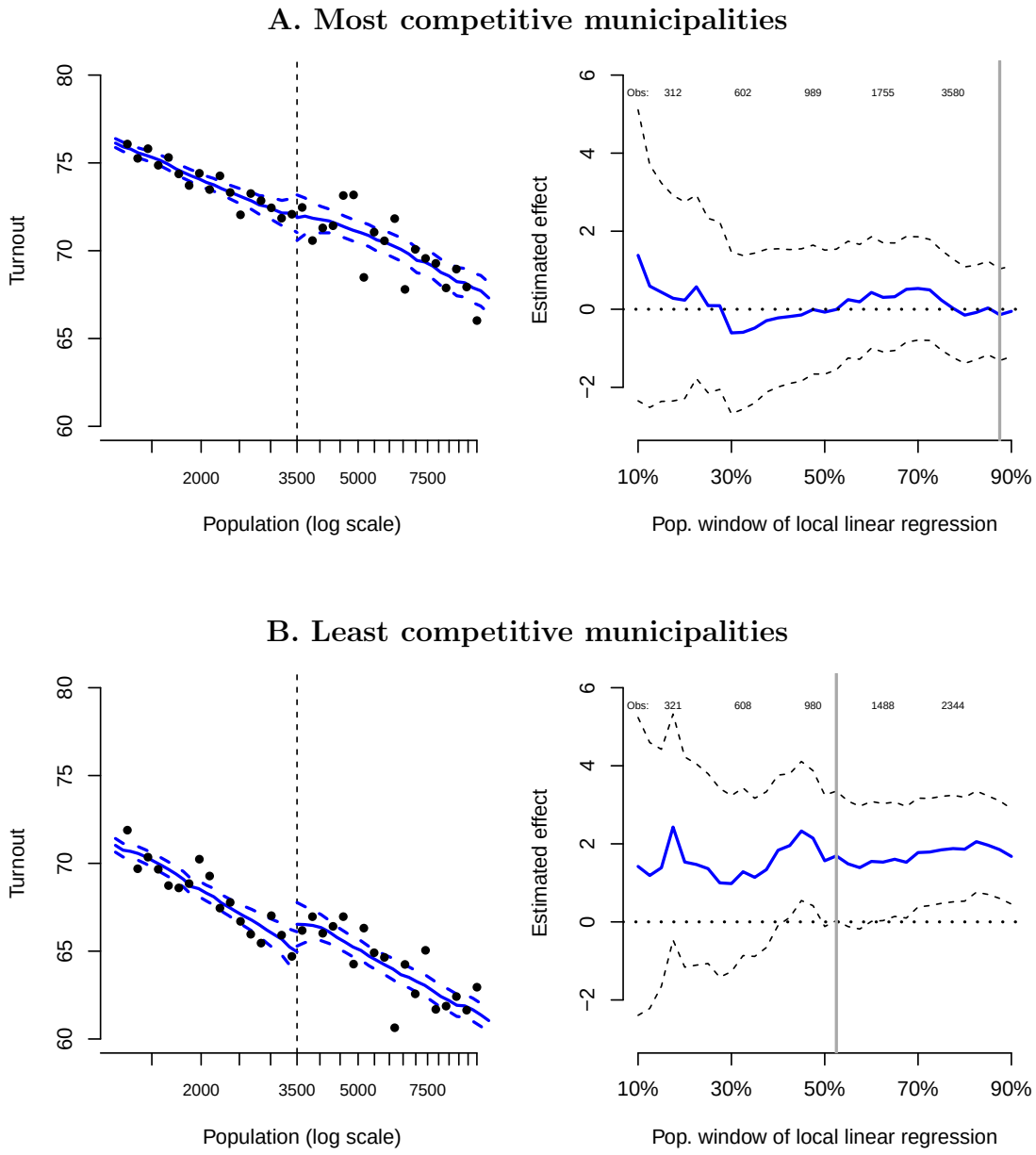
As noted by Cox et al. (1999), studies of the variance of electoral outcomes are far less common than studies of levels.[25] In part this must be due to the fact that political scientists are less accustomed to explaining the variance of outcomes than they are to explaining the mean of outcomes (Braumoeller 2006). My approach is to extend the RD framework to study how moving above the 3,500 population threshold affects the magnitude of residual turnout after accounting for mean shifts. To be more specific, I first use local linear regression to estimate mean turnout as a function of population on either side of the 3,500 population threshold. (I use a population bandwidth of 50%, i.e. the same procedure that produces the smoothed line in the left panel of e.g. Figure 2.) I then extract the absolute value of the residuals – that is, the size of the difference between average turnout at a given population level and the turnout in a given city. Finally, I apply the standard RD analysis to this vector of residuals.[26]

Figure 4 presents the results for analysis pooling 2001 and 2008. The analysis indicates that, consistent with Cox et al. (1999)'s prediction, PR appears to reduce the variation in turnout. The mean residual is lower in PR cities by between .5 and 1, depending on the

[25] See Cox et al. (1998) and Powell & Vanberg (2000), who examine the variance of turnout and disproportionality (respectively) across districts of different magnitudes.

[26] The substantive results are the same if I use squared residuals or even if I simply calculate the variance of turnout across municipalities within bins of population. For a comparison of different approaches to variance function estimation, see Davidian & Carroll (1987)

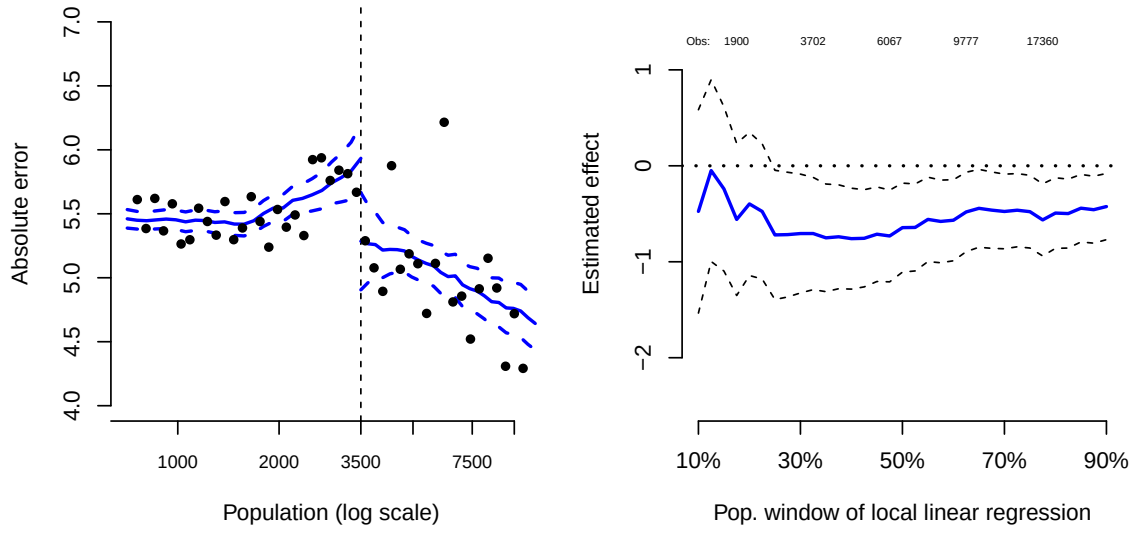
Figure 3: The effect of crossing the 3,500 population threshold on 2008 municipal turnout for most and least competitive municipalities



NOTE: See note to Figure 2 on presentation. The construction of the competitiveness terciles is described in footnote 24.

bandwidth used in the regression; this constitutes a drop of between 10% and 20% in the average magnitude of the residuals. This drop in variance (like the jump in average turnout I documented above) may be linked to proportionality through both direct and indirect channels. That is, it may be that the greater proportionality of the PR system makes incentives to mobilize or vote more consistent across municipalities, or it may be that the greater proportionality of the PR system induces entry which creates a more consistent level of competition across municipalities (which in turn makes turnout more consistent across municipalities).

Figure 4: Effect of crossing 3,500 threshold on mean absolute deviation of turnout in 2001 and 2008



NOTE: See Figure 2. The dependent variable is the absolute value of residual turnout, i.e. the difference between actual turnout and turnout predicted as a function of population in a local linear regression with a 50% bandwidth estimated separately on either side of the 3,500 threshold.

F. RESULTS: NUMBER OF LISTS AND SUPPORT FOR LESSER LISTS

The top row of Table 2 and the top panel of Figure 5 report RDD analysis of the effect of crossing the 3,500 threshold on the number of lists in competition in the 2001 and 2008 elections. (Analysis here is restricted to northwest France, because list-level results for

sub-3,500 cities are not available elsewhere.) The results suggest that the number of lists jumps by about 0.2 on average, from just below 2 to just above 2. As indicated by Figure 5, the point estimate depends on bandwidth but is positive and significant for any bandwidth above about 35%. (As indicated by Table 8, the Imbens-Kalyanaraman estimate is also positive and significant; note however that the cross validation-based algorithm (Table 7) yields a narrow bandwidth and a negative and borderline significant estimate.) The binned averages plot (top left of Figure 5) gives the clear impression of a jump in the number of lists per contest.

The second row of Table 2 and the bottom panel of Figure 5 reports the effect of crossing 3,500 on the share of the vote (in %) won by the top two lists. The binned averages plot (bottom left of Figure 5) suggests a drop at the threshold, and for larger bandwidths we have a statistically significant drop of about 3% on average, from around 98% to around 95%. Both of the bandwidth selection algorithms yield a significant effect of around -3%.[27]

Both findings suggest that the PR system may have increased turnout in part by encouraging the entry of new lists that increase aggregate mobilization effort and appeal to previously unengaged parts of the electorate.[28] It may have also increased turnout by increasing the quality or differentiation of the lists in competition: conditional on two lists competing, for example, we might expect more experienced candidates to run on the less dominant list when the leaders of that list are more likely to win a seat.

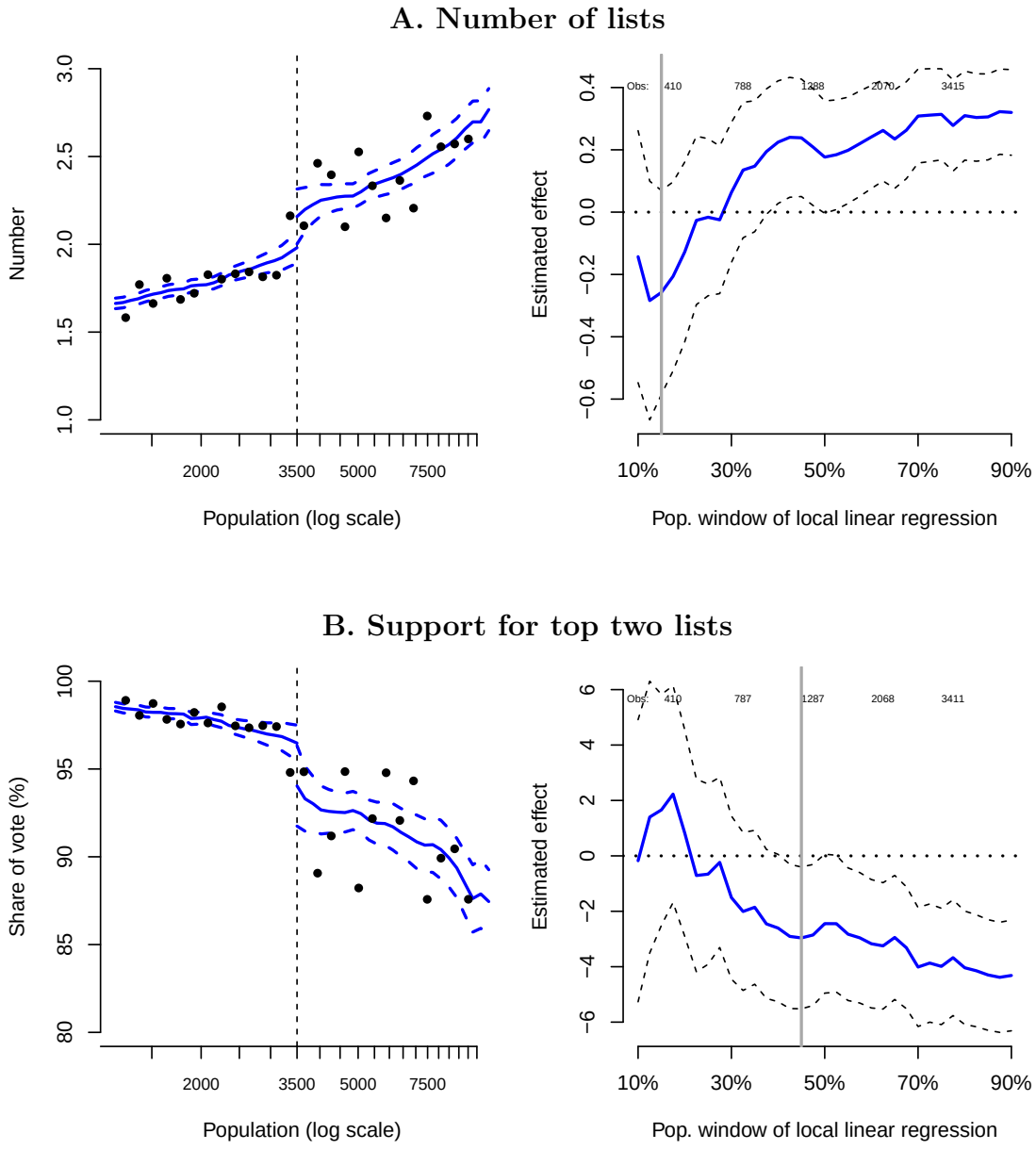
IV. Addressing Multiple Treatments

So far I have provided evidence that average municipal election turnout in cities just above the 3,500 population threshold is slightly higher and less variable than that in cities just below the threshold; I have shown that the effect is only found in less competitive munici-

[27]As suggested by an anonymous reviewer, the reduction in average support for the top two lists might result from either the entry of new (and/or higher quality) lists, or from a change in voting behavior as strategic voters realize that an unpopular list can win seats under PR.

[28]Note that, at the cross-national level, the number of parties in competition does not seem to be positively related to turnout (Blais 2006). Jackman (1987) attributes this to the fact that multipartyism makes elections less decisive, a consideration that does not enter in my context because there are no coalition governments. See also Grofman & Selb (2011).

Figure 5: Effect of crossing 3,500 population threshold on number of lists and support for top two lists



NOTE: See notes to Figure 2. Analysis here is based on results in northwest France in 2001 and 2008.

Table 2: Effect of crossing 3,500 population threshold on number of lists and support for lists

Dependent variable	**Mean**	**Effect estimates**					
		(1)	(2)	(3)	(4)	(5)	(6)
Number of lists	2.02	-0.016	0.177***	0.315***	-0.007	0.162***	0.299***
		(0.074)	(0.053)	(0.04)	(0.063)	(0.048)	(0.037)
Vote share (%) for top two lists	95.42	-0.659	-2.456***	-3.996***	-0.994	-2.25***	-3.872***
		(0.911)	(0.706)	(0.56)	(0.786)	(0.654)	(0.532)
Window:	25%	25%	50%	75%	25%	50%	75%
Covariates?					✓	✓	✓

NOTE: Analysis is based on cities in northwest France in the 2001 and 2008 elections. See Table 1 for details of the table presentation. Sample sizes depend on bandwidth: 573 at 25%; 1406 at 50%; 3080 at 75%.

palities (as would be predicted if voters and candidates are acting based on the probability of being pivotal) and that the number of lists also appears to jump at the same threshold. Because the electoral formula changes from plurality to PR at that threshold, it seems reasonable to attribute these effects to the more proportional electoral formula used in the PR municipalities. There is, however, a complication. As in many cases in which policies depend on population thresholds (Ade & Freier 2011), other features of municipal government change at the 3,500 population threshold: a gender parity rule is imposed on electoral lists, the number of councillors increases from 23 to 27, and the mayor's salary increases by about 400 euros a month. In this section I consider whether these other treatments may also have contributed to the jump in turnout I observe at the 3,500 threshold.

First, consider the gender parity rule that, since 2001, has applied to cities of 3,500 or more inhabitants. The rule aims to achieve gender parity on municipal councils by requiring that each list include an equal number of men and women. The fact that the electoral system and the gender parity rule go into effect at the same population threshold is not an accident; the assumption among policymakers seems to be that parity would be much less effective under plurality rule because voters in that system could disproportionately cast

votes for male candidates even if lists are gender-balanced.[29]

In principle, the increase in average turnout at the 3,500 threshold could be explained by the gender parity rule: perhaps the newly-included women are able to mobilize a new set of voters, or perhaps their presence in politics spurs turnout by increasing the perceived legitimacy of municipal politics.[30] One can even think of a logic by which the effect of the parity rule on turnout might be larger in less competitive elections: perhaps voters who would be mobilized by the parity rule in less competitive contests are already mobilized in competitive contests. To test whether the parity rule might be responsible for the increase in turnout I find at 3,500, I carry out subgroup analysis based on the idea that, if the parity rule were in fact responsible, the jump in turnout would be largest in places where the parity rule had the largest effect – cities where women would be most under-represented in the absence of the parity rule. I use the observed level of female representation in 2008 in cities below the 3,500 threshold to predict the level of female representation for cities on both sides of the threshold (based on socioeconomic covariates and voting outcomes in the 2007 presidential election) in the absence of parity requirements. I then use the predicted level of representation to divide cities into terciles based on the size of the predicted effect of the parity rule (where the largest effect is predicted for those cities with the lowest predicted level of female representation). After confirming that the actual effect of the gender parity rule (estimated via RD) is in fact strongly related to the predicted effect, I estimate the effect of crossing the 3,500 population threshold separately for the three groups of cities. The results are reported in Table 3 and plotted in Figure 6. It does not appear to be the case that the jump in turnout at 3,500 is largest where the gender parity law would have the largest effect. If anything, turnout jumps more in places where the effect of the gender parity rule would be *smaller*, which suggests that the parity law is not responsible for the

[29]Given how commonly entire lists are elected currently in smaller cities, this assumption may be unwarranted. An article in the original gender parity proposal involved reducing the electoral rule threshold from 3,500 to 2,000 explicitly in order to bring more cities under the parity rule; this article was removed following opposition in the Senate. See debate of 1 March 2000, accessible at `http://www.senat.fr/seances/s200003/s20000301/sc20000301009.html`.

[30]It is also of course possible to think of ways in which the gender parity rule may suppress turnout, for example by reducing the average political experience of council candidates.

Table 3: Effect of crossing 3,500 population threshold on 2008 turnout, as a function of effect of gender parity law

Subgroup: Effect of parity law	**Mean turnout**	**Effect estimates**					
		(1)	(2)	(3)	(4)	(5)	(6)
High	69.82	-0.503	0.166	0.14	0.334	0.837	0.975†
		(1.242)	(0.867)	(0.683)	(0.996)	(0.697)	(0.556)
Medium	69.33	1.029	1.984*	2.385**	0.575	1.934**	2.035***
		(1.313)	(0.924)	(0.753)	(0.928)	(0.695)	(0.566)
Low	68.25	1.561	0.573	1.859*	0.992	1.037	1.555*
		(1.431)	(0.918)	(0.761)	(1.118)	(0.751)	(0.623)
Window:	25%	25%	50%	75%	25%	50%	75%
Covariates?					✓	✓	✓

NOTE: As described in the text, cities are divided into terciles ("High", "Medium" and "Low") according to the size of the predicted effect of the gender parity law; the effect of crossing the 3,500 population threshold is separately estimated for each group. See Table 1 for details of the table presentation.

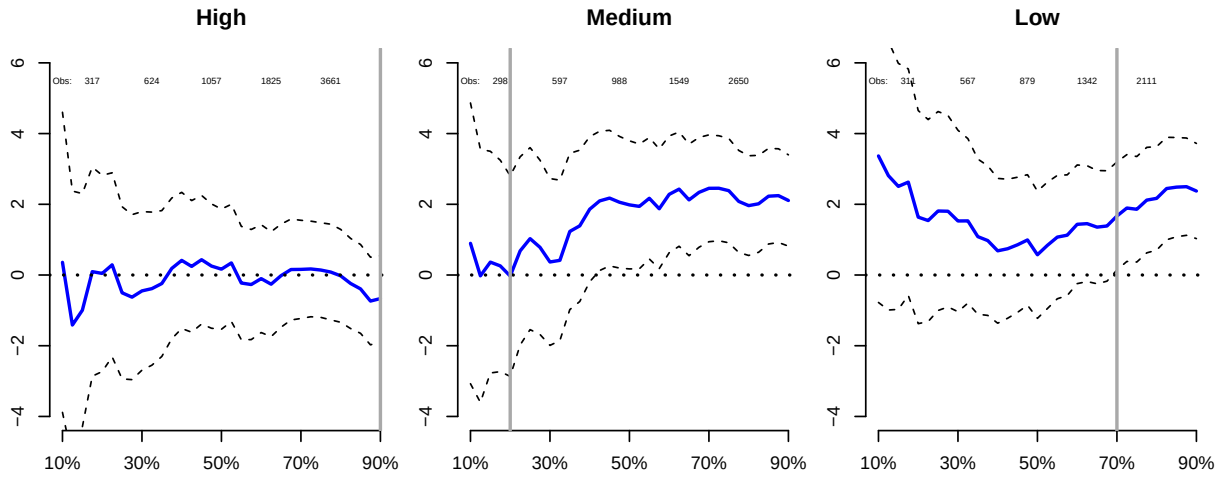
turnout jump at the 3,500 threshold.

Two other important policies also change at the 3,500 threshold: the salary of the mayor increases (from about 1600 euros per month to about 2060 euros per month as does the size of the council (from 23 to 27). In both cases one can imagine a mechanism by which the policy change would increase turnout: a higher salary makes it more valuable to win office and should thus induce greater mobilization efforts; a larger council means longer lists and thus more people with direct involvement in the elections. I use two approaches to determine whether either or both of these treatments could be responsible. First, I take advantage of the fact that both the salary and the council size increase at other population thresholds (500 and 1000, for salary; 500 and 1500, for council size) where we can conduct RDD analysis.[31] Under the assumption that the effect would be roughly similar at other thresholds where the same policy changes, we can evaluate whether the change at 3,500 could be attributable to one or both of these policies.[32] In Table 4 I report RDD results

[31]Council size also changes at 2,500, but at that threshold there is also a change in the rules about fielding incomplete candidate lists, which further complicates matters.

[32]Note that on a percentage basis, the increases in council size and salary at 3,500 are smaller than those

Figure 6: Effect of crossing 3,500 threshold on 2008 turnout according to predicted effect of gender parity law



NOTE: Each plot shows the predicted effect of crossing the 3,500 threshold on turnout (y-axis) as a function of the window of the local linear regression (x-axis) for one group of cities defined by the size of the predicted effect of the gender parity law.

for the effect of crossing the 500, 1000, and 1500 population thresholds on turnout in 2001 and 2008 (pooled); I also show the effect at three placebo thresholds (750, 2150, and 4520) where no policy change takes place.

At none of the thresholds in Table 4 do I find an effect on turnout that is either as large or as consistent as the effect of crossing the 3,500 threshold. There is some evidence, however, of a jump in turnout at 500 and 1000, the two population thresholds where the mayor's salary increases. This suggests that mayor salary could play a role in the jump at 3,500. A careful consideration of the way in which a higher mayor salary would affect mobilization incentives suggests this role is small, however. If a higher salary increases turnout by inducing greater mobilization effort by mayoral hopefuls, it would be most likely to do so when it is most unclear which list will prevail – i.e. in elections expected to

at smaller thresholds. The increase in salary at 3500 is 28% (1612 euros/month → 2062) compared to 38% at 1000 (1162 → 1612) and 82% at 500 (637 euros/month → 1162). The increase in council size at 3,500 is 17% (23 → 27) compared to 36% at 1500 (11 → 15) and 22% at 500 (9 → 11). This suggests that if these features cause the change at 3,500 we should see larger effects at these smaller thresholds, although of course there are many possible reasons why the effect of a policy in a municipality of 3,500 would be different from the effect in a municipal a fraction of that size.

Table 4: Effect of crossing other population thresholds on turnout in 2001 and 2008 municipal elections

Pop.	**Policy changes**	**Mean turnout**	**Effect estimates**					
			(1)	(2)	(3)	(4)	(5)	(6)
500	S,C	78.95	0.735*	0.359	0.299	0.705**	0.419*	0.392**
			(0.323)	(0.228)	(0.184)	(0.263)	(0.186)	(0.144)
750		77.21	-0.179	-0.383	-0.226	0.071	-0.332	-0.303†
			(0.356)	(0.252)	(0.206)	(0.289)	(0.204)	(0.163)
1000	S	75.99	0.916*	0.82**	0.446*	0.7*	0.586**	0.075
			(0.398)	(0.275)	(0.224)	(0.311)	(0.219)	(0.179)
1500	C	74.08	0.426	-0.275	-0.07	0.274	-0.185	-0.101
			(0.463)	(0.335)	(0.273)	(0.369)	(0.266)	(0.218)
2150		72.06	0.19	-0.191	-0.825*	0.399	-0.095	-0.578*
			(0.569)	(0.404)	(0.328)	(0.44)	(0.31)	(0.253)
4520		69.33	-0.451	-0.192	0.448	-0.358	-0.064	0.744*
			(0.796)	(0.537)	(0.426)	(0.57)	(0.391)	(0.318)
Window:		25%	25%	50%	75%	25%	50%	75%
Covariates?						✓	✓	✓

NOTE: RD estimates are shown for the effect on turnout of crossing the population thresholds indicated in the left-most column on turnout in 2001 and 2008. The second column from the left indicates the policies that change at each threshold; "S" indicates an increase in the salary of the mayor and "C" indicates an increase in the size of the municipal council. See Table 1 for other notes.

be close. In Section III, however, it was seen that crossing the 3,500 threshold increased turnout the most in the *least* competitive races. Table 5 reports the same subgroup analysis at the 500 and 1,000 population thresholds.[33] The results depend on the specification but indicate a different pattern from the one I find at 3,500: across the two thresholds, the evidence of a turnout jump seems to be strongest in the highest competitiveness tercile. Together with the analysis reported in Section III, this analysis casts doubt on the idea that the effect of crossing the 3,500 threshold on turnout can be attributed to the change in salary: the jump in turnout at 3,500 occurs where the mayor's salary should have the *smallest* effect and the electoral rule should have the *largest* effect.

As a final exercise, I check whether the drop in the variance of turnout (documented for the 3,500 threshold in the previous section) is also seen at the thresholds where salary increases. This could be the case if increasing the salary of mayors intensifies competition in the least competitive places and thus makes turnout more uniform across thresholds. In fact, I find no effect of crossing these other thresholds on variance in turnout. Using the same procedure described above I do not find a robust effect of crossing the 500 and 1000 thresholds on the variance of turnout. (Figure 7 graphically reports the results.) Thus while there is intriguing evidence of turnout jumps at other thresholds where the mayor's salary increases, these jumps seem to reflect a different process from the one responsible for the increase in turnout at 3,500: they do not happen in the less competitive cities, and they do not coincide with a drop in the variance of turnout. Especially given that the change in salary at 3,500 is substantially smaller in percentage terms than that at 500 and 1000 (see footnote 32), this provides evidence that the jump in turnout at 3,500 is due to the electoral system and not other factors that change at the same population threshold.

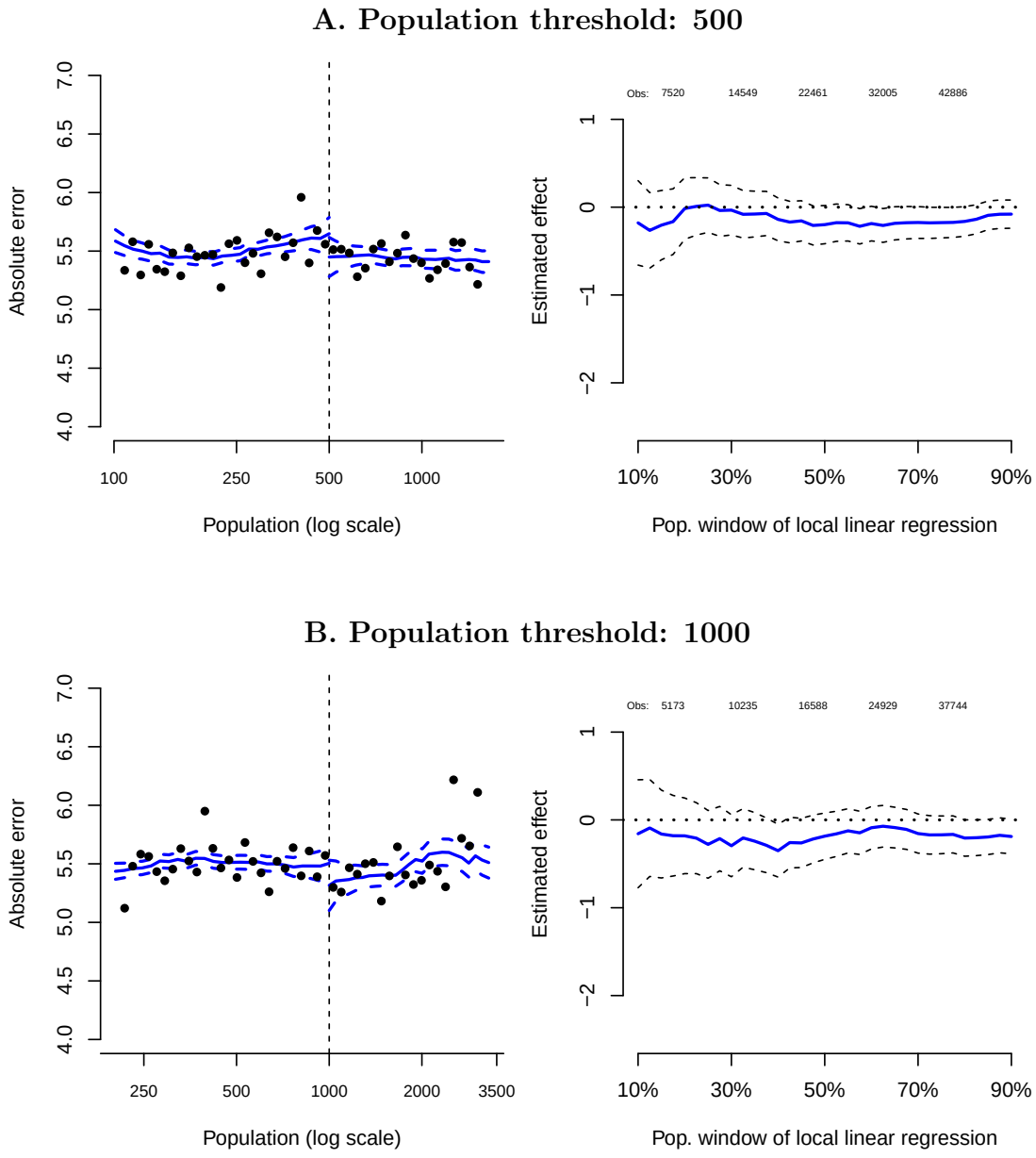
[33]Competitiveness terciles are constructed in the same way as described in footnote 24, but based on a model using municipalities with population between 250 and 1,250. The results using actual competitiveness rather than predicted competitiveness even more starkly show a jump in turnout in the most the competitive municipalities.

Table 5: Effect of crossing population thresholds on 2008 turnout, as a function of competitiveness

Pop.	**Subgroup: Competitiveness**	**Mean turnout**	**Effect estimates**					
			(1)	(2)	(3)	(4)	(5)	(6)
500	High	79.81	1.777**	1.246**	0.517	1.402**	0.947*	0.494†
			(0.625)	(0.432)	(0.341)	(0.529)	(0.372)	(0.296)
500	Medium	78.31	0.27	-0.281	0.052	0.526	-0.207	-0.008
			(0.637)	(0.446)	(0.36)	(0.563)	(0.399)	(0.328)
500	Low	76.26	0.515	0.572	0.834*	0.609	0.78†	0.885*
			(0.662)	(0.476)	(0.387)	(0.601)	(0.434)	(0.354)
1000	High	77.81	1.944**	1.458**	1.396***	1.878**	1.061*	0.827*
			(0.707)	(0.501)	(0.406)	(0.598)	(0.426)	(0.354)
1000	Medium	75.13	0.221	0.021	-0.234	-0.258	-0.239	-0.539
			(0.761)	(0.525)	(0.435)	(0.666)	(0.469)	(0.387)
1000	Low	72.9	1.238	1.364*	0.906*	1.46*	1.373**	0.75†
			(0.822)	(0.554)	(0.452)	(0.703)	(0.488)	(0.4)
Window:		25%	25%	50%	75%	25%	50%	75%
Covariates?						✓	✓	✓

NOTE: RD estimates are shown for the effect on turnout of crossing the population threshold indicated in the left-most column, separately by tercile of predicted competitiveness. See Table 1 for presentation notes. See text for construction of competitiveness terciles.

Figure 7: Effect of crossing 500 and 1000 population thresholds on mean absolute deviation in turnout in 2001 and 2008 (compare with Figure 4)



NOTE: See notes to Figure 2.

V. Conclusion

This paper takes advantage of an unusual natural experiment in small French municipalities in order to investigate the relationship between electoral proportionality and turnout. Theory suggests that greater electoral proportionality could induce higher turnout through both a direct channel and an indirect channel: greater proportionality could lead directly to higher turnout by parties to mobilize and voters to vote even when competition is not particularly balanced between the leading parties; it could also lead indirectly to higher turnout by inducing more (and possibly better) lists to enter competition, which could in turn lead to higher turnout. Using a regression discontinuity design, I show that turnout is indeed higher on average in French cities using PR than in similarly-size cities using plurality. I also provide evidence that this effect operates through both the direct and indirect channels: I show that turnout jumps especially in places where competition is relatively low (which provides evidence for the direct channel), and I show that the number of lists in competition is also higher in the PR cities (which provides evidence for the indirect channel). Finally, I show that (consistent with Cox et al. (1999)) turnout varies less across PR cities than it does across plurality cities.

There are two primary empirical approaches to the question of how electoral systems affect turnout, each corresponding to a broader style of research in comparative politics. One starts from the variation in political participation that we hope to explain – usually cross-country variation in turnout in legislative elections – and attempts to relate it to variation in electoral systems, controlling when possible for other aspects of the political environment that may vary across countries. The other approach starts from the possible explanations of turnout and looks for settings in which the effect of one of those explanations may be advantageously measured.[34] This study is decidedly of the second type. For the purpose of understanding why turnout varies in political systems across the world, the two approaches are undoubtedly complementary: cross-country studies highlight the

[34]This approach adheres to Holland (1986)'s guidance (pg. 959): in order to learn about causation we should "begin with studying the effects of causes rather than the traditional approach of trying to define what the cause of a given effect is."

conditional variation that exists, pointing toward social and institutional factors that may help to explain this variation, while narrower studies like this one focus attention on a small set of hypothesized factors in a setting where the effect of those factors can be more credibly measured. Although there are myriad differences between the French municipal elections I examine and the legislative elections that have been the focus of most existing comparative work, it stands to reason that the effects I find here operate at the cross-national level as well (where the role of proportionality is harder to disentangle from other confounding factors). Thus I hope that my findings on the effect of proportionality on turnout in French municipalities may contribute to advancing our understanding of electoral systems and voter participation more generally.

References

Ade, F. & Freier, R. (2011), When can we trust population thresholds in regression discontinuity designs? Unpublished manuscript.

Aldrich, J. H. (1993), 'Rational choice and turnout', *American Journal of Political Science* pp. 246–278.

Banducci, S. A., Donovan, T. & Karp, J. A. (1999), 'Proportional representation and attitudes about politics: results from new zealand', *Electoral Studies* **18**(4), 533–555.

Barone, G. & De Blasio, G. (2013), 'Electoral rules and voter turnout', *International Review of Law and Economics* .

Blais, A. (2006), 'What affects voter turnout?', *Annu. Rev. Polit. Sci.* **9**, 111–125.

Blais, A., Lachat, R., Hino, A. & Doray-Demers, P. (2011), 'The mechanical and psychological effects of electoral systems a quasi-experimental study', *Comparative Political Studies* **44**(12), 1599–1621.

Boix, C. (1999), 'Setting the rules of the game: the choice of electoral systems in advanced democracies', *American Political Science Review* pp. 609–624.

Braumoeller, B. F. (2006), 'Explaining variance; or, stuck in a moment we can't get out of', *Political Analysis* **14**(3), 268–290.

Brollo, F., Perotti, R., Tabellini, G. & Nannicini, T. (forthcoming), 'The political resource curse', *American Economic Review* .

Colomer, J. M. (2005), 'It's parties that choose electoral systems (or, Duverger's laws upside down)', *Political Studies* **53**(1), 1–21.

Cox, G. W., Rosenbluth, F. M. & Thies, M. F. (1998), 'Mobilization, social networks, and turnout: Evidence from japan', *World Politics* **50**, 447–474.

Cox, G. W., Rosenbluth, F. M. & Thies, M. F. (1999), 'Electoral reform and the fate of factions: the case of japan's liberal democratic party', *British Journal of Political Science* **29**(1), 33–56.

Davidian, M. & Carroll, R. J. (1987), 'Variance function estimation', *Journal of the American Statistical Association* **82**(400), 1079–1091.

Downs, A. (1957), *An economic theory of democracy*, Harper.

Duverger, M. (1954), *Political Parties: Their Organization and Activity in the Modern State*, Wiley.

Egger, P. & Koethenbuerger, M. (2010), 'Government spending and legislative organization: Quasi-experimental evidence from germany', *American Economic Journal: Applied Economics* **2**(4), 200–212.

Fiva, J. H. & Folke, O. (2013), Mechanical and psychological effects of electoral reform. Unpublished working paper.

Fujiwara, T. (2011), 'A regression discontinuity test of strategic voting and duvergers law', *Quarterly Journal of Political Science* **6**(3-4), 197–233.

Gagliarducci, S. & Nannicini, T. (2013), 'Do better paid politicians perform better? disentangling incentives from selection', *Journal of the European Economic Association* **11**(2), 369–398.

Geys, B. (2006), 'Explaining voter turnout: A review of aggregate-level research', *Electoral Studies* **25**(4), 637–663.

Grofman, B. & Selb, P. (2011), 'Turnout and the (effective) number of parties at the national and district levels: A puzzle-solving approach', *Party Politics* **17**(1), 93–117.

Hahn, J., Todd, P. & Van der Klaauw, W. (2001), 'Identification and estimation of treatment effects with a regression-discontinuity design', *Econometrica* pp. 201–209.

Holland, P. W. (1986), 'Statistics and causal inference', *Journal of the American statistical Association* **81**(396), 945–960.

Imbens, G. & Kalyanaraman, K. (2012), 'Optimal bandwidth choice for the regression discontinuity estimator', *The Review of Economic Studies* **79**(3), 933–959.

Imbens, G. W. & Lemieux, T. (2008), 'Regression discontinuity designs: A guide to practice', *Journal of Econometrics* **142**(2), 615–635.

Jackman, R. (1987), 'Political institutions and voter turnout in the industrial democracies', *The American Political Science Review* pp. 405–423.

Ladner, A. & Milner, H. (1999), 'Do voters turn out more under proportional than majoritarian systems? the evidence from swiss communal elections', *Electoral Studies* **18**(2), 235–250.

Lee, D. (2008), 'Randomized experiments from non-random selection in US House elections', *Journal of Econometrics* **142**(2), 675–697.

Loughlin, J. (2007), *Subnational Government: The French Experience*, Palgrave McMillan.

McCrary, J. (2008), 'Manipulation of the running variable in the regression discontinuity design: A density test', *Journal of Econometrics* **142**(2), 698–714.

Pettersson-Lidbom, P. (2012), 'Does the size of the legislature affect the size of government? evidence from two natural experiments', *Journal of Public Economics* **96**(3), 269–278.

Powell, G. B. & Vanberg, G. S. (2000), 'Election laws, disproportionality and median correspondence: Implications for two visions of democracy', *British Journal of Political Science* **30**(3), 383–412.

Riker, W. H. & Ordeshook, P. C. (1968), 'A theory of the calculus of voting', *American Political Science Review* **62**(01), 25–42.

Rokkan, S. (1970), *Citizens, Elections, Parties: Approaches to the Comparative Study of the Process of Development*, Universitetsforlaget.

Thistlethwaite, D. & Campbell, D. (1960), 'Regression-discontinuity analysis: An alternative to the ex post facto experiment', *Journal of Educational Psychology* **51**, 309–317.

Table 6: RD analysis: The effect of crossing the 3,500 population threshold on placebo (pre-treatment) outcomes

Outcome	**Mean**	**Effect estimates**		
		(1)	(2)	(3)
Pct. retired, 1999	19.07	0.711 (0.667)	0.313 (0.455)	0.24 (0.361)
Pct. working in agriculture, 1999	5.34	-0.023 (0.638)	-0.068 (0.461)	0.775* (0.38)
Pct. with 'bac' degree, 1999	36.45	-0.713 (0.985)	-0.758 (0.718)	-0.187 (0.585)
Pct. unemployed, 2001	12.33	-0.764 (0.762)	-0.456 (0.542)	0.064 (0.441)
Log pop., 1990	8.03	0.025† (0.013)	0.013 (0.009)	0.011 (0.007)
Area (sq. km.)	21.37	-3.087 (2.021)	-1.883 (1.406)	-1.803 (1.123)
Local tax revenue, 2000 (in thous. euros)	1142.57	172.027 (106.377)	125.215 (75.952)	109.848 (66.66)
FCTVA, 2000 (in thous. euros)	101.36	5.422 (8.829)	4.661 (6.544)	6.406 (5.628)
Turnout, 1995 pres. elections	81.87	-0.157 (0.341)	-0.057 (0.236)	-0.109 (0.192)
Pct. for Chirac, 1995 pres. elections	51.87	0.633 (0.927)	0.772 (0.674)	0.585 (0.541)
Region: Center	0.08	-0.033 (0.028)	-0.006 (0.019)	-0.005 (0.016)
Region: West	0.22	-0.005 (0.044)	-0.076* (0.031)	-0.084*** (0.025)
Region: South	0.22	0.018 (0.045)	0.042 (0.032)	0.052† (0.026)
Region: East	0.13	0.046 (0.037)	0.044 (0.027)	0.013 (0.022)
Region: North	0.16	-0.019 (0.039)	0.004 (0.028)	0.018 (0.023)
Region: SW	0.13	0.013 (0.037)	0.003 (0.026)	0.015 (0.021)
Region: Paris	0.06	-0.021 (0.026)	-0.01 (0.019)	-0.01 (0.015)
Window:	25%	25%	50%	75%

Table 7: Estimated effects at bandwidths chosen by cross-validation

Reference	**Outcome**	Mean	Window	Effect	Std. Err.	N
Figure 3.A	Turnout, 2008; high competition	72.257	87.5%	-0.14	(0.653)	7046
	Turnout, 2008; medium competition	69.181	90%	1.841**	(0.686)	4351
Figure 3.B	Turnout, 2008; low competition	66.041	52.5%	1.691†	(0.909)	1132
Table 1, row 1	Turnout, 2001	70.727	67.5%	1.416**	(0.454)	5997
Table 1, row 2	Turnout, 2008	69.141	52.5%	1.071*	(0.539)	3419
Table 1, row 3	Turnout, 2001 & 2008	69.962	67.5%	1.235***	(0.317)	11600
Table 1, row 4	Turnout, 2002 presidential	74.949	67.5%	-0.126	(0.257)	5997
Table 1, row 5	Turnout, 2004 regional	63.384	55%	-0.588	(0.416)	3963
Table 1, row 6	Turnout, 2007 presidential	86.326	60%	-0.246	(0.2)	4658
Table 2, row 1	Number of lists at 3500	2.017	15%	-0.258†	(0.151)	330
Table 2, row 2	Vote share for top two lists	95.416	45%	-2.961**	(1.082)	1180
Table 3, row 1	Turnout, 2008; high parity effect	69.818	90%	-0.667	(0.662)	8761
Table 3, row 2	Turnout, 2008; medium parity effect	69.327	20%	-0.03	(1.478)	339
Table 3, row 3	Turnout, 2008; low parity effect	68.248	70%	1.668*	(0.809)	1684
Table 4, row 1	Turnout, 2001 & 2008 at 500	78.948	60%	0.45**	(0.167)	30281
Table 4, row 2	Turnout, 2001 & 2008 at 750	77.212	77.5%	-0.309†	(0.162)	41269
Table 4, row 3	Turnout, 2001 & 2008 at 1000	75.992	42.5%	0.862***	(0.243)	14350
Table 4, row 4	Turnout, 2001 & 2008 at 1500	74.079	87.5%	-0.065	(0.2)	45314
Table 4, row 5	Turnout, 2001 & 2008 at 2150	72.056	27.5%	0.093	(0.434)	4444
Table 4, row 6	Turnout, 2001 & 2008 at 4520	69.569	42.5%	-0.196	(0.477)	4262
Table 5, row 1	Turnout in 2001 at 500; high comp.	79.249	90%	0.736*	(0.365)	6935
Table 5, row 2	Turnout in 2001 at 500; medium comp.	76.744	90%	0.003	(0.341)	7261
Table 5, row 3	Turnout in 2001 at 500; low comp.	75.462	42.5%	1.119*	(0.467)	3313
Table 5, row 4	Turnout in 2001 at 1000; high comp.	77.084	67.5%	0.926†	(0.492)	4755
Table 5, row 5	Turnout in 2001 at 1000; medium comp.	74.12	90%	0.119	(0.405)	8528
Table 5, row 6	Turnout in 2001 at 1000; low comp.	72.065	80%	1.503***	(0.411)	6801
Table **??**, row 1	Number of lists at 500	1.494	40%	-0.049	(0.06)	1734
Table **??**, row 2	Number of lists at 750	1.523	72.5%	0.032	(0.04)	3787
Table **??**, row 3	Number of lists at 1000	1.622	90%	0.085*	(0.037)	5218
Table **??**, row 4	Number of lists at 1500	1.692	90%	0.015	(0.041)	5611
Table **??**, row 5	Number of lists at 2150	1.769	22.5%	0.013	(0.102)	827
Table **??**, row 6	Number of lists at 4520	2.277	15%	-0.359†	(0.212)	182

NOTE: Because the algorithm yields very large bandwidths in some cases, I set a maximum of 90%.

Table 8: Estimated effects at bandwidths chosen by Imbens-Kalyanaraman algorithm

Reference	**Outcome**	Intercept	Window (log pop.)	Effect	Std. Err.	N
Figure 3.A	Turnout, 2008; high competition	71.717	1.25	0.619	(0.438)	2774
	Turnout, 2008; medium competition	68.676	1.25	1.655**	(0.501)	2279
Figure 3.B	Turnout, 2008; low competition	65.119	1.187	1.951***	(0.532)	2148
Table 1, row 1	Turnout, 2001	70.017	1.063	1.491***	(0.314)	6272
Table 1, row 2	Turnout, 2008	68.455	1.219	1.371***	(0.301)	7050
Table 1, row 3	Turnout, 2001 & 2008	69.321	0.982	1.358***	(0.237)	11096
Table 1, row 4	Turnout, 2002 presidential	74.9	1.172	-0.016	(0.168)	7114
Table 1, row 5	Turnout, 2004 regional	63.449	1.25	-0.165	(0.236)	7748
Table 1, row 6	Turnout, 2007 presidential	86.38	0.947	-0.231	(0.142)	5471
Table 2, row 1	Number of lists at 3500	1.958	1.111	0.238***	(0.053)	2556
Table 2, row 2	Vote share for top two lists	96.544	1.195	-3.325***	(0.61)	2780
Table 3, row 1	Turnout, 2008; high parity effect	69.593	1.25	0.083	(0.485)	2839
Table 3, row 2	Turnout, 2008; medium parity effect	68.23	1.25	2.109***	(0.527)	2385
Table 3, row 3	Turnout, 2008; low parity effect	67.528	1.25	1.933***	(0.531)	2084
Table 4, row 1	Turnout, 2001 & 2008 at 500	78.595	1.062	0.343**	(0.116)	41669
Table 4, row 2	Turnout, 2001 & 2008 at 750	77.131	1.23	-0.141	(0.118)	41039
Table 4, row 3	Turnout, 2001 & 2008 at 1000	75.641	1.25	0.543***	(0.127)	36680
Table 4, row 4	Turnout, 2001 & 2008 at 1500	73.998	1.25	-0.295*	(0.148)	29083
Table 4, row 5	Turnout, 2001 & 2008 at 2150	72.048	1.04	-0.571**	(0.189)	17957
Table 4, row 6	Turnout, 2001 & 2008 at 4520	68.988	1.2	-0.107	(0.239)	11324
Table 5, row 1	Turnout in 2001 at 500; high comp.	75.855	0.732	0.761*	(0.358)	4844
Table 5, row 2	Turnout in 2001 at 500; medium comp.	78.187	0.702	-0.129	(0.341)	4788
Table 5, row 3	Turnout in 2001 at 500; low comp.	79.143	0.732	0.975**	(0.319)	5031
Table 5, row 4	Turnout in 2001 at 1000; high comp.	72.341	0.993	1.032**	(0.356)	4943
Table 5, row 5	Turnout in 2001 at 1000; medium comp.	75.038	1.25	-0.143	(0.308)	5976
Table 5, row 6	Turnout in 2001 at 1000; low comp.	77.026	0.776	1.469***	(0.364)	3523
Table **??**, row 1	Number of lists at 500	1.527	1.25	-0.072*	(0.034)	4827
Table **??**, row 2	Number of lists at 750	1.511	1.065	0.047	(0.032)	4607
Table **??**, row 3	Number of lists at 1000	1.614	0.747	0.061	(0.039)	3701
Table **??**, row 4	Number of lists at 1500	1.721	1.25	-0.056	(0.035)	4898
Table **??**, row 5	Number of lists at 2150	1.783	0.803	-0.059	(0.048)	2710
Table **??**, row 6	Number of lists at 4520	2.269	1.204	-0.094	(0.062)	2240

NOTE: Because the algorithm yields very large bandwidths in some cases, I set a maximum of 1.25 of log population.