

# CRASHING THE GATE: THE EFFECTS OF PARLIAMENTARY FRAGMENTATION ON DEMOCRATIC OUTCOMES

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## **Abstract**

The upsurge in parliamentary representation for electorally marginal parties with extreme or anti-system platforms has generated concern over the effects that such representation can have. In this paper, I use an expansive collection of elections from European parliamentary democracies and a series of regression discontinuity designs to test whether the addition of what I term “gate-crashing” parties undermines parliamentary stability or significantly alters the perceptions and behaviors of voters. I find that such an addition has no discernible causal effect on traditional measures of parliamentary stability, including the size of the governing coalition, the size of the largest party, or even future levels of parliamentary fragmentation. However, the inclusion of a gate-crashing party does lead to a dramatic increase in wasted votes in the following elections. This effect is normatively worrisome, given the strong connection between wasted votes and dissatisfaction with democracy.

## Introduction

In the past half decade, a cottage industry has grown up around discussions of democracy's fragility, particularly in the developed world.<sup>1</sup> Many of these works highlight what seems to be the increasing ungovernability of parliamentary democracies as niche and extreme parties gain representation and upset the traditional balance between center left and center right parties. In this argument, governments that cannot legislate efficiently and effectively are far more prone to collapse, especially under the stress of massive shocks like the global financial crisis or the European refugee crisis. Political fragmentation of this sort becomes a source of policy frustration, and eventually both a cause and a function of democratic dissatisfaction among the populace.

Political science scholars have spent a great deal of time exploring the causes of political fragmentation, including the structure of electoral rules (see, e.g. [Taagepera and Shugart 1989](#), [Taagepera 1997](#), [Amorim Neto and Cox 1997](#), [Filippov, Ordeshook and Shvetsova 1999](#), and [Flick Witzig and Vatter 2017](#)), country size ([Anckar 2000](#)), strategic political considerations on the parts of voters ([Golder 2006](#)), ethnic heterogeneity ([Birnie and Van Cott 2007](#) and [Lublin 2017](#)) and the information environment ([Rozenas and Sadanandan 2018](#)), as well as its possible effects on turnout (see, e.g. [Blais and Carty 1990](#), [Blais and Dobrzynska 1998](#), and [Lundell 2011](#)). However, comparatively little work has been done to causally identify the effects of increased fragmentation on more immediate democratic outcomes, particularly those that may be associated with democratic governance and satisfaction.

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<sup>1</sup>The most recent and prominent popular examples include [Luce \(2017\)](#), [Levitsky and Ziblatt \(2018\)](#), [Mounk \(2018\)](#), and [Snyder \(2018\)](#).

In this article, I take up this challenge and focus on political fragmentation of a specific type: the addition of what I call a “gate-crashing” party to a country’s parliament. I define these parties as those electorally marginal parties who just barely qualify for parliamentary representation. These parties tend to appeal to small sections of the electorate, and frequently trumpet populist or extreme platforms.<sup>2</sup> Their inclusion in parliament serves as perhaps the most visible form of fragmentation. In the past two years alone, one could include as examples the qualification of populist Volya in Bulgaria, the rise of decentralization-focused STAN in the Czech Republic, the return to parliament of the nationalist Slovenian National Party, the ill-fated arrival (and then prompt disappearance) of center-right Network in Slovakia,<sup>3</sup> and the introduction of the left-wing anti-Islam Peter Pilz List in Austria.

I apply a series of regression discontinuity analyses centered on party systems where parties either just qualify or fail to qualify for representation to test the direct and indirect effects of adding a gate-crashing party to a parliament. Specifically, I test whether such an addition (a) increases the number of parties that are brought into the governing coalition, (b) increases the likelihood that early elections are called, (c) decreases the vote share of the largest party in the following election, (d) increases a standard measure of fragmentation<sup>4</sup> in the following election, and (e) increases the number of wasted votes in the following election.

I find little evidence of direct impact on the number of coalition partners, largest

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<sup>2</sup>As we discuss below, there is a great deal of overlap between this group of parties and a more traditional “fringe” party grouping, but it is the level of electoral success - and not the ideological platform - that delineates gate-crashers.

<sup>3</sup>Network won 10 seats in the 2016 Slovakian election, but through party splits and agglomerations now has no members of parliament representing it.

<sup>4</sup>The effective number of parliamentary parties (“ENPP”)

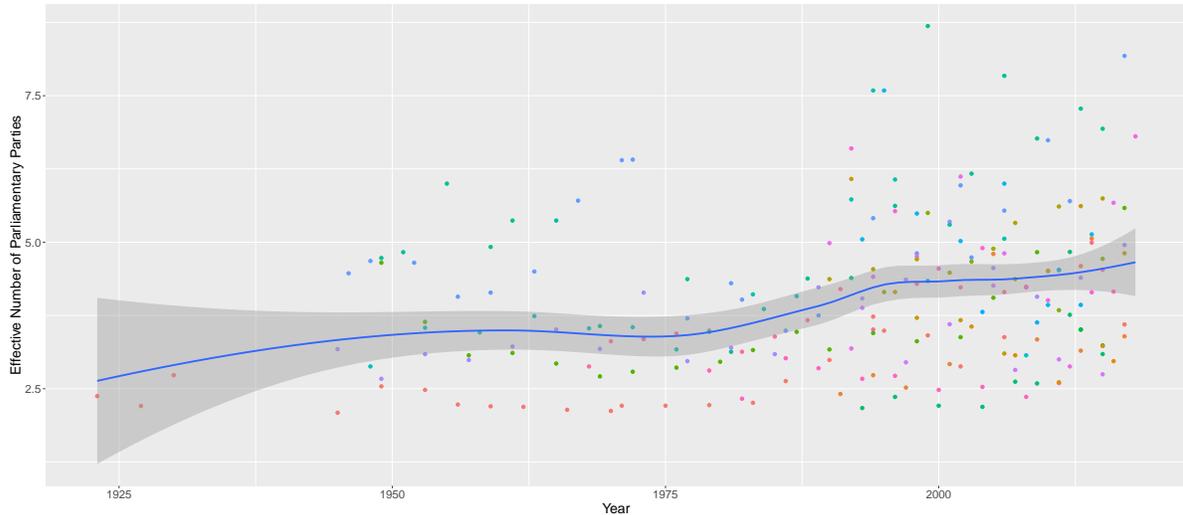
party vote share, or on future fragmentation. However, the introduction of a small party causes a substantial increase in the percentage of wasted votes in the following election, a worrying result for the perception of democratic legitimacy even absent actual deterioration in democratic efficiency. I also find some suggestive evidence that gate-crashing parties actually act as parliament stabilizers, increasing the likelihood that the parliament serves its full legal term. In the next section, I discuss party system fragmentation and its possible effects on democratic governance.

## **Party System Fragmentation and Democratic Outcomes**

Party system fragmentation, measured either as an increasing number of parties that receive votes, or as the number of parties that actually enter the legislature, has been on the rise across western democracies for multiple decades. Figure 1 shows the time trend for the effective number of parliamentary parties in each party system in the sample I use in my analysis. While the fitted line shows the general trend across all party systems, one can observe the same trend mirrored in each of the countries included. This measure captures the number of parties in a system that reach parliamentary representation, but accounts for their relative strength using vote share.

Fragmentation of this kind is not obviously bad for democracy. Heterogeneity of voter preferences can create demand for alternative parties which focus on narrower issues or more extreme platforms. Having those voices represented in parliament may,

**Figure 1:** Effective Number of Parliamentary Parties, Sample Countries



in certain circumstances, aid democratic legitimacy by giving voice to the dissatisfied, rather than accruing hostility toward the system outside of its gates.

However, personal voice is only one aspect of democratic satisfaction. Most voters also expect responsiveness on the part of the government as a whole, particularly in times of economic or social disruption. The ability of a government to respond in the desired way, which I call “democratic efficiency,” can be conditioned by many things, not the least of which is the number of veto players (in this case, parties) in parliament (Tsebelis 1999). The proper balance between democratic representation and democratic efficiency is never perfectly clear, and is highly likely to be contextual in nature. Thus, it is imperative to capture the effects that fragmentation has on democratic outcomes associated with democratic satisfaction. I focus here on one type of fragmentation, and its effects on both democratic efficiency and representativeness.

Fragmentation can come in different forms, and previous research has not always

seen it necessary to disentangle these (but see [Best 2013](#) for an analysis of opposition cohesiveness that does attempt this distinction). It is important to tease these types of fragmentation apart, as they could plausibly generate heterogeneous effects that are ameliorated or amplified by the effects generated by alternative forms. In this paper, I focus on the addition of electorally marginal parties to parliament. As discussed in the Introduction, this is perhaps the most accessible form of fragmentation for most voters. Moreover, there are good reasons to believe that this type of fragmentation might also be the most disruptive, as it can introduce parties that either lack experience in parliamentary procedures, rules, and formalities, or parties whose platforms are either explicitly or implicitly populist, anti-establishment, or ideologically extreme in ways that are likely to be obstructionist more than legislatively productive.<sup>5</sup>

However, it should be noted that fragmentation can also be driven by vote-shifting among existing parliamentary parties, and specifically where large parties lose votes to smaller and medium-sized parties, flattening the relative power structure. Of course, this type of fragmentation eventually requires the introduction of new parties to continue fragmentation,<sup>6</sup> but such fracturing can still plausibly have effects on democratic outcomes in the short and middle term without such additions. My research strategy will not allow me to speak authoritatively on this type of fragmentation, but I discuss the need for additional research on this area in the [Discussion](#) below.

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<sup>5</sup>I describe how parties qualify as gate-crashers in greater depth below, under [Treatment](#).

<sup>6</sup>Otherwise, there is a ceiling that is reached when vote shares are identical across all current parliamentary parties.

Focusing only on the fragmentation caused by the addition of a gate-crashing party, I suggest that this type of dynamic can plausibly affect both democratic efficiency and representativeness, and test these possibilities in five separate ways.

In terms of efficiency, I first expect that adding an additional gate-crashing party to parliament will increase the likelihood of a discretionary termination of the parliament's term.<sup>7</sup> The types of parties that just qualify for parliamentary representation are more likely than not to be newer parties, with relatively little parliamentary experience. From the literature on government formation, we know that parties new to parliament are rarely included in the governing coalition ([Harmel and Robertson 1985](#), [Bolleyer, Spanje and Wilson 2012](#)), and those with the smallest vote shares are most likely to be excluded (see, e.g. [Grotz and Weber 2016](#) for how informational uncertainty can lead to the exclusion of small and new parties in Central and Eastern Europe particularly). This suggests that party systems with an additional party of only marginal electoral importance are likely simultaneously to see more difficult coalition formations (as the vote share of possible "viable" coalition partners is lower than in the system where seats are distributed only among parties that easily qualified for participation), and likely to contain large formateur parties with an incentive to call new elections if the coalitions in the new government would be less fractious. This can be a recipe for early elections, either due to coalitions too broad or unwieldy to succeed, or large parties with incentives to call them.

Second, the addition of a gate-crashing party is expected to increase the number of parties in the governing party coalition. This follows from our discussion above, but

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<sup>7</sup>This includes either a call for snap elections by the government, or a vote of no confidence that triggers new elections.

with some small percentage of the seats in parliament occupied by a party unlikely to be included in the coalition, the formateur may be required to add an additional party to a governing coalition to garner the necessary voting support. Mechanically, any seats that go to a small party are denied to a larger party, and as larger parties shrink, the number that are necessary to form a coalition rises.

Third, I expect that adding an electorally marginal party to parliament will increase future fragmentation. This effect can operate through at least two channels, though I certainly do not rule out others. It may be that a small party generally makes democratic governance more difficult, either because of the reasons discussed above (fractured or over-populated coalitions), because the marginal party is particularly obstructionist, or simply because these parties may be disorganized or poor at carrying out traditional parliamentary responsibilities. To the extent that governance is poor, it is more likely that voters will blame the larger parties (whether government or opposition) than the small. In any case, the former have a much greater vote share to lose than the latter. The end result is a flattening of vote share among large parties, which one observes as future fragmentation.

Even absent a decrease in democratic efficiency, the inclusion of a gate-crashing party can also increase future fragmentation through the way it changes voters' perceptions. Here, the party that is now part of parliament serves as proof to voters that parties of this type and size *can* overcome electoral thresholds and other barriers to entry. If some voters that previously adopted a strategic position of voting for medium and larger parties rather than their preferred small parties now find it more

acceptable to risk a wasted vote to express themselves more truthfully, this is likely to increase fragmentation.<sup>8</sup>

These two avenues implicate the two different parts of democratic satisfaction discussed in this paper (efficiency and representativeness), and yield our final two hypotheses.

In the fourth hypothesis, I expect that - whether dissatisfied at the democratic performance of the government or simply more open to voting sincerely - voters will move from larger parties to smaller ones. Thus, I expect that the addition of a gate-crashing party to parliament will decrease the vote share of the party who wins the greatest number of votes in the following election. This hypothesis implicates both efficiency, in that governing parties are likely to be smaller and need to compromise more in governing, and representativeness, if the smaller parties now receiving more votes are closer to voters' ideological position.

However, the inclusion of a gate-crashing party need not be an unalloyed good for the representativeness of a system. If perceptions shift such that voters move away from larger established parties and ultimately cast votes for a party that fails to be included in parliament, representativeness can dramatically decrease. Thus, a slight increase in representativeness for those voters supporting the gate-crashing party in one election is likely to decrease representativeness across the system as a whole in future elections. The final hypothesis addresses this exact scenario, and suggests

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<sup>8</sup>In general, any votes that move from medium and large parties to smaller parties are likely to increase the parity between these two groups and increase fragmentation.

that the inclusion of a gate-crashing party will dramatically increase the number of wasted votes in the following election.

Table 1 briefly encapsulates our hypotheses, but before moving on to the research design aimed at testing them, it is worth briefly considering why these outcomes in particular matter.

**Table 1:** Hypotheses

<b>Outcome (Efficiency or Representativeness)</b>	<b>Direction</b>	<b>Time</b>
Early Elections (Efficiency)	Increase	Instant Parliamentary Term
Number of Coalition Parties (Efficiency)	Increase	Instant Parliamentary Term
Fragmentation (Efficiency)	Increase	Election After Inclusion
Vote Share of Largest Party (Both)	Decrease	Election After Inclusion
Wasted Votes (Representativeness)	Increase	Election After Inclusion

Each of the five outcomes hypothesized above can limit democratic efficiency, or bring a higher likelihood of democratic dissatisfaction due to lack of representativeness. Constant electioneering is costly, and more frequent elections court the possibility of habituating individuals to a form of electoral lethargy.<sup>9</sup> Increased number of elections can also work to decrease the stakes of any one election in the eyes of voters, something that has been shown to decrease turnout (Pacek, Pop-Eleches and Tucker 2009).

The number of coalition parties is linked with the survival of the government (Warwick 2007), as well as the ability to pass substantial legislation (Tsebelis 1999) that is responsive to voters' preferences (Klüver and Spoon 2017). An increase in their coalition size, then, threatens both democratic efficiency and stability.

<sup>9</sup>This is similar to the theory supported in Franklin and Hobolt (2011) for elections to the European Parliament, as well as in traditional arguments against elections with two stages.

An increase in wasted votes, on the other hand, is a more indirect harm, though just as serious. A long line of literature has established the connection between losing an election and decreased feelings of democratic legitimacy and representativeness (see, e.g. [Anderson and Guillory 1997](#), [Singh, Karako and Blais 2012](#), and [Blais, Morin-Chass and Singh 2017](#)) and that dissatisfaction of this type may actually be worse in parliamentary systems under proportional representation ([Ferland 2015](#)) and when the parties for whom wasted votes are cast are of the type that never or seldom reach parliamentary representation ([Delgado 2016](#)). As the perceptions of democratic legitimacy can impact political decisions (including the support of anti-democratic groups) even absent obvious declines in democratic performance, an increase in wasted votes is a worrying sign for democracies.

In the cases of both future fragmentation and the declining strength of large parties, these outcomes also serve potentially to reinforce the cycle of fractionalization, plausibly leading to greater long-term effects of the type described above. By the logic of this paper, fragmentation in the future may be self-reinforcing. More immediately, governmental fragmentation may itself be associated with dissatisfaction with democracy ([Christmann and Torcal 2018](#)), and thus lamentable for the same reasons that wasted votes are.

It is imperative, then, that we test whether the fragmentation induced by gate-crashing parties can in fact cause these harms, as I suggest above. I now move on to the research design used to carry out this task.

## Research Design

In the following sections, I describe the methodological approach and data used to test the hypotheses developed above, before moving on to the results.

### Methodology

In this paper, I attempt to isolate the causal effect of an additional gate-crashing party in parliament on various political outcomes. One approach to this issue might simply regress values of the chosen dependent variables on the number of parliamentary parties selected in a particular country-election. However, this approach (even were it to include a large host of appropriate control variables) courts inferential difficulties.

Party systems separated even by only one parliamentary party can differ in fundamental ways that make their comparison for purposes of estimating the desired effect questionable. Consider a sample comparison between a strict two-party system where no third party has ever gained representation and a multi-party democracy with three equal-sized parties that nearly always gain representation in the parliament. Using our naïve regression will effectively measure the difference in the mean values of the dependent variable for each of the two systems; however, the theoretical value of such an estimate is minimal. There is little or no overlap in our sample, so one cannot reasonably extend the measured effect to either system. In general, we probably think that observations where the likelihood of parties qualifying or

dropping out of the parliament is quite low are not helpful for estimating the desired effect, which requires the *possibility* that fragmentation occurs.

My methodological approach addresses this issue directly. I ensure a meaningful sample of comparison cases by adopting a regression-discontinuity (“RD”) design. RD designs have become increasingly common in political science as a means of generating plausible causal estimates in situations where experimental manipulation is unlikely or impossible. When the appropriate assumptions are met, the design allows a researcher using observational data to divide the sample at a meaningful threshold (in this paper, a party just passing the necessary barriers for parliamentary representation) as if that threshold were exogenous. This allows the researcher to estimate the expected level of any desired outcome on either side of the threshold, and generate a credible causal estimate for the effect of crossing that threshold by comparing those expected outcomes. The design’s appeal, then, is allowing researchers to treat observational data as if it were generated through an experiment.<sup>10</sup> While I leave a broader, more general discussion of the design strategy to reviews like [Imbens and Lemieux 2008](#), [Lee and Lemieux 2010](#), and [Cattaneo, Idrobo and Titiunik 2017](#), I focus on my own design here.

I employ a continuity-based, local polynomial approach in my design, which has become the standard in empirical analysis.<sup>11</sup> This approach relies on the main as-

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<sup>10</sup>Thus, the RD design is frequently considered “quasi-experimental.”

<sup>11</sup>However, I also conduct the same analyses using an approach centered on localized randomization, where I assume that there is a small window around our cutoff where an additional party either makes or misses parliamentary qualification on an *as if* random basis. The analysis conducted there follows from the experimental literature. The results of these robustness checks are presented in Appendix C and, as noted in the Results section, track what I find in the main part of the paper.

sumption that the average potential outcomes are continuous functions on either side of the cutoff, and a causal effect of passing a threshold can be estimated by taking the difference of the expected outcomes on either side of the cutoff at this threshold.

I consider as my running variable the measure of closeness to parliamentary representation I describe in the data section below. I call this “margin of representation,” and it is positive for parties that are represented in parliament and negative for those who fail to earn a seat. Note that my observations are at the level of a party system, while the running variable is an attribute of a single party within that system.

Following the most common procedure for RD estimations, I isolate the causal effect of adding an additional parliamentary party by employing a triangular kernel and estimating the weighted local-linear fits to observations within a specific bandwidth on either side of the cutoff. The bandwidth is chosen through an automated, data-driven process (to avoid possible researcher manipulation) that attempts to optimize the bias-variance trade-off at the heart of bandwidth selection. Here, I chose the bandwidth that minimizes the mean squared error (“MSE”) given our choice of the triangular kernel and local linear fit. In my primary estimation, I construct a common bandwidth for each side of the threshold, but I show in the Appendices that our results are robust to changes in all of these choices (kernel, polynomial order, and number of bandwidths).

I follow this procedure separately for each dependent variable, as the distribution of the variable around the cutoff will alter the bias-variance trade-off that instructs our bandwidth. The point estimation of each causal effect is a simple comparison of the expected outcome of the local linear fit at the cutoff for the “treatment” group

(the systems that saw a party just make the parliament) with the expected outcome of the local linear fit at the cutoff for the “control” group (the systems that saw a party just miss the parliament). I now move on to discuss the data.

## Data

I construct the dataset from two different sources. I first use Bormann and Golder’s Democratic Electoral Systems (“DES”) dataset ([Bormann and Golder 2013](#)) for certain attributes tied to the political systems in our sample, updating it in the limited instances necessary. The extracted variables from this dataset are generally associated with the level of fragmentation, or system-level covariates that are useful in our estimation procedure.<sup>12</sup>

I marry this dataset to a second and more expansive set that was created for this paper. This dataset includes outcomes from elections in parliamentary democracies, with particular attention given to the results of parties that either barely earned representation in the legislature, or barely failed to. Thus, for each of the 229 elections<sup>13</sup> in our sample (Table 6 in Appendix D lists the countries and periods included in our sample), I collect how close the last party in (out) of the legislature was to missing (being included) in the parliament. This allows me to separate systems into “treated” and “control” groups, which I discuss now.

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<sup>12</sup>I provide descriptions and summary statistics for all of our variables in Appendix B.

<sup>13</sup>These are spread across 19 countries.

## Treatment

This paper attempts to causally identify the effects of adding a gate-crashing party to parliament on a host of dependent variables. As such, it requires a clear and definitive delineation of those parties that serve as gate-crashers, and those that do not. For the purposes of this paper, gate-crashers are to be defined by their level of electoral success, and specifically by whether they qualify for parliamentary representation or not. Thus, parties that gain parliamentary representation *may* be gate-crashers, those that do not cannot. Those that do qualify for representation are considered gate-crashers based on our analytic approach, with the likelihood of qualification as a gate-crasher increasing in just how narrowly representation was achieved. Thus, below I describe how I calculate a party's margin of representation, before moving on to discussing the substantive qualities of our gate-crashers.

For countries with national constituencies (where the district magnitude is the same as the entire legislature) and national electoral thresholds (Israel is one example), the calculation for margin of representation is a relatively straightforward task. The parties who barely cross the threshold enter the legislature by the difference between their vote total and the product of the threshold and the total number of valid votes in the national election, all divided by the national vote total. Similarly, the parties who *just miss* do so by the same difference, which will be negatively signed.<sup>14</sup>

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<sup>14</sup>Mathematically, our running variable in this instance is equal to:

$$\frac{\text{Marginal Party Votes} - (\text{Electoral Threshold})(\text{Number of Votes Nationally})}{\text{Number of Votes Nationally}}$$

However, when legislative seats are earned at sub-national levels, the process is slightly more complicated. Here, I identify the party who came closest to winning a seat in the parliament without doing so. In most cases, this is a party that competes nationally, but is closest to gaining a seat in one particular legislative district.<sup>15</sup> In some cases, it is a party that is competitive only regionally, but is still not quite strong enough to gain representation. For these parties, I calculate the percentage of votes by which they missed the final seat in the district.<sup>16</sup> I provide an example of how I calculate this in Appendix A.

Where possible, I also identify the party who only barely qualified for representation in the legislature. Where seats are earned below the national level, I restrict myself to parties that earned a single seat in the legislature or earned all of their seats in the legislature in the same district.<sup>17</sup> Here, I calculate the percentage of votes by which the party cleared the threshold between representation and no representation.<sup>18</sup> It should be noted that all election years in our sample have a party that “just missed,” but not all contain parties that “just made” the legislature. Merely having

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<sup>15</sup>Throughout this paper, I will refer to the division at which a party makes or misses a parliamentary seat a “district.” Depending on the country and electoral system, this can be anything from a small single-member municipality to the entire country.

<sup>16</sup>Mathematically, our running variable in this instance is equal to:

$$\frac{\textit{Marginal Party Votes in District} - \textit{Number of Votes Necessary to Gain Seat}}{\textit{Number of Votes in District}}$$

<sup>17</sup>This is due not only to the difficulty in identifying this party across multiple districts within country-election observations, but also to the strain this conceptually puts on what it means to “just make” the parliament.

<sup>18</sup>I again demonstrate how this works in Appendix A.

an observed “just missing” party, however, does not mean that the observation enters our analysis, which relies on *how close* the miss actually was.<sup>19</sup>

The final step in assigning “treatment” lies in paring the full set of observations down to those that will be included in our analysis. As described above, this is done through the bandwidth selection algorithm, removing discretion from the researcher’s hands. Once the restricted dataset is created, we term the parties that just barely crossed the threshold as gate-crashers, and compare the outcomes associated with their party systems to party systems (within the chosen bandwidth) with a party that just failed to qualify as a gate-crasher.

It is hopefully clear from this distinction that the attribute “gate-crasher,” as attached to a party, is transient and contextual. Parties can move from being a gate-crasher in one election to a non-gate-crasher in the next. In fact, this is the most likely outcome, as parties either fail to qualify for parliament, or develop enough electoral support that they cannot be considered as having “just” made the parliament. In this way, this designation is very much like the “bare winner” and “bare loser” designation that is frequently used when RD designs are applied to estimate incumbency effects in American politics (see, e.g. [Lee 2001](#) and [Caughey and Sekhon 2011](#)). There,

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<sup>19</sup>Note also that I could be faced with a situation where a party system has a party that just missed qualifying for representation, as well as a party that barely qualified for representation. While this is relatively uncommon, for our main analyses, I treat this as a system where a party just qualified, and remove the instance of a system that contained a party that barely missed. I do this because our theory above posits that it is the addition of any party that triggers either the psychological or practical effect I am concerned with, and having a party just left out of the parliament is ancillary to this effect. That is, it does not work as an antidote to the fragmentation that has already occurred. Most importantly, our main results are robust to this choice, and stand even if I include these systems twice (once on either side) of our estimation.

individual candidates tend to be “bare winners” or “losers” in only one election, before they either win or lose by a greater margin, or fail to compete again.

For the theoretical purposes of our paper, it is important to characterize substantively the parties that qualify as gate-crashers. My hypotheses rely on the assumption that these parties tend to be younger parties, with more extreme or populist platforms that may make it more difficult to govern effectively. Each of these assumptions holds when we investigate which parties are ultimately coded as gate-crashers. There is substantial overlap between the list of gate-crashing parties and what might traditionally be coded as “fringe” parties - electorally marginal parties whose main focus is not on a traditional left-right economic discussion. In general, these parties are also much younger than the average party in their party system, and far more likely to have never previously held seats in parliament.

Having established that the treatment captures accurately what we are attempting to estimate, I now move to a brief discussion of how I measure our five dependent variables.

### **Dependent Variables**

I have five main dependent variables, each attempting to capture a different aspect of democratic efficiency or representativeness. I discuss the intuition behind the inclusion of these variables in the section above, but want to clarify how these are measured in our data.

The *change in the effective number of parliamentary parties* is a weighted measure of the number of parties in a legislature that accounts for the relative strength of

the parties, adjusted for previous levels. Introduced in [Laakso and Taagepera 1979](#), the effective number of parliamentary parties has become a standard way to judge fragmentation in a legislature. Increasing numbers represent more nodes of influence in the legislature, and thus, more fragmentation. Here, I use the corrected version introduced by [Taagepera 1997](#) that accounts for systems with large groups of very small parties or large dis-proportionality between the seats allocated and the votes garnered, and use the change in this measure from the previous election.

Our second dependent variable, the *change in the size of the largest party in parliament*, is the vote share of the party that received the largest number of votes in the election of interest, adjusted for the electoral success of the previous election's largest party. I use vote share instead of seat share to avoid comparing countries that reward a disproportionate number of seats to election winners through a majority bonus system<sup>20</sup> with those that do not.

The *increase in wasted vote percentage* is our third dependent variable. I measure this as the change in the percentage of votes that are cast for a party that does not receive parliamentary representation from the previous election, divided by the latter number. When two different types of votes are cast,<sup>21</sup> I use the percentage of votes cast in the proportional aspect of the election for parties that do not gain seats, regardless of method. Thus, party list votes for parties who gain single-member district seats (but no proportional representation) are not considered wasted.

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<sup>20</sup>Greece is one example of such a country. Italy also used this system through parts of the last decade.

<sup>21</sup>As an example, German voters cast one ballot for a proportional party list and another for their single-member constituency.

Fourth, I use a dummy variable to capture whether there was a *complete electoral term*. If early elections were called, this variable takes on the value of “0,” if the term was completed and elections called on schedule, it takes value “1.”

Finally, I measure the causal effect of the inclusion of a gate-crashing party on the *percentage increase in the number of parties in the governing coalition*. Here, I use the number of parties in the first governing coalition that is formed directly after the election, as well as the number of parties that were in the original government formation of the previous election. Any changes in the makeup or number of parties in the coalition during the respective parliamentary periods are not included.

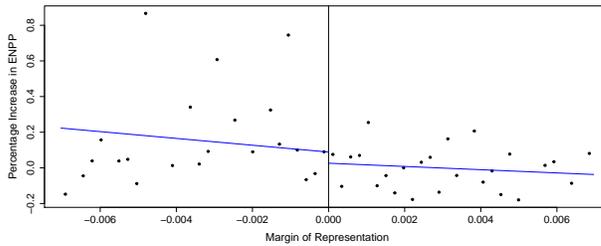
In the first three cases, I measure the effect of a party just making the parliament on the dependent variable in the *following* election. For the variables associated with a completed electoral term and the number of coalition parties, however, the effect measured is on the term in which the marginal party is seated in parliament.

## Results

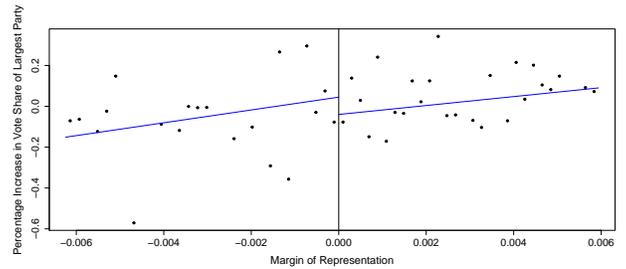
The results of a RD analysis are nearly always most easily understood when depicted visually, and so I begin with Figure 2. Here I have five graphs, each showing a dependent variable mapped above and below the threshold (where a gate-crashing party qualifies for parliamentary representation), and the local linear fits to the data within the MSE-optimal bandwidth. Figure 3 shows the same five variable relationships, but now presents a larger range of the dependent variable, as well as a smoothed locally weighted polynomial fit to the data, surrounded by 95% confidence

intervals. While my focus will be on the first set of graphs and the connected results, I find it useful to display both collections for the reader.

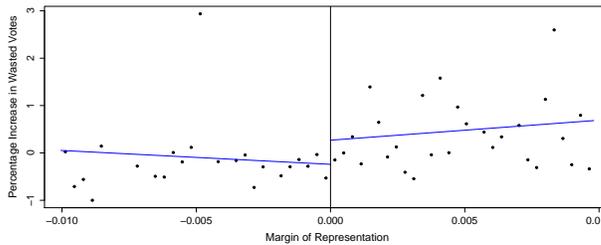
**Figure 2:** Local Linear Fits in the Optimal Bandwidths



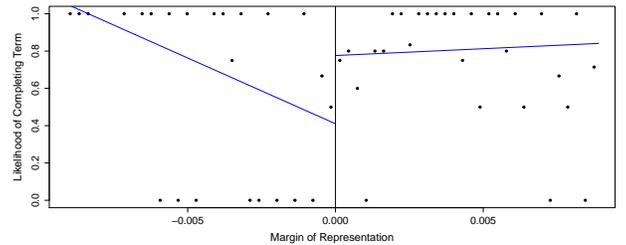
(a) Change in ENPP



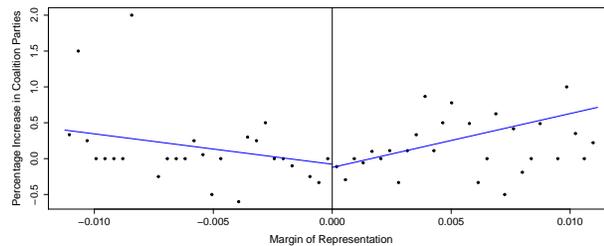
(b) Change in Lead Party Vote Share



(c) Change in Wasted Votes



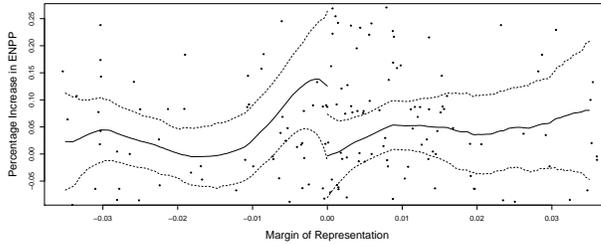
(d) Likelihood of Completing Electoral Term



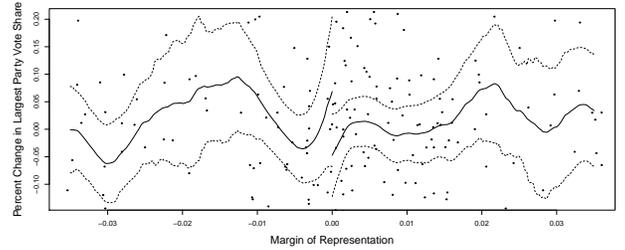
(e) Change in Number of Coalition Parties

Note first in Figure 2 that the optimal bandwidths for the analyses are all quite similar and compact, ranging from 0.7% to 1.1% on either side of the cutoff. I can thus confidently argue that the local linear fit on either side of the threshold is a

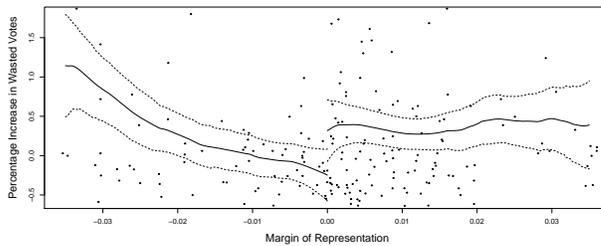
**Figure 3:** Smoothed Local Polynomial Fits, with Confidence Intervals



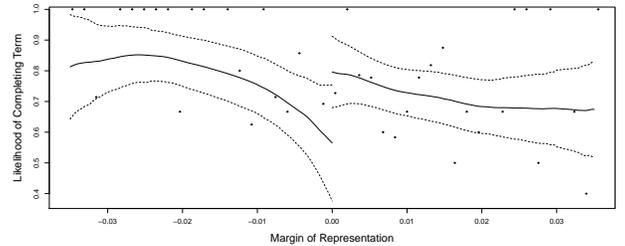
(a) Change in ENPP



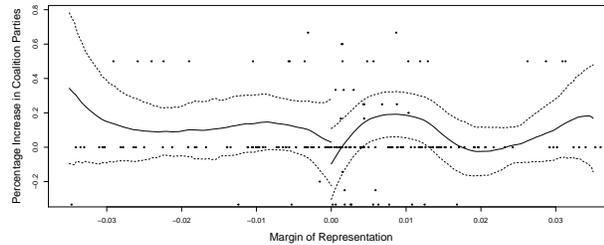
(b) Change in Lead Party Vote Share



(c) Change in Wasted Votes



(d) Likelihood of Completing Electoral Term



(e) Change in Number of Coalition Parties

plausible model for the actual continuous function that relates our running variable to our dependent variables. Were the bandwidths to be much wider, I might suspect that higher order polynomials would be necessary to properly fit the relationship.<sup>22</sup>

Second, looking at both figures suggests that adding a gate-crashing party may

<sup>22</sup>In fact, this is what the graphs in Figure 3 suggest as the bandwidths expand.

only affect two of our dependent variables: the change in wasted votes and the likelihood of completing an electoral term. This expectation is largely borne out when one looks at the detailed estimation results in Table 2.

The table presents two different results for each dependent variable. The top line in each set represents the naïve, conventional RD result, where the estimate is equal to the difference between the expected outcome at the threshold using the linear fit for treated cases and the expected outcome at the threshold using the fit for non-treated cases, and the variance is calculated as in a traditional weighted least squares estimation. However, this result fails to account for the bias-variance trade-off I conducted in the establishment of the MSE-optimal bandwidth, as well as the nonparametric aspect of the linear fit.<sup>23</sup>

Thus, the second line in each set of results presents a modified error and test statistic that account for the effects of misspecification, and the resultant increase in sampling error. Following Cattaneo, Idrobo and Titiunik (2017), I call this the “robust bias-corrected” result. It is derived from using a bandwidth that, instead of minimizing the MSE, minimizes the asymptotic coverage error rate (“CER”) of the ensuing confidence interval. In general, the robust bias-corrected error is larger than the conventional one, and the confidence intervals constructed using it are centered not on the conventional point estimate, but on a bias-adjusted point estimate. This estimate is excluded from the table because it is suboptimal to the conventional estimate when I use the MSE-optimal bandwidth.<sup>24</sup>

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<sup>23</sup>That is, I *know* that the model is misspecified, by the very nature by which I created it. More can be found on this in Cattaneo, Idrobo and Titiunik (2017), section 4.3.

<sup>24</sup>That being said, it is trivial to derive from the confidence intervals provided.

**Table 2:** Results of Regression Discontinuity Analyses

Dependent Variable	Method	Estimate	Std. Err.	z	P> z	95% CI
Change in Wasted Votes	Conventional	0.513	0.204	2.516	0.012	[0.113, 0.913]
	Robust Bias-Corrected		0.230	2.288	0.022	[0.075, 0.976]
Change in ENPP	Conventional	-0.066	0.092	-0.717	0.474	[-0.245, 0.114]
	Robust Bias-Corrected		0.103	-0.344	0.731	[-0.238, 0.167]
Change in Largest Vote Share	Conventional	-0.085	0.107	-0.797	0.426	[-0.295, 0.124]
	Robust Bias-Corrected		0.119	-1.047	0.295	[-0.358, 0.109]
Likelihood of Completing Term	Conventional	0.371	0.200	1.851	0.064	[-0.022, 0.764]
	Robust Bias-Corrected		0.235	1.691	0.091	[-0.063, 0.857]
Number of Coalition Parties	Conventional	-0.042	0.140	-0.301	0.764	[-0.317, 0.233]
	Robust Bias-Corrected		0.160	-0.432	0.666	[-0.383, 0.245]

The results in the table largely confirm what the visualizations suggested. First, there is a statistically and substantively significant effect of including a gate-crashing party on wasted votes in the election following that party’s inclusion. The estimate reflects that the growth in wasted votes is over 50% larger in systems that add a gate-crasher, with an expected increase in wasted votes of approximately 41% in these systems, and an expected reduction of 10% in systems where a party just missed parliamentary representation. Given that both groups experience roughly identical levels of wasted votes in the election I analyze (4.40% median for the control group, 4.25% for the treatment), an effect of this size equates to an expectation of approximately 4% of votes being wasted in the following election for systems where parties just miss, and roughly 6% of the votes wasted in systems where parties just qualify for representation. This is a substantively large percentage of voters who may perceive themselves as voiceless within their democratic system.

It should be noted that this is a pooled result across systems where the marginal party added can represent either a small or large proportion of the number of parties

in parliament. As such, one might be concerned that the overall effect is driven by only a subsample of the parliamentary systems under study (Cattaneo et al. 2016). I address this concern in Appendix F, where I break down the sample into discrete subsamples where elections yield either  $x$  or  $x + 1$  parties, and run the same analysis covered above on each subsample separately.<sup>25</sup> I now move on to the remaining dependent variables.

While only reaching statistical significance at the  $\alpha = 0.10$  level, the result concerning the likelihood of completing the electoral term is suggestive and substantively very interesting. First, the effect is large, if imprecisely measured. The estimate suggests that adding an additional small party to parliament can increase the probability of completing the electoral term from approximately 43% to just over 80%. Second, this effect is in the opposite direction of that predicted, with the specific type of fragmentation analyzed here actually *aiding* in democratic stability.<sup>26</sup>

In hindsight, of course, this is perhaps not so shocking. Parties that just cross the electoral threshold have very little incentive to support calls for early elections (either by the government or via a vote of no confidence), as they are at risk of falling just on the other side of the cutoff and missing out on representation in the next parliamentary session. Unless there is reason to believe that they will profit

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<sup>25</sup>I complete an additional series of robustness checks in the Appendices. In Appendix C, I approach the issue through an entirely different RD framework, that of local randomization rather than continuity. In Appendix E, I report results from specifications of the continuity-based framework that vary over selections of kernel, polynomial order, and the number of bandwidths. As I discuss in each Appendix, the effect of the inclusion of a gate-crashing party on wasted votes is robust to these changes.

<sup>26</sup>In Appendix G, I break down the analysis by number of parliamentary parties as I did for wasted votes in Figure 5 in Appendix F. I find the effects are still positive for nearly all sizes of parliamentary party contingents, except at very high levels of party numbers. Again, though, these effects are even more imprecisely measured than those attached to the wasted vote analysis.

incredibly from new elections, they are likely to serve as stabilizing forces out of their own self-interest.

Similarly, one might imagine that an additional party in parliament could simultaneously affect the way governmental coalitions are formed and maintained, while also fracturing the opposition. In the former case, the existence of a gate-crashing party in parliament could allow the leading party to form a cabinet more to its liking (and alleviating one of the reasons for a future call for snap elections) by enlarging the pool of potential coalition partners.<sup>27</sup> In the latter, there is no assurance that a gate-crashing party that qualifies will have the same concerns as larger parties in the opposition, nor join them in coordinated efforts to undermine the governing coalition.<sup>28</sup> In any event, this result deserves greater research in the future.

In each of the other three analyses (those concerned with the largest party's vote share, the number of parties in a coalition, and the future level of parliamentary fragmentation), I find no evidence for my hypothesized effects. The estimates are all substantively small and fail to reach traditional levels of statistical significance.<sup>29</sup> These null findings suggest that the introduction of a gate-crashing party to the parliament does not affect these direct measures of democratic efficiency. It is certainly

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<sup>27</sup>Consider, for instance, the 2016 Slovakian elections, and the aforementioned Network party. By barely qualifying for parliamentary representation, Network increased the number of possible coalition parties that lead party Smer-SD could join in talks and negotiations. This was particularly important as Smer-SD had already ruled out cooperating with the far-right Kotleba People's Party Our Slovakia, who won over 8% of the votes and 9% of seats.

<sup>28</sup>Consider here the Bulgarian Volya, who barely won entry into the Bulgarian parliament in 2017 and has campaigned on sweeping away the political corruption it sees as rampant not only in government parties, but in the opposition as well. This is a common difficulty when the gate-crashing party has run on a populist anti-elite platform.

<sup>29</sup>In fact, in two of the three cases, the estimates are in the opposite direction of the predictions, though the confidence intervals around them suggest that any effect could just as well run in the same direction.

possible that fragmentation of another type (the flattening of vote shares among medium and large parties, for instance) *does* have a deleterious effect on these and other measures, of course, but those are not captured here. I discuss the broader implications of all of the results below.

## Discussion

In this paper, I applied a regression discontinuity design to assess the causal effect of a particular type of party system fragmentation: the addition of an electorally marginal parliamentary party. I found that, contra expectations, an addition of this type of gate-crashing party does not seem to affect certain key measures of democratic efficiency or future fragmentation. However, adding a gate-crasher *does* greatly increase the percentage of wasted votes in the following election. In addition, there is suggestive evidence that these parties can be system stabilizers, increasing the likelihood that the parliament runs its full term.

Despite worries that the introduction of gate-crashing parties (which can tend to support tightly focused platforms on niche issues or present themselves as anti-establishment) can upset the stability of the parliament, I find no evidence that this addition has such a direct effect. There is no increase in the number of parties needed to form a governing coalition, and the vote share of the largest party in the following election (and thus, their relative strength in forming coalitions) is not affected. On a more systemic level, fragmentation of this type has no effect on future fragmentation *of any type*. Systems that add gate-crashing parties in one election are no more likely

to see their effective number of parliamentary parties increase than systems that see a party just miss out. This dampens concerns about a self-reinforcing spiral where the introduction of electorally marginal parties acts as a catalyst to ever-increasing fragmentation.

On the other hand, I find strong evidence that the inclusion of a gate-crashing party greatly increases the percentage of wasted votes in future elections. As discussed above, there are deep theoretical and empirical literatures on the relationship between individuals casting votes for parties that fail to gain representation in the parliament and feelings among those same individuals of being voiceless and dissatisfied with democratic outcomes. The finding that gate crashers do not seem to negatively affect our measures of democratic efficiency arguably amounts to a second order concern if there is still a marked increase in dissatisfaction among the electorate. In other words, it might not matter if democracy is resilient to small levels of fragmentation in practice if a large enough percentage of the populace *believes* otherwise. Thus, the findings surrounding the increase in wasted votes call for far more research.

The possible mechanisms behind the increase in wasted votes are important to tease apart. While I hypothesized that voters may perceive the representation of gate-crashing party in parliament as a type of “proof of concept” for other niche parties and be more willing to forgo strategic voting, I cannot establish this as the definitive mechanism with the analysis conducted here. One might alternatively believe that the parties that qualify for parliament attract the attention of larger parties, who move to co-opt the smaller party’s major points of attraction (similar

to arguments made in [Meguid 2005](#) and [Meguid 2010](#)). In this case, one might very well see some portion of the votes gained by the small party transferred to a larger party, while the party's remaining supporters lose their voice in parliament, increasing the percentage of wasted votes. Additional work is required to adjudicate between these possible mechanisms, or others.

similarly, the results surrounding parliamentary term completion demand additional research. While scholars have noted the relationships between government survival and the ideological diversity of the parties involved, the distribution of votes, and the returnability of parties (but see [Chiba, Martin and Stevenson 2015](#) for a discussion about concerns with selection bias that may weaken these results), there has been relatively scant work on how the constitution of the parliament itself may work to stabilize or destabilize the government ultimately chosen. In particular, the case I describe here (where a gate-crashing party may have competing concerns of both strong opposition and the compelling desire to remain in parliament) deserves deeper consideration, especially as party systems may be becoming more volatile or open to new entry parties.

Finally, it should be noted that this paper has only analyzed the causal effects of a particular type of parliamentary fragmentation. It may well be that other types are far worse for democratic efficiency and serve to exacerbate the effects I find here. What seems most pressing from a research standpoint is identifying the different avenues through which party systems fragment, the degree to which these avenues are interrelated, and how this interaction manifests itself in democratic outcomes.

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## Appendix A: Sample Running Variable Calculation

In this Appendix, I provide an example of how I calculate our running variable when legislative seats are distributed at the sub-national level. Consider a country where legislative seats are distributed in multi-member districts using a D'Hondt method. In Table 3, I display the voting results from a district that allocates 8 seats, and has 4 parties competing and earning the votes as displayed in the second column.<sup>30</sup>

**Table 3:** Sample District, Election Results

Denominator	1	2	3	4	5	Seats Won
Party A	200,000*	100,000*	66,666*	50,000*	40,000	4
Party B	160,000*	80,000*	53,333*	40,000	32,000	3
Party C	60,000*	30,000	20,000	15,000	12,000	1
Party D	40,000	20,000	13,333	10,000	8,000	0

Asterisks denote a seat allocation.

There are 460,000 total votes, and the final seat in the district is allocated to Party A. Party D misses a seat by 10001 votes<sup>31</sup> out of 460,000 votes, or approximately 2.17%. Note that I do not assume that the votes come from any of the parties currently allocated seats, but rather could be shifted from the votes for losing parties. This is not a particularly strong assumption, as there are almost always parties who receive fewer votes than our marginal party, but whose votes - when summed across all such parties - total more than the margin between representation and no seat.<sup>32</sup>

<sup>30</sup>The numbers and setup of this example are constructed from the following website: <http://www.moonwise.co.uk/dhondt.php>.

<sup>31</sup>I assume throughout that tiebreaker procedures would cut against the party in question, so they needed to gain one more vote than earned the final seat.

<sup>32</sup>More to the point, while I recognize the possibility of a distribution of votes that does not satisfy this assumption, in actuality such a distribution never appears in our data. There are always more than enough votes of this type to cover the margin.

In order to demonstrate how I calculate the running variable for those parties who just qualify for the legislature, consider the case where Party C's lone seat in the legislature was garnered in this district. I would say that Party C made the legislature by 20,000 votes, or 4.35%. Had the party received 20,000 fewer votes,<sup>33</sup> they would not be represented in the legislature.

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<sup>33</sup>Here, I assume these votes are distributed in a way that does not change the allocation of seats.

## Appendix B: Summary Statistics

**Table 4:** Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Max
Number of Legislative Parties	387	7.501	2.925	3	15
Completion of Electoral Term	362	0.740	0.439	0	1
Largest Party Vote Share	389	0.345	0.079	0.152	0.523
Percent Change in Largest Party Vote Share	355	0.007	0.200	-0.571	0.658
Effective Number of Parliamentary Parties	389	4.070	1.315	2.090	8.690
Percent Change in ENPP	355	0.040	0.229	-0.423	0.970
Wasted Votes	389	0.060	0.056	0.002	0.351
Percent Change in Wasted Votes	355	0.293	1.080	-1.000	5.044
Number of Coalition Parties	385	2.831	1.638	1	8
Percent Change in Coalition Parties	357	0.142	0.663	-1.000	3.000
Rate of Complete Electoral Terms	389	0.762	0.233	0.000	1.000
Age of Democracy	389	42.211	33.664	0	123
Historic Variability in ENPP	389	0.553	0.377	0.000	1.496

## Appendix C: Local Randomization Design

Instead of a continuity-based approach to the RD design, one might employ a design based on local randomization. This approach relies on the assumption that, in a tight window around the cut-off, whether an observation qualifies as in the control or treatment group (that is, whether the observation occurs to the left or right of the cutoff) is essentially random. To the extent that this assumption is plausible, one can then use statistical techniques generally used in experimental setups to analyze the effect of crossing the threshold itself. This approach can present a stiffer test, as the window is generally smaller than the bandwidth associated with the continuity-based test, shrinking the number of appropriate observations and decreasing the power of one's tests. In this Appendix, I employ this design as a form of robustness test for our continuity-based results. I describe it in depth below, before presenting the results.

I construct a window around the cut-off (where the margin of representation is equal to 0) in a data-driven and systematic way that restricts the degrees of researcher freedom available to us and lends itself to replicability of our results. Specifically, I select a group of predetermined<sup>34</sup> covariates that may be associated with our running variable everywhere except inside a small window around the cutoff. These covariates should also be plausibly related to our dependent variable.

Once I select this group of covariates and the way in which I test their balance within a particular window,<sup>35</sup> I start the window-selection procedure with a window

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<sup>34</sup>Here, I simply mean the values taken by the covariates are known before the treatment occurs.

<sup>35</sup>This includes whether the test will be based on a difference in means across treated and untreated groups or some alternative, the randomization mechanism on which the test will be based, the minimum of observations in a window, and the statistical threshold at which I test the balance.

that includes the minimum number of observations and iteratively extend it outwards until balance is no longer achieved in our test.<sup>36</sup>

In this project, I believe three covariates in particular are important to consider in the construction of our window. The first is the system's historical variability, which I measure here as the standard deviation in the effective number of parliamentary parties in all of the elections prior to the election of interest. The second is the percentage of previous parliaments that completed their term.<sup>37</sup> The final covariate I believe is importantly related to the dependent variables is the age of the parliamentary democracy.

In each of these cases, these variables are likely to have an independent effect on our dependent variable. Countries with high levels of historic variability in their number of parliamentary parties should be expected to continue that trend, which could have an adverse effect on our estimation of the causal effect of a marginal party, especially when I discuss the change in parliamentary parties between elections. Similarly, countries that are more (or less) prone to calling early elections should be balanced across our control and treatment cases, particularly when estimating the effect of a marginal party on completion of term.

I also include the age of the democracy given the widely-held belief that older, more-established democracies tend to be more stable and experienced with small perturbations to their legislatures. In this case, I want to balance our sample across

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<sup>36</sup>Annotated code for the window-selection process and all other results is available on the author's website, as well as upon request.

<sup>37</sup>Conversely, this can be thought of as: (1 - the percentage of previous parliaments that ended in calls for an early election).

treatment and control because it recognizes that both parties and individual voters may be less likely to respond to the feeling of greater fractionalization and chaos.

Within the window selected, I use a simple difference-in-means test statistic that is evaluated in two ways. First, I conduct a randomization-based test of the Fisherian sharp null hypothesis that the effect is zero via simulation methods, which yields an exact associated p-value in a finite sample. Second, I calculate the p-value associated with a test of the Neyman null hypothesis that the average treatment effect is zero. These Neyman inferences are based on the large sample approximate behavior of the statistic, and the p-value itself is also not exact. The former test is focused testing the specific sharp null (which in all of our cases will be at zero), while the latter is more focused on point estimation of the effect size. With the Fisherian test, I also calculate a range of values for the treatment effect for which I would fail to reject the null, were the null to be assigned at that effect size, and tested at the traditional  $\alpha = .05$  levels.

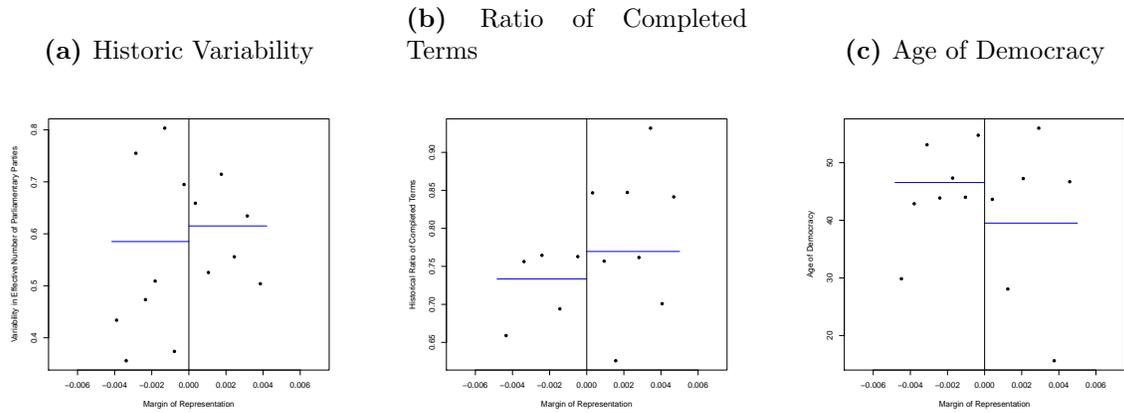
## **Results**

Our results from this approach mirror those in the main paper. I continue to find little evidence of direct effects of marginal parties on the various democratic outcomes, but continue to find a statistically and substantively significant effect on the amount of wasted votes in the following election. I first discuss the window in which I conduct each of our analyses.

As discussed directly above, the choice of window is data-driven, based on the largest area around the cutoff where our chosen predetermined covariates are bal-

anced (and thus, unlikely to bias our results). Our covariates are balanced in the symmetric window  $[-0.0042, 0.0042]$ .<sup>38</sup> This suggests that I can reasonably compare systems where parties just made or just missed qualifying for parliamentary representation by 0.42% points *in the decisive election*. In Figure 4, I show the traditional RD plots visualizing the balance across these variables inside our window. By construction, none of these differences are statistically significant at the  $\alpha = .15$  level.

**Figure 4:** RD Plots of Predetermined Covariates



In the window of local randomization, I have 120 observations when the dependent variable is measured in the following election (that is, the change in the size of the largest party, the change in the effective number of parliamentary parties, and the increase in wasted votes) and 121 observations when the dependent variable is measured in the election of interest (the completion of an electoral term and the increase in the number of coalition parties).

I present the results of our pooled analysis for five tests in Table 5 below.

<sup>38</sup>I use a Kolmogorov-Smirnov test statistic with  $\alpha$  set at 0.15, such that any differences in the covariates across treatment and control more “significant” than this violates our balance.

**Table 5:** Results, Pooled RD tests

Dependent Variable	N	Diff. Means	Finite-Sample P>T	Large Sample P>T	Fisherian 95% CI
Change in Wasted Votes	120	0.508	0.003	0.013	[0.14,0.87]
Change in Effective Number of Parliamentary Parties	120	-0.049	0.26	0.257	[-0.13,0.04]
Change in Largest Party Vote Share	120	0.005	0.667	0.665	[-0.026,0.017]
Likelihood of Completing Term	121	0.121	0.135	0.112	[-0.03,0.28]
Increase in Coalition Parties	121	-0.094	0.43	0.386	[-0.3,0.13]

Interpretation of the results is fairly straightforward and follows very much in line with the main results. The estimated effect of adding a small parliamentary party is a nearly 51% increase in wasted votes in the following elections, spread between a 42% increase in systems that add the party and a 8.8% decrease in systems where a party just misses qualifying for representation.

The remaining four dependent variables still have estimated effects that fail to meet traditional levels of statistical significance, but the imprecisely measured effect attached to the likelihood of completing the term is substantively large and theoretically interesting.

## Appendix D: Elections Used in Dataset

**Table 6:** Elections Currently in Sample

<b>Country</b>	<b>Years in Sample</b>	<b>Number of Elections</b>
Austria	1923-2017	25
Bulgaria	1991-2017	9
Croatia	2003-2016	5
Czech Republic	1992-2017	8
Denmark	1990-2015	8
Estonia	1995-2015	6
Germany (West Germany)	1949-2017	19
Greece	1993-2015	10
Israel	1949-2015	20
Italy	1948-2013	17
Latvia	1993-2014	8
Luxembourg	1999-2013	4
Netherlands	1946-2017	22
Norway	1945-2017	19
Poland	1993-2015	7
Slovakia	1990-2016	9
Slovenia	1992-2014	7
Spain	1979-2016	12
Sweden	1970-2014	14

## Appendix E: Robustness of Continuity-Based Design

In this appendix, I test the robustness of the results surrounding the increase in wasted votes. In general, our main analysis follows the best practices of continuity-based RD design, but in this section, I vary the selections of kernel, polynomial order, and the number of bandwidths in order to confirm that the results are robust to alternative approaches. I first describe the possible alternatives, and then display all results in Table 7.

### Kernel

To derive the main results, I used a triangular kernel and a local-linear estimation. However, one might prefer a uniform kernel that weights all observations within the bandwidth equally, rather than by their proximity to the cutoff. Thus, I re-estimate the effect of adding a small parliamentary party on the increase in wasted votes using a uniform kernel.

### Polynomial Order

Following best practices, I estimated our main effects using a local linear estimator that provides a balance between the accuracy of the estimation and variability of the estimate. In the tests presented below, I increase the order of the polynomial (allowing for a second and third order fit to the data on either side of the cutoff), which increases both the accuracy and variability of the estimate.

## Bandwidth Selection

I employed a bandwidth selection process focused on optimizing the mean-squared error in our original estimation, while also constructing the confidence intervals using a bandwidth that minimizes the asymptotic coverage error rate. In both cases, however, I constrained the bandwidths on both sides of the cutoff to be identical. In practice, this is not necessary, and so below I report tests that loosen this restriction. Here, different bandwidths are used for estimation on the left and right sides of the threshold, optimizing the MSE for each respective estimation.

## Results

Table 7 presents the results of our alternative specifications. Only a change in the polynomial order affects the statistical significance of our results, though even there it is the increased variability forced on the fit and the widening of the bandwidth that causes this change. The estimates are still substantively large, and similar to the main result presented in the paper.

**Table 7: Robustness Results - Wasted Votes**

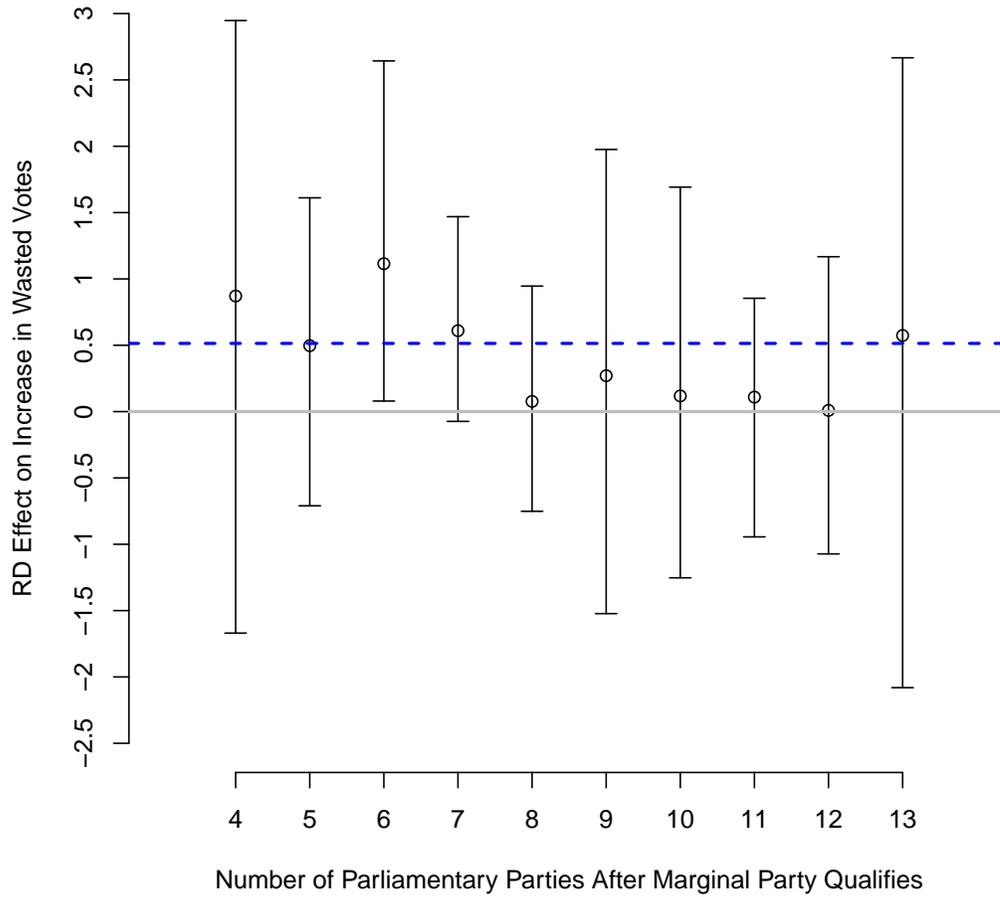
Specification	Kernal	Order	Bandwidth (L)	Bandwidth (R)	Estimate	Std. Err.	z	P> z	95% Conf. Int.
Baseline	Triangular	1	.010	.010	0.514	0.204	2.520	0.012	[0.114, 0.914]
Change in Kernal	Uniform	1	.008	.008	0.501	0.223	2.251	0.024	[0.065, 0.937]
Polynomial Order - 2	Triangular	2	.013	.013	0.444	0.257	1.728	0.084	[-0.060, 0.948]
Polynomial Order - 3	Triangular	3	.015	.015	0.398	0.312	1.273	0.203	[-0.215, 1.010]
Unequal Bandwidths	Triangular	1	.008	.024	0.685	0.208	3.285	0.001	[0.276, 1.093]

## Appendix F: Subsample Analysis for Wasted Votes

In this Appendix, I show that our pooled result for the increase in wasted votes is not driven by a particular set of observations, or party systems. In order to assess this concern, I break down our sample into discrete subsamples where elections yield either  $x$  or  $x + 1$  parties, and run the same analysis covered above on each subsample separately. Thus, I measure the effect in each subsample of moving from  $x$  to  $x + 1$  parties, using the identical RD framework. The results are displayed in Figure 5.

I immediately note that, reassuringly, all estimates are positive, if imprecisely measured due to our sample disaggregation. There may be some deterioration in the effect as the number of parliamentary parties increases, though I do not have enough data to test this robustly. The estimates in the subsamples where I have the greatest support (systems having anywhere from 5 to 8 parliamentary parties, represented in the Table by the 3rd-5th results) all see similar effect sizes and a combined effect that also nearly replicates our overall pooled effect. These results all tend to suggest a robustness to our main result.

**Figure 5:** RD Effects at Different Levels of Parliamentary Parties

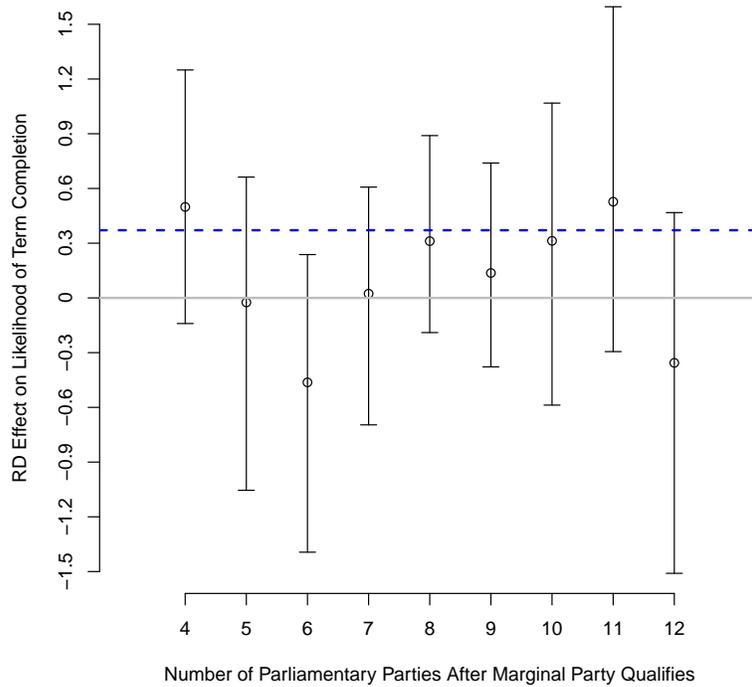


Estimates are calculated in the same manner as in the main analysis, and 95% confidence intervals are constructed using robust bias-corrected standard errors. The dashed blue line represents the pooled effect.

## Appendix G: Subsample Analysis for Likelihood of Completing Electoral Term

In Figure 6 below, I analyze each subsample of possible parliamentary party numbers as described in the main text surrounding the increase in wasted votes. Here, however, our dependent variable is the likelihood of completing a full electoral term.

**Figure 6:** RD Effects at Different Levels of Parliamentary Parties, Full Term Completion



Estimates are calculated in the same manner as in the main analysis, and 95% confidence intervals are constructed using robust bias-corrected standard errors. The dashed blue line represents the pooled effect.

As discussed in the body of the paper, most of the results are positive and approach the pooled result (here, 0.371). However, all results are very imprecisely measured due both the reduced sample size and the noisiness inherent in a binary outcome (survival vs. early elections). This figure invites additional research into how different types of fragmentation may have mixed effects on government survival.