Political fragmentation and government stability. Evidence from local governments in Spain

Felipe Carozzi[1]

London School of Economics

Davide Cipullo[2]

Uppsala University

Luca Repetto[3]

Uppsala University

Abstract

This paper studies how political fragmentation affects government stability. Using a regression-discontinuity design, we show that each additional party with representation in the local parliament increases the probability that the incumbent government is unseated by 5 percentage points. The entry of an additional party affects stability by increasing both the probability of a single-party majority and the instability of governments when such a majority is not feasible. We interpret our results in light of a bargaining model of coalition formation featuring government instability.

Keywords: Government Stability; Fragmentation; No-confidence votes; Bargaining.
JEL classification: H1, H7, R50

First Version: February 2019
This Version: September 2020

[1]Department of Geography and the Environment. London School of Economics. Houghton Street. London WC2A 2AE. Email: F.Carozzi@lse.ac.uk.

[2]Department of Economics, Uppsala University, SE-751 20 Uppsala, Sweden. Email: davide.cipullo@nek.uu.se.

[3]Department of Economics, Uppsala University, SE-751 20 Uppsala, Sweden. Email: luca.repetto@nek.uu.se.

This paper previously circulated as "Divided they fall: Fragmented Parliaments and Government Stability". We would like to thank the editor Ilyana Kuziemko, two referees, Alberto Alesina, Inés Berniell, Germán Bidegain, Jan Bietenbeck, Michael Blanga-Gubbay, Daniel Buquet, Davide Cantoni, Guillermo Caruana, Stefano DellaVigna, Albert Falcó-Gimeno, Olle Folke, Horacio Larreguy, Gianmarco León, Monica Martinez-Bravo, Eva Mörk, Salvatore Nunnari, Henry Overman, Torsten Persson, David Strömberg, Ferenc Szucs, Pilar Sorribas-Navarro, Janne Tukiainen, Stephane Wolton, and seminar participants at UCFS, Universidad de La Plata, SSE-SITE, Uppsala University, Harvard University, Helsinki GSE, LSE, European Commission - JRC (Ispra), Central European University, IEB - Universidad de Barcelona, CEMFI, Stockholm University, Spring Meeting of Young Economists, Instituto de Ciencia Politica - UDELAR, and the 75^{th} Annual Congress of the International Institute of Public Finance for comments and suggestions.

1. Introduction

Political instability is widely held to be a major obstacle to global economic development (UN, 2018). Frequent government turnover can be harmful because it increases uncertainty about policy, which could in turn discourage investment and reduce growth.[1] On the other hand, the ability to unseat and replace unfit politicians is one of the pillars of democratic rule. Striking a balance between stability and accountability is a significant challenge for parliamentary democracies.

Unstable governments have been historically associated with fragmented parliaments. Topical cases include the Weimar Republic in Germany and the Fourth Republic in France. More recently, Spain experienced its first successful vote of no confidence in 2018, after the entry of new parties in Congress challenged the established two-party system. Despite the abundance of examples, to date, we lack rigorous evidence on whether the association between fragmentation and stability is indeed causal. The main empirical issue lies in finding exogenous variation in fragmentation, especially when using national level data.[2]

The main aim of this paper is to provide credible empirical evidence on the effect of parliamentary fragmentation on government stability. Using a regression-discontinuity (RD) design and a large dataset of local-level elections, we show that fragmentation – measured by the number of parties achieving representation – has a sizeable and negative effect on stability. This effect operates via two channels. In the first place, more fragmented local councils are less likely to have a single-party majority. Secondly, the entry of an additional party has a large, negative effect on stability even in councils where a single-party majority is unfeasible. To contextualize our findings, we propose a two-period bargaining model with the possibility of government turnover where party entry can affect stability by allowing the largest party to form a cheaper, but less stable, coalition.

The empirical strategy relies on a dataset covering over 50,000 Spanish municipal governments, spanning all full terms between 1979 and 2014. Using local-level data allows us to overcome some important limitations of previous empirical work on the determinants of government stability. First, government breakdowns – such as no-confidence votes or *coups* – are rare events; thus, the available variation in cross-country studies is limited. We take advantage of the richness of our data, which contain information on a large number of local governments and provide us with roughly 1,000 successful no-confidence votes. Second, finding credible sources of exogenous variation in the determinants of stability is typically hard. We exploit institutional features common to all Spanish municipalities to generate

[1]Cross-country evidence documenting a positive association between political stability and growth can be found in Barro (1991), Alesina et al. (1996), and, more recently, Arezki and Fetzer (2019). Recent work has also emphasized the effect of policy uncertainty on investment (Bloom, Bond and Van Reenen, 2007; Julio and Yook, 2012), hiring (Baker, Bloom and Davis, 2016), bank lending (Bordo, Duca and Koch, 2016) and, ultimately, growth (Bloom, 2014). Bernanke (1983) provides an early theoretical model linking policy uncertainty to reduced investment.

[2]Previous work has generally relied on observational methods. For example, Taylor and Herman (1971) estimate the effect of fragmentation on stability using a limited set of controls. Merlo (1998) analyse the duration of Italian national governments using a duration model controlling for government characteristics such as majority status or aggregate time-series variables. Diermeier, Eraslan and Merlo (2003) use data on 255 governments for nine Western European countries to estimate a structural model of government formation.

quasi-experimental variation that can be used to identify the causal effect of fragmentation on stability. Our results can be informative about the determinants of stability of national governments because Spanish municipalities share many of the common traits of modern parliamentary democracies. Each has the equivalent of a parliament that appoints the executive, and the possibility of using a no-confidence vote to unseat the incumbent.

To study the effect of fragmentation — measured as the number of parties with representation – we exploit a discontinuity in the probability that a party obtains a seat in the local council generated by a 5% vote-share admission threshold. Municipalities in which one party obtained a vote-share just above this threshold have, on average, more parties in the council than municipalities in which the party fell just below the threshold. We use this variation in an RD design, and find that the entry of an additional party leads to a 5 percentage-point increase in the probability of the local mayor being voted out of office and replaced by a challenger. This effect is large, amounting to twice the corresponding baseline probability.

To guide the empirical analysis, we build on Baron and Ferejohn (1989) and Persson and Tabellini (2002) to develop a two-period sequential game of coalition formation in which parties bargain over the allocation of budgetary resources. The probability that the incumbent is unseated by a vote of no confidence in the second period depends on the number of parties with representation in Parliament via two channels. First, more fragmented legislatures are less likely to have stable single-party majorities. Second, coalition governments elected by more fragmented parliaments are more likely to be unseated, because coalition members tend to be smaller and can be persuaded to support a no-confidence vote by being offered a lower share of the budget. The mechanisms at the core of our theoretical framework are general and do not rely on specific institutional features of Spanish municipalities. Hence, the model also helps emphasize the potential external validity of our empirical findings.

Designers of electoral rules can use the admission threshold to Parliament as a tool to achieve more stability.[3] Keeping the observed vote-share distributions fixed, we estimate that increasing the vote-share threshold from 5% to 6% would reduce the number of parties and, correspondingly, the probability of unseating the government, by 0.75 percentage points, one-fourth of the baseline probability. Similarly, lowering the threshold from 5% to 4% would increase the likelihood of replacing the government by 0.6 percentage points.

Our analysis is partly motivated by the fact that fragmentation has become a prominent feature of parliaments all over the world. Over the last few decades, fragmentation has risen steadily, reaching unprecedented levels. In OECD countries, the average number of parties with representation in Parliament has grown from 7 in the late 1940s to 9 in the 1980s, and exceeds 10 as of 2019 (see Figure D.1 in Appendix D). As mentioned above, previous empirical work on the determinants of government stability typically relies on strong assumptions for identification.[4] One exception in this regard is the work by Gagliarducci and Paserman

[3]High admission thresholds also present the problem of leaving a large part of the electorate without representation in the Parliament. We do not discuss issues of representation in our paper.

[4]For example, Taylor and Herman (1971) and Merlo (1998) provide reduced-form evidence, whereas Merlo

(2011), which uses an RD design and focuses specifically on estimating how the gender of the executive head affects government stability. Our contribution to this line of research lies in providing rigorous causal evidence on key drivers and consequences of government stability.

Theoretical models of legislative bargaining featuring government instability in a parliamentary setting can be found in Lupia and Strøm (1995), Baron (1998), and Diermeier and Merlo (2000). All of these models feature legislative bargaining between three parties, and include shocks to economic or electoral prospects that can induce renegotiations and votes of no confidence. More recently, Francois, Rainer and Trebbi (2015) present a simple model of coalition formation with the risk of coups or revolutions to understand power-sharing arrangements in African countries. Our model contributes to this literature by explicitly studying how an increase in the number of parties with representation affects stability. The main predictions are derived without specifying parties' preferences for specific coalition partners, though we include party-level heterogeneity in bargaining resources.

Finally, our results relate to a broad strand of the political science literature that studies the effects of political institutions on stability. The pioneering work by Linz (1994), who argues that presidentialism is inherently less stable than parliamentarism, sparked an intense debate. More recent studies have highlighted the role of differences within the electoral system due to, for example, the fragmentation of the party system (Mainwaring and Shugart, 1997), or the ability to form coalitions (Cheibub, Przeworski and Saiegh, 2004). In this paper, we focus on an institutional feature shared by most parliamentary systems – the vote share threshold – and study how it impacts stability through its effect on the number of parties represented in the Parliament.

2. Theoretical Framework

We start by presenting a two-period coalition-formation game that links government instability to the number of parties represented in Parliament. In each period, a party is chosen as the agenda setter or *formateur* with some probability. The agenda setter has the right to propose a transfer allocation to other parties to form a governing coalition. The setting draws on elements from the seminal work by Baron and Ferejohn (1989), and has features in common with Diermeier and Merlo (2000). Government instability in our context is driven by the possibility that the incumbent is unseated and replaced by a different party via a no-confidence vote. To our knowledge, this is the first formal model relating fragmentation with political instability.

Variation in the number of parties admitted in Parliament affects government stability through two channels: (i) it changes the probability of a single party having a majority of seats, and (ii) it has an effect on the size of the minimum winning coalition needed to secure a majority when no party has a majority of seats. Smaller coalitions are cheaper to form, but

(1997) and Diermeier, Eraslan and Merlo (2003) obtain structural estimates of a government-formation model. Baron, Bowen and Nunnari (2017) and related work explore the determinants of coalition stability in the lab.

also easier to unpick by a competitor. As a result, the entry of an additional party in Parliament decreases stability. We illustrate the case in which the number of parties increases from three to four and leave the treatment of other cases for Appendix A.

2.1. Model Setup and Timing

We present a sequential, two-period game of coalition formation with complete information. There are J parties with seat-shares $[s_1, ..., s_J]$ satisfying $\sum_{j=1}^{J} s_j = 1$ and $s_1 > s_2 > ... > s_J$. We can think of parties as representing groups of voters, each with a specific and exclusive policy agenda, so that all politicians belonging to a party have the same preferences (Persson and Tabellini, 2002). In each period, the payoff function for party j is $u_j^t = g_j^t + \omega \mathbb{1}\{j = m\}$, where g_j^t is the approved party-specific transfer in period t, and m is the party-index of the mayor in that period. Parameter $\omega > 1$ captures ego rents from holding office. Future payoffs are discounted by $\beta \leq 1$.

There are two potential *formateurs*, party 1 and 2, that coincide with the parties with the highest and second-highest seat shares, respectively. Parties 1 and 2 differ in the resources they can allocate among coalition members, denoted as θ_1 and θ_2, respectively. θ_1 and θ_2 are continuously distributed on the unit square $[0, 1] \times [0, 1]$, and are known to all players at the start of the game. θ_1 and θ_2 can be interpreted as characteristics of the parties – for example ability or political connections – which affect the total amount of resources available for bargaining. Because transfers are bounded by 1, the assumption that $\omega > 1$ makes preferences lexicographic – the agenda setter will always prefer to be in power, regardless of any feasible transfers they may receive if supporting another party.

The timing of the sequential game is as follows. In the first period, party 1 is selected as agenda-setter and attempts to form a coalition by offering a vector of transfers $g^1 = [g_1^1, ..., g_J^1]$ with $g_j^1 \geq 0, \forall j$ and $\sum_{j=1}^{J} g_j^1 \leq \theta_1$.[5] Other parties decide whether to accept the proposal by party 1. If the proposal is accepted by a majority of Parliament, a coalition is formed and each party receives its payoff. If the proposal does not gather enough support, a default policy is implemented, in which parties receive a fraction of the total budget corresponding to their seat share, so that $g^1 = [\theta_1 s_1, ..., \theta_1 s_J]$. This ensures parties' continuation values are increasing in their seat shares.

In the second period, with probability μ, party 2 has an opportunity to become a new *formateur* and make an alternative proposal g^2 satisfying $\sum_{j=1}^{J} g_j^2 \leq \theta_2$. If the proposal is accepted by a strict majority of seats, a new coalition headed by party 2 is formed and we say that a successful vote of no confidence occurred. In this case, period 2 payments are g^2. If this proposal is not accepted, or party 2 is unable to make a proposal (an event with probability $1 - \mu$), period 2 payoffs are the same as those determined in period 1. The assumption that party 2 can only become the new *formateur* with some probability is a simple way of modelling

[5] Our assumption that only party 1 and party 2 have the chance to be agenda setters, and do so sequentially, departs from the probabilistic formulation in Baron and Ferejohn (1989) and the related literature. In our model, this assumption is necessary to ensure we can characterize the equilibria in (θ_1, θ_2) space, disregarding potential heterogeneity in other parties' types. The proposition below also follows if the initial agenda setter is selected at random between party 1 and party 2.

the fact that votes of no confidence are uncommon and may only be feasible after a political shock such as a public scandal, or a swift change in support (see Diermeier 2006).

2.2. *Equilibrium*

Single-party Majorities

If $s_1 \geq 0.5$ party 1 holds a *single-party majority*, and can allocate all transfers to itself, earning a payoff of $\omega + \theta_1$ in both periods, with other parties obtaining zero. Note that single-party majorities are not contestable, in the sense that party 2 cannot form an alternative coalition that achieves the majority of seats.

Coalition Governments

When $s_1 < 0.5$, multi-party majority coalitions can arise and strategic interaction is possible. Let us start by characterizing the equilibrium in the 3 party case. We proceed by backward induction. In period 2, with probability $(1 - \mu)$, party 2 is not selected as the new agenda setter and payoffs are the same as in period 1, so $g^2 = \overline{g}^1$. With probability μ, party 2 can attempt to form a new coalition to replace party 1 by offering party 3 at least the continuation value $\overline{g}_3^1$ carried over from period 1. Whether party 2 has enough resources to make this offer depends on whether $\theta_2 \geq \overline{g}_3^1$. If this condition is satisfied, party 2 will propose $g^2 = [0, \theta_2 - \overline{g}_3^1, \overline{g}_3^1]$ and attempt to create a new coalition. If this condition is not met, party 1 remains in power and everyone receives their continuation value.

Having characterized decisions in period 2, we move to period 1. Equilibrium strategies in this period, as well as the probability of a vote of no confidence, will depend on θ_1, θ_2 and seat shares. There are three cases to consider:

If $\theta_2 < s_3\theta_1$, equilibrium results in a *safe minimum-cost coalition*. Party 1 can propose $g^1 = [(1-s_3)\theta_1, 0, s_3\theta_1]$ and rule for both periods with certainty. In period 1, this offer is taken by party 3 (it coincides with the default option) and a coalition is formed. Because $\theta_2 < s_3\theta_1$, party 2 cannot make a successful proposal in period 2.

If $\theta_2 \geq \theta_1$, no transfer to party 3 in period 1 can prevent a vote of no confidence in period 2 (i.e., $\theta_2 > g_3^1$). As a result, any coalition formed by party 1 will be contestable. The dominating strategy among the set of contestable coalitions is a *contestable minimum-cost coalition*. As above, this equilibrium play requires offering $s_3\theta_1$ to party 3.

Finally, for values of θ_2 such that $\theta_2 \in [s_3\theta_1, \theta_1)$, party 1 can form a *safe blocking coalition*.[6] A vector of transfers leads to a *blocking* coalition if it prevents party 2 from mounting a successful vote of no confidence in period 2. This strategy requires matching the party 2's best possible offer, so is only feasible if $\theta_1 > \theta_2$. Whether it is incentive compatible will depend on the payoff from contestable minimum-cost coalitions.[7] Party 1 faces an intertemporal trade-off between high current transfers and the risk of losing future rents from office. It will only play a blocking coalition if the costs of securing power in both periods are

[6]In this case, party 1 forms a more expensive coalition that cannot be undone in period 2. This strategy is similar to the formation of a supermajority (Groseclose and Snyder, 1996). In our setting, the size of the coalition is unchanged, but allies enjoy larger transfers relative to those in a minimum-cost coalition.

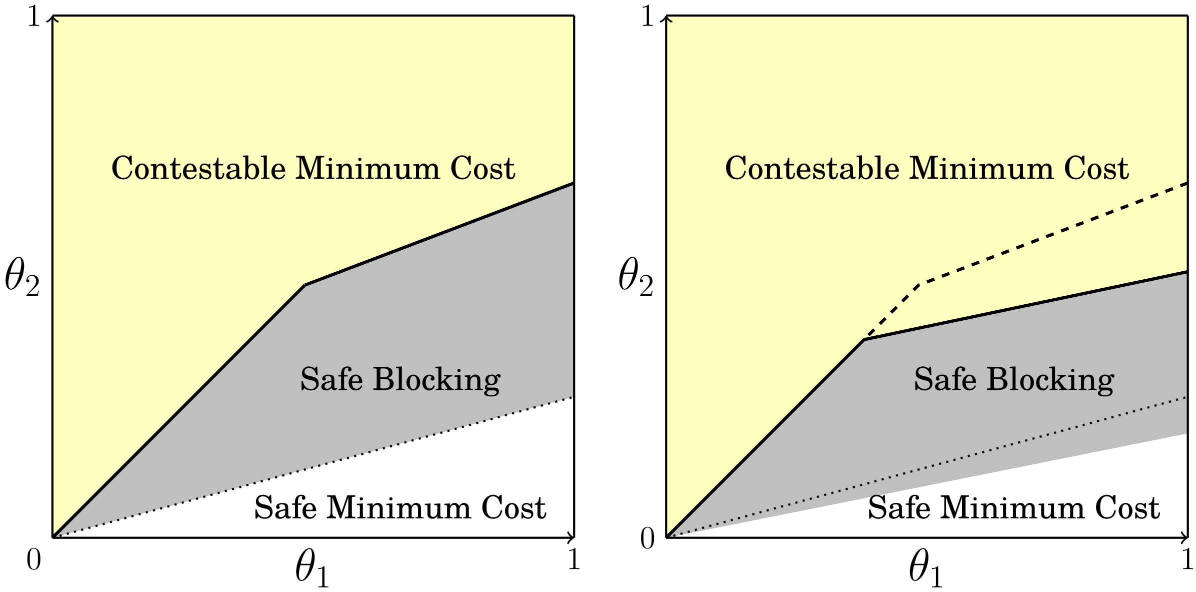
[7]Expressions of the pay-offs from every type of coalition are provided in Appendix A.

low enough relative to the additional transfers obtained when risking a contestable coalition. The corresponding incentive-compatibility constraint is

$$\theta_2 \leq h(\theta_1, s_3) \equiv \frac{\mu\omega\beta}{1+\beta} + \frac{s_3(1+\beta-\mu\beta)+\mu\beta}{1+\beta}\theta_1. \tag{1}$$

Combining this with the feasibility constraint $\theta_1 > \theta_2$, we obtain the region in which safe blocking coalitions are played in equilibrium, represented by the gray area between the solid and dotted lines in the left-panel of Figure 1. A kink in the boundary of this region is found in the intersection of both constraints.[8]

FIGURE 1
COALITIONS IN (θ_1,θ_2) SPACE - 3 TO 4 PARTIES



Notes: Equilibrium party 1 coalition strategies in period 1 in the (θ_1, θ_2) space. Case with $s_1 < 0.5$. **Left panel**: Three-party case. Solid line represents the boundary between safe and contestable coalitions. **Right panel**: Four-party case. Solid line represents the boundary between safe and contestable coalitions. The dashed line represents the boundary of the safe blocking coalition region in the case with three parties. The dotted lines represent the boundaries of the safe minimum-cost coalition regions.

Consider now the case with four parties, with seat shares $s_1 > s_2 > ... > s_4$. When $s_1 < 0.5$, party 1 now has two options to form a majority. It can always form a majority with party 3, because necessarily $s_1 + s_3 \geq 0.5$. Alternatively, it can form a majority with party 4 whenever $s_1 + s_4 \geq 0.5$. This will have an impact on both the feasibility and the pay-offs of different strategies. Define s_* as the seat share of either party 3 or 4, depending on which one allows party 1 to form the minimum winning coalition. The condition for party 1 to prefer a safe blocking coalition over a contestable minimum cost coalition is now given by $h(\theta_1, s_*)$, where function $h(\cdot)$ is defined as in expression 1. Combining this constraint with

[8]This kink will only be interior to the unit square under the assumption that $\beta\Big(\mu(1+\omega-1/3)-(2/3)\Big) < 2/3$, which follows from substituting θ_1 and θ_2 by 1 in 1 and replacing s_3 by its upper bound (1/3). If the kink is outside of the unit square, then the propositions below are still technically satisfied because the statements on probabilities are weak and not strict.

$\theta_1 > \theta_2$, we obtain the solid line in the right panel of Figure 1. As in the three party case, there are three type of coalitions in equilibrium. However, given that $s_* \leq s_3$, the entry of party 4 may create scope for a smaller coalition. If it does, it will affect the probability of a no-confidence vote and the amount of transfers necessary to secure the support of coalition members, creating a mechanism that links the number of parties to government stability.

Proposition 1

Assume two seat-share vectors $\mathrm{s} = (s_1, s_2, s_3)$ and $\mathrm{s}' = (s'_1, s'_2, s'_3, s'_4)$ such that $s_j \geq s'_j \;\; \forall j = \{1, 2, 3\}$ and $s'_4 > 0$. Let $\pi(\mathrm{s})$ be the probability of a vote of no confidence as a function of s. For a given joint distribution $g(\theta_1, \theta_2)$ with positive density in the unit square, we have that $\pi(\mathrm{s}') \geq \pi(\mathrm{s})$.

Proof: see Appendix A.

Proposition 1 states that the entry of a fourth party - the change from s to s′ - results in an increase in π, the probability of a vote of no confidence. Party entry is assumed to decrease the seat share of at least one of the incumbents. For example, the difference between s′ and s could be due to the introduction of a vote-share threshold that causes a party to be left without representation in Parliament.

Moving from three to four parties in Parliament can result in an increase in the probability of a vote of no confidence via two channels: (i) The entry causes party 1 to lose a single-party majority, and/or (ii) it increases the payoff from forming a contestable minimum-cost coalition. This latter case is illustrated in the right panel of Figure 1, where we see the region of stable government in the (θ_1, θ_2) space shrinks when the number of parties increases from three to four.

We test our proposition by implementing an RD design in the following, using data on over 50,000 local elections in Spain. We exploit the existence of a 5% vote-share threshold for entering the local council to generate exogenous variation in the number of parties with representation.

3. Institutional Setting and Data

3.1. Institutional Setting

Spanish local governments

Municipalities are the lowest level of territorial administration of Spanish local government and are autonomous, as recognized in the Spanish constitution. Their functions include urban planning, upkeep of transport networks, local services (e.g., sport facilities), waste disposal, and public transit.[9] Municipal expenditures are financed by municipal taxes (the largest of which are a business tax and a property tax) and fiscal federalism transfers from the national and regional governments. As of 1996, the mid point of our sample, Spain had 8,098 municipalities, covering all of the Spanish territory.

[9] See details in law number 7/1985 (April 2, 1985, *Ley Reguladora de las Bases del Régimen Local).*

Municipalities are governed by a municipal council (*pleno* or *concejo municipal*) and a mayor (*alcalde*). In municipalities with more than 250 inhabitants, council members are directly elected by citizens via a closed-list proportional system, with municipal elections taking place every four years.[10] The average size of councils elected under the closed-list system is roughly 10, with the number of members ranging from 7 in the smaller towns up to a maximum of 57 in Madrid. Council seats are assigned following a D'Hondt rule with a 5% entry threshold, implying parties with a vote-share below 5% will not be represented in the council. This type of entry threshold is also used in the elections to the national Parliament in Spain and in most parliaments in Europe and elsewhere.[11] We use this threshold in our RD analysis of the effect of legislative fragmentation on stability. In similar fashion, Palguta (2019) uses a 5% threshold in Czech municipal election to induce exogenous variation in local-party representation in municipal councils.

Mayors direct the administration and local service provision, and manage a substantial fraction of the municipal budget. Their salaries are subject to population caps, but range between EUR 40,000 and EUR 100,000 per year, a relatively generous amount compared to the median wage in Spain of EUR 19,000 (2009 data, see http://www.ine.es/prensa/np720.pdf). The mayor is elected by the council members, under a majority rule. If one party has the absolute majority of seats in the council, its candidate is, in most cases, directly elected mayor. If no party has a majority, a bargaining process occurs, by which a mayor can be elected with the support of different parties (Fujiwara and Sanz 2019). If no candidate can secure majority support, the most voted party appoints the mayor. Mayors are usually local leaders of the party branch, which, together with the closed-list system, helps promote party discipline. In their comparative analysis of local government leaders, Mouritzen and Svara (2002) classify Spanish mayors as strong, where a strong mayor is defined as "an elected official who is the primary political leader of the governing board and possesses considerable executive authority". In the vast majority of cases, council members from a party vote in block, which motivates the choice of parties – rather than councillors – as players in the model above.

The institutional features of Spanish local government imply municipalities share the key features of parliamentary systems, with the head of the executive being elected by a collective, legislative body in a proportional system. Parliamentary systems with these characteristics are in place in most OECD countries (with the exception of only Chile, France, Mexico, South Korea, Turkey, and the US which are presidential democracies), and in large non-OECD countries such as India or Pakistan.

[10]Municipalities with less than 250 inhabitants use an open-list system instead, where voters can express multiple preferences for different candidates. We do not use these municipalities in our analysis. See Chapter IV of *Ley Orgánica del Régimen Electoral General*.

[11]In 2015, the European Parliament adopted resolution 2015/2035 recommending, among other things, a vote-share threshold. As of 2019, 15 countries in the EU 27 had a threshold, with 5% being the most common figure. Germany used to have a 3% threshold, but it was ruled unconstitutional in 2018. Finally, 11 countries have none.

The political landscape in Spain

In the last several decades, Spanish local politics have been largely dominated by two large national parties, the center-left socialists *PSOE* and the center-right popular party *PP* (which ran as *Alianza Popular* in the 1980s). These two parties alone account for over 65% of all mayors and 59% of all municipal council members in our sample. The third party running in all jurisdictions in this period is *IU*, a left-wing platform including the Spanish communist party. Several regional parties can be important players in their area of influence. For example, the center-right coalition *CiU* ruled over 50% of all municipalities in Catalonia between 1979 and 2014. About 85% of all mayors and 83% of all elected council members come from parties that also participate in elections at the national or regional level.[12] It is not uncommon for smaller, local platforms to run for election in some municipalities, although they tend to have modest electoral results.

The 5% vote share entry threshold will have a disproportionate effect on the entry of certain parties with moderate to low electoral prospects. These marginal parties can have different political or ideological origins, as well as varying levels of national visibility. Of all parties obtaining a vote share between 4% and 6% in our sample, the left-wing *Izquierda Unida* (IU) is the most common. Other national parties, such as PA, BNG, PP, PSOE, and ERC, are also found relatively often. In almost two-thirds of the cases, however, these marginal parties are civic lists, which are created specifically to run in local elections and often do not have a clear position in the ideological spectrum.

No-confidence votes

Under Spanish law, at any moment, the municipal council can unseat the incumbent mayor and replace her with a new one via a no-confidence vote (*moción de censura*).[13] Successful *mociones* have to be approved by an absolute majority of the members of the municipal council. Although these events lead to a change in the local executive, the municipal election schedule is fixed and early elections are not possible.[14]

Council members can only sign one such motion per term. Votes of no confidence are *constructive*, in the sense that they have to explicitly include an alternative candidate mayor, who will assume the office when the incumbent steps down. Another event that can lead to early termination of the incumbent government is the motion of confidence (*cuestión de confianza*), which can be proposed by the mayor in certain cases to seek the explicit support of the council, for example, when negotiating the yearly budget. If a mayor loses such a vote, the council can elect a new mayor. Although the initiator of these two types of motions is different (the opposition in the case of *mociones de censura* and the government in *cuestiones*

[12]These parties are PSOE, PP, IU, UCD, CDS, CIU, ERC, PNV, BNG, PAR and PA.

[13]The relevant pieces of legislation can be found in Art. 197 of *Ley Orgánica del Régimen Electoral* and Arts. 33 and 123 of *Reguladora de las Bases del Régimen Local*.

[14]It is worth noting that changes of the party in power are more common around the middle of the term, possibly because, in certain cases, parties have an agreement to take turns in power. The results in the following are robust to dropping observations in which the motion happened in a 90-days window around the midpoint of the term, suggesting that our interpretation of party turnover as a consequence of a new round of bargaining (as opposed to parties simply taking turns) is sensible.

de confianza), the political consequence in both cases is that the incumbent is replaced if the council gathers enough support for an alternative candidate. For this reason, throughout the paper, we generically refer to successful votes of no-confidence when observing the identity of the mayor in office and her party change during the term, without distinguishing between the two motions.

Our dataset identifies 1,065 no-confidence votes taking place between 1979 and 2014, distributed across the country, as shown in Figure 2. Governments led by one of the two main parties in the country (*PP* and *PSOE*) are taken down by no-confidence votes at comparable rates. Anecdotal evidence based on press reports suggests that the overwhelming majority of no-confidence votes are the result of an initiative by the opposition - motions of confidence fielded by the incumbent are very rare.[15] These reports also indicate that votes of no confidence are the result of a swift change in pacts between parties, often coinciding with the breakdown of a previous coalition, or with opposition parties successfully coordinating to unseat the incumbent some months into the term. For example, in the Andalusian sea-side town of Chiclana, a vote of no confidence led by the socialist party in 2007 was made possible by a delayed pact between left-wing parties which had failed to materialize in the first months after the election. The only vote of no confidence taking place in the Madrid municipality happened in 1989, with the socialist mayor losing power after *CDS* and *PP* agreed on a new coalition.

In some cases, votes of no-confidence are made possible by *transfugas*, council members that switch partisan affiliation during the term.[16] Yet, this phenomenon is not pervasive. According to Passarelli et al. (2017), only 5.3% of candidates for the council changed parties between the 2007 and 2011 elections.

In an effort to study whether votes of no confidence are prompted by cases of corruption, we use data on 3,850 reported cases for the period 1995-2007 from Costas-Pérez, Solé-Ollé and Sorribas-Navarro (2012). This includes municipal corruption cases reported in Spanish media and systematically collected by the authors. We find that the presence of a corruption case does not predict an increase in the probability of a vote of no confidence.

3.2. Data

Our dataset consists of a panel of municipalities covering the period 1979-2014. The time dimension corresponds to each legislature, indexed by the year of the corresponding municipal election (1979 to 2011). Our main data sources consist of electoral records, data on individual mayors and mayoral changes, municipal demographics (population, density, etc.), and data on the composition of regional and national governments. Electoral outcomes in municipal elections are obtained from the Ministry of Internal Affairs. We complement this dataset with information on mayors and their political-party of affiliation from the same

[15] In a review of 40 successful no-confidence votes discussed in the press, we only found one motion of confidence. This took place in the municipality of Vigo in 2003, when the socialist incumbent was replaced after failing to secure a vote in the council.

[16] An example of the role of *transfugas* in no confidence votes can be found in the province capital Guadalajara in 1992. In this case, a member of the socialist party broke party discipline and voted with the right to replace the left-wing incumbent.

Figure 2

Distributions of votes of no-confidence across municipalities

Notes: Number of successful votes of no-confidence in each municipality with more than 250 residents between 1979 and 2014. Source: authors' elaboration on electoral data. Geodata from *Instituto Geográfico Nacional de España (Ministerio de Fomento)*.

source. Data on budgets for a subset of years are obtained from the Ministry of Finance, and yearly municipal populations from the residential registry. For a more detailed description of data sources and sample selections, please refer to Appendix C.

Because of the different electoral system in small towns, we only include municipalities with more than 250 inhabitants, leaving us with up to 9 elections for each of the 6,400 municipalities in the original dataset, for a total of about 51,000 elections. We impose additional sample restrictions based on missing data, or inconsistencies between sources, and lose 840 elections (1.6% of the remaining total), and exclude cases in which the party of the mayor cannot be identified, or only one party runs in the election. For each election in our sample, we have complete election information, including the vote-shares of all parties and their number of seats in each council. We also have data on the day in which each mayor takes office, which usually happens shortly after elections, although occasionally mayors change during the legislature. We identify votes of no confidence as instances in which change occurs both in the identity *and* the party of the mayor.[17]

Panel A of Table 1 provides municipal-level descriptive statistics for our sample. The

[17] We have also explored an alternative definition, that excludes cases when the mayor in unseated immediately after taking office, and we obtained analogous results.

Table 1
Descriptives statistics

	Mean	Std. dev.	Min	Max
A. General information				
Mean Population 000s (1979-2014)	6.72	52.02	0.3	3114
Surface (in km2)	207.05	232.73	0.1	1798
# of Elections in sample	6.94	2.33	1.0	9
Observations	6087			
B. Municipal Elections and Local Government				
# of Parties Running	3.39	1.58	2	25
# of Parties in Council	2.80	0.93	1	9
# of Council Seats	10.35	4.36	3	59
Vote of No Confidence (%)	2.50	15.60	0	100
Single-party Majority (%)	74.58	43.54	0	100
1st Mayor - PP (%)	33.04	47.04	0	100
1st Mayor - PSOE (%)	41.10	49.20	0	100
1st Mayor - IU (%)	3.13	17.41	0	100
1st Mayor - CIU (%)	6.17	24.06	0	100
Observations	42259			
C1. Local Government - Stable Mayor				
Single-party Majority (%)	76.23	42.57	0	100
# of Parties in Council	2.78	0.92	1	9
Observations	41204			
C2. Local Government - Vote of No Confidence				
Single-party Majority (%)	9.95	29.95	0	100
# of Parties in Council	3.52	0.95	1	8
Observations	1055			

Notes: Panel A provides descriptives at the municipal level for all municipalities that appear at least once in our sample. Panel B provides descriptives on electoral outcomes at the municipality-council level. Panel C splits this sample into councils that approved at least one vote of no confidence during the term (C2), and those that did not (C1).

average municipal population over the 1979-2014 period was 6,700 inhabitants, with an average surface of 207 km^2. In some cases, municipalities cross the 250 population threshold during the sample period, merge, or have missing electoral data (see data Appendix for details), so we have an unbalanced panel with an average of about 7 elections per municipality in our sample (out of a maximum of 9).

Panel B includes descriptives on local governments. The average number of parties running in each municipal election is 3.4. The average election distributes 10 council seats, with specific council sizes determined by population thresholds (see, e.g., Foremny, Jofre-Monseny and Solé-Ollé 2017). The average council includes 2.8 parties, although the number varies substantially by town, with some having up to nine parties with seats.[18] Importantly, successful no-confidence votes are passed in 2.5% of all legislatures in the sample. About three-quarters of councils have a single-party majority. Governments in these municipali-

[18]As Figure D.2 in the appendix shows, the number of parties elected in a municipality council are four or fewer in over 90% of cases. Hence, situations like the ones derived in the model's equilibrium with three and four parties are prominent in our sample.

ties tend to be more stable and have been shown to differ from more fragmented ones in the management of the municipal budget (Artés and Jurado, 2018).

The last two panels show characteristics of municipalities that had stable governments throughout the four-year term (C1) and those that experienced a vote of no confidence (C2), respectively. Unsurprisingly, stable governments are much more likely to be backed by a party which has the majority of seats (over 75% of the cases). The mayor can be replaced in municipalities featuring a single-party majority as a result of the actions of *transfugas* breaking party allegiance and voting to replace the mayor.[19] It is worth noting that this is extremely rare. Only 0.3% of municipalities with a single-party majority experience a vote of no confidence.

In panels C1 and C2 we can also observe that municipalities where a no-confidence vote is passed have more fragmented councils (3.5 vs. 2.8 parties in council). Although encouraging, extrapolating from these mean comparisons may be problematic. The number of parties in the council, or a town's alignment status, may be affected by other observable or unobservable characteristics of the town, its region, or its politicians. Observing local-level political or economic conditions in detail is difficult, so estimators that rely on observables such as regression or matching are unlikely to be successful in identifying a causal effect.

For this reason, in the following, we recur to RD methods, which allow us to exploit exogenous variation in both council fragmentation and political resources. As usual, in interpreting the results, one has to keep in mind that all RD estimates are local, in the sense that they identify local average treatment effects for the sub-population of compliers around the discontinuity (Angrist and Imbens, 1994).

4. Empirical Analysis

In this section, we test whether the prediction laid out in Proposition 1 of the theoretical model is supported by the data. Specifically, we show that governments formed by more fragmented legislatures are more likely to be unseated by a no-confidence vote, and that the entry of an additional party increases the probability of unseating the incumbent via two channels. First, it decreases the probability of a single-party majority. Second, it increases the likelihood of a successful vote of no-confidence vote, conditional on the legislature not having a single-party majority.

4.1. ***Legislative fragmentation decreases stability***

Proposition 1 states that an increase in fragmentation leads to a decrease in stability. To obtain causal estimates of the effect of fragmentation – measured as the number of parties in the council – on government stability, we exploit the existence of a 5% vote-share threshold for admission to the local council. This threshold causes parties with vote-shares just below 5% to be excluded from the council, generating exogenous variation in the number of parties with representation.

[19] Cruz (2010) reports that in the region of Galicia, over the period 1987-2011 *all* votes of no confidence in single-party majorities were related to *transfugas*.

To implement our RD design, we first calculate, in each municipality i and for each term t, the difference between the vote-share of each party p and 5%. This variable is denoted as V_{pit} and serves as our running variable. Because each observation is a party-municipality-election triple, each municipality appears in the sample as many times as the number of parties that ran in the election, for a total of 143,400 observations.[20]

Our baseline specification relates Y_{it} – an indicator equal to 1 if the mayor of municipality i is unseated and replaced by a new mayor during term t – to our measure of fragmentation, N_{it}, the number of parties with seats in the council, as follows:

$$Y_{it} = \alpha_1 + \tau_1 N_{it} + \beta_1 V_{pit} + \beta_2 V_{pit} D_{pit} + \epsilon_{pit}. \tag{2}$$

The number of parties N is instrumented with an indicator D for a party being above the 5% threshold as in the following first stage equation:

$$N_{it} = \alpha_0 + \gamma_1 D_{pit} + \delta_1 V_{pit} + \delta_2 V_{pit} D_{pit} + u_{pit}. \tag{3}$$

The instrument D is constructed for each municipality, election, and party. This instrument is relevant – that is, correlated with the number of parties – because the number of parties in the council is affected by how many parties have obtained a vote-share larger than 5% and, hence, have $D = 1$. Notice that, as in the theoretical model, the entry of a new party in the council will affect both the allocation of seats among the other parties and the number of parties with representation.

The predictive power of the instrument is especially strong close to the 5% threshold. As an example, imagine the case in which two parties have vote-shares close to 5%. If, by chance, they both get more that 5% – so $D = 1$ for both parties – and the proportional rule assigns both of them a seat in the council, the number of parties N will be relatively large. If, on the contrary, one of the parties receives a vote-share just below 5% ($D = 0$), it will be relegated out of the council, and N will be relatively small. A detailed description of how we construct the instrument is given in section B of the appendix.

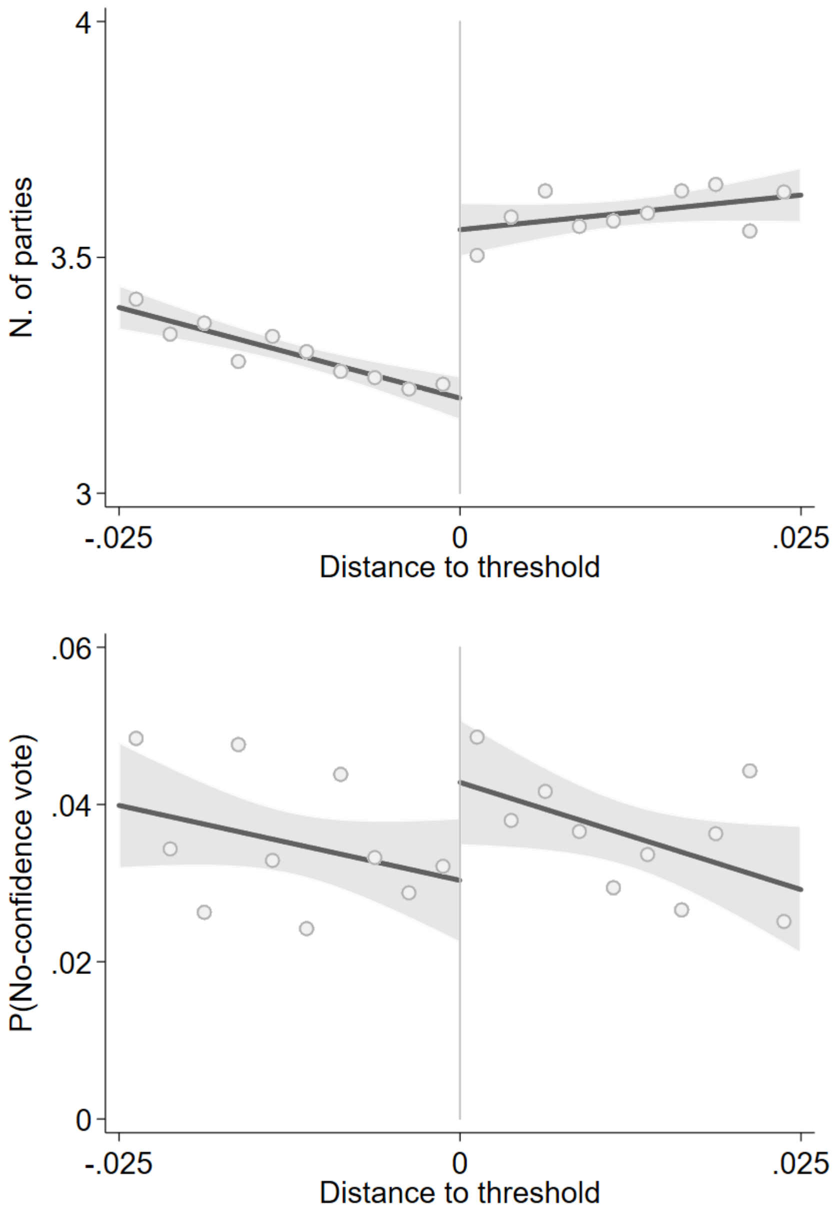
Given the uncertainty of election results due to voters' unknown preferences, election-day weather conditions, or last-minute events, we can reasonably assume parties are unable to perfectly anticipate their results, or to manipulate vote-shares to locate on either side of the 5% threshold. We show in Figure D.3 in Appendix D that manipulation is unlikely, by testing for a jump in the density of the running variable at the threshold. Both visual inspection and formal tests using the procedures in McCrary (2008) and Cattaneo, Jansson and Ma (2017) indicate no significant jump at the threshold. Figure D.4 and Table D.1 in the appendix present further evidence of the validity of our RD design by showing covariate balancing. Specifically, we do not observe any discontinuity at the threshold for a number of pre-election outcomes and municipal characteristics.

The top panel of figure 3 illustrates our first stage by plotting the number of parties

[20]An alternative is to define the running variable only for the party that is closest to the 5% entry threshold. Estimates obtained using this and other approaches are reported in section 5.

Figure 3

The effect of fragmentation on stability - First-stage and Reduced-Form



Notes: In both panels, the horizontal axis corresponds to the running variable, defined as the vote-share distance between a party's vote-share and 5%. Hence, in a given election, each municipality appears as many times as the number of parties running. The **top panel** illustrates the first stage; hence, the vertical axis measures the number of parties represented in the council. The **bottom panel** plots the reduced-form, which relates the probability of the mayor being unseated to the running variable. Dots are averages in 0.25 percentage point bins of the running variable, and lines are linear regressions estimated on either side of the threshold separately. Shaded areas are the corresponding 95% confidence intervals.

with seats in the council against our running variable. The number of parties exhibits a clear jump at the threshold, when a party obtains at least 5% of the votes and is eligible to enter the council. Note that receiving at least 5% of the votes is not always enough to receive a seat. Especially in small councils, the number of available seats is so small that

TABLE 2
REDUCED-FORM AND 2SLS ESTIMATES - FRAGMENTATION AND STABILITY

	(1) Mayor uns.	(2) Mayor uns.	(3) Mayor uns.	(4) Mayor uns.
A. Reduced-form results				
Above threshold	0.013**	0.013**	0.013**	0.013**
	(0.006)	(0.006)	(0.006)	(0.006)
Mean of dep.var.	0.036	0.036	0.036	0.036
Bandwidth	0.017	0.017	0.017	0.017
Obs.	11293	11109	11293	11109
B. 2SLS results				
N. Parties	0.053**	0.049**	0.052**	0.052**
	(0.026)	(0.024)	(0.024)	(0.025)
Mean of dep.var.	0.036	0.036	0.036	0.036
Bandwidth	0.017	0.017	0.017	0.017
Obs.	11293	11109	11293	11109
Fixed Effects	N	N	Y	Y
Controls	N	Y	N	Y

Notes: Reduced-form and 2SLS estimates of the effect of the number of parties on the probability of unseating the mayor (equation 2). The dependent variable is an indicator taking value 1 if the mayor was unseated by a vote of no confidence during the legislature. Controls and FE are included as indicated in each column. Controls: surface and population (in logs). FE: number of available seats and year fixed effects. The optimal bandwidth is calculated using the CCT method. Standard errors are clustered at the municipality level. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

the allocation rule might leave parties with 5% of the votes with no seats at all. For this reason, our design is a *fuzzy* RD design with a continuous treatment.[21] The size of the jump is about 0.3, in line with the regression estimates of the first-stage coefficients reported in Table D.2 in the appendix. The relationship between the running variable and the outcome is upward sloping because the higher is the vote-share of the party, the higher is the probability that it is actually admitted into the council, based on the number of available seats and the D'Hondt allocation rule.

The bottom panel of Figure 3 plots the reduced-form relationship between our outcome and the running variable. We observe a clear discontinuity in the probability of unseating the mayor at the threshold of about 1.3 percentage points.

We now turn to formal estimation of parameter τ_1. Following Lee and Lemieux (2010), our preferred estimation method is local linear regression, with different linear terms on the running variable estimated at either side of the threshold. We estimate the baseline model in equations 2 and 3 by two-stage least squares using only observations within a bandwidth h from the threshold. We use the optimal bandwidth popularized in Calonico, Cattaneo and

[21] An alternative approach is to calculate the running variable as the minimum vote-share change required, to lose (win) the last (first) seat in the council (see, e.g., Fiva, Folke and Sørensen 2018). This approach requires specifying a vote transfer rule when reducing (increasing) parties' vote-shares. It is also uninformative about the effect of the 5% threshold on stability. We provide results using this method in Section 5.

Titiunik (2014) to select h in all cases, and show results are robust to bandwidth choice in section 5. Standard errors are clustered at the municipality level to take into account the repeated observations within each municipality and the possible within-municipality serial correlation in the data.

We report estimates of our reduced-form and second-stage coefficients, respectively, in panels A and B of Table 2 starting, in column 1, by estimating the baseline model without controls. The effect of fragmentation on stability is sizeable. We estimate that the entry of an additional party in the council increases the probability of the mayor being unseated by approximately 5 percentage points. This estimate is largely unaffected by adding, in column 2, population and surface (in logs), and fixed effects for the number of available seats and election year fixed effects, in columns 3 and 4. The inclusion of controls and fixed effects is not required for consistency of the estimates but improves precision slightly.

This is the main result of the paper. Given that the average probability of unseating the mayor in the whole sample is 2.5% (3.6% around the threshold), the estimated effect of 4.5 percentage points for the entry of an additional party in the council is large, showing fragmentation has a substantial effect in harming government stability. We interpret these estimates as evidence in support of the statement in Proposition 1. This interpretation requires an exclusion restriction assumption: the entry of an additional party affects stability through its impact on the legislative bargaining process. It also requires that the effect is present when no single-party majorities are present, a point to which we turn in the next section.

To assess the robustness of these estimates, we perform a number of additional checks and tests. For example, we show that estimates obtained for placebo thresholds between the 1% and 10% vote shares lead to statistically insignificant effects. Only the 5% threshold yields a positive and significant discontinuity. Our estimates are also robust to controlling for quadratic polynomials in the running variable. They also remain stable across a range of bandwidths, and when estimated over sub-samples obtained by removing one election term at a time. These and other tests are detailed in section 5.

4.2. ***Treatment effect conditional on no single-party majorities***

The theoretical model presented above predicts that the estimated effect of fragmentation on stability operates via two channels. First, the entry of an additional party decreases the probability of a single-party majority.[22] Second, the number of parties can also affect stability in cases where no single-party majority exists, through its effect on the composition of the ruling coalition.

A simple sample split, based on whether the largest party has a single-party majority or not (shown in Table D.4 in the Appendix), suggests that our main result in Table 2 is driven by legislatures where no party has the majority of seats. Whereas in this subsample we find a large effect of fragmentation on stability, there is virtually no effect when a single-

[22]RD estimates showing the entry of an additional party reduces the probability of a single-party majority by 11 percentage points are available in Table D.3 of Appendix D.

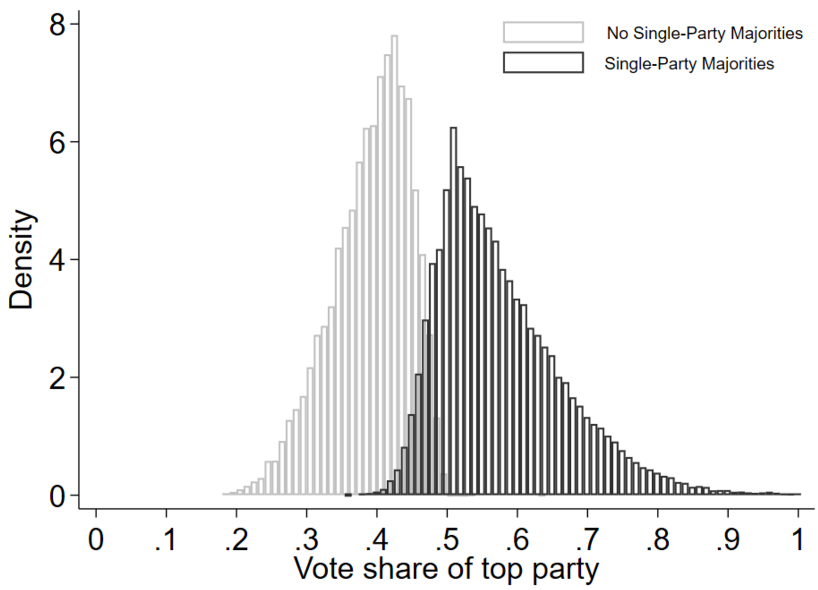
party majority is in power. While suggestive, the evidence presented in Table D.4 is based on selecting the sample based on the single-party majority status, a variable that is also affected by the entry of a party in council and is, therefore, endogenous.

To tackle this issue, in the following we propose two alternative approaches. First, we replicate our main results restricting the sample to elections where the largest party received less than 40% of the votes. In these cases, the probability of a single-party majority is always zero and cannot be affected by the entry of an additional party in the council. Second, we apply the method proposed by Lee (2009) and adapted to RD designs by Anagol and Fujiwara (2016) to calculate bounds on the effect of fragmentation conditional on no party having a single-party majority of the seats. This method relies on assuming a specific value for the bias term that arises when selecting the sample.

Effect in elections where the largest party never has a single-party majority

The entry of an additional party can affect the probability of a single-party majority only if the largest party receives a vote share around 50 percent. More specifically, as documented in figure 4, we virtually never observe cases of single-party majorities if the largest party receives less than 40 percent of the votes. Correspondingly, we always observe a single-party majority when it receives more than 50 percent of the votes.

FIGURE 4
VOTE SHARE DISTRIBUTION AND SINGLE-PARTY MAJORITIES



Notes: The histogram in light gray plots the distribution of the vote share of the largest party in legislatures in which no party has more than half the seats in the council. The histogram in dark gray shows that distribution in legislatures where the most voted party has more than half the seats.

Therefore, we can estimate the effect of fragmentation on stability, holding constant the probability of a single-party majority to zero, by restricting the sample to legislatures where the largest party receives less than 40 percent of the votes. This sample selection should not induce a bias since the probability of receiving more than 40% of the votes is smooth around the 5 percent threshold.[23] The results of this exercise are reported in Table 3. In this Table, we show that when the largest party receives less than 40 percent of valid votes – and, thus, cannot rely on a single-party majority – the entry of an additional party increases the probability of a vote of no-confidence by 16–18 percentage points. The estimated coefficients confirm that the effect of fragmentation on government stability is driven by legislatures in which parties bargain to form a government and that fragmentation affects government stability also when it does not change the probability of a single-party majority. The estimated coefficients are large in magnitude because, in this subsample, the effect is identified using cases in which the largest party has a weaker support in the population and, ultimately, in the council.

TABLE 3

REDUCED-FORM AND 2SLS ESTIMATES - ELECTIONS WITH NO PARTY WITH MORE THAN 40% OF VOTES

	(1) Mayor uns.	(2) Mayor uns.	(3) Mayor uns.	(4) Mayor uns.
A. Reduced-form results (Vote Share of top party <0.4)				
Above threshold	0.057**	0.054**	0.054**	0.052**
	(0.025)	(0.025)	(0.024)	(0.025)
Mean of dep.var.	0.098	0.098	0.098	0.098
Bandwidth	0.017	0.017	0.017	0.017
Obs.	2512	2485	2512	2485
B. 2SLS results (Vote Share of top party <0.4)				
N. Parties	0.177*	0.184*	0.159**	0.165*
	(0.091)	(0.098)	(0.080)	(0.089)
Mean of dep.var.	0.098	0.098	0.098	0.098
Bandwidth	0.017	0.017	0.017	0.017
Obs.	2512	2485	2512	2485
Fixed Effects	N	N	Y	Y
Controls	N	Y	N	Y

Notes: Reduced-form and 2SLS estimates of the effect of the number of parties on the probability of unseating the mayor (equation 2). Sample restricted to elections in which the largest party receives less than 40 percent of valid votes. The dependent variable is an indicator taking value 1 if the mayor was unseated by a vote of no confidence during the legislature. Controls and FE are included as indicated in each column. Controls: surface and population (in logs). FE: number of available seats and election year fixed effects. The optimal bandwidth is calculated using the CCT method. Standard errors are clustered at the municipality level. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

Bounding the effect of fragmentation conditional on no single-party majority

To estimate the effect of fragmentation on stability in councils where no party has the majority of the seats, we apply the method proposed by Lee (2009) and adapted for regression-discontinuity designs by Anagol and Fujiwara (2016) and Pons and Tricaud (2019). Consider

[23]The estimated discontinuity at the threshold of the probability that the most voted party receives more than 40% of the votes is equal to 0.010 (cluster-robust s.e. equal to 0.012).

for simplicity the case of one party for each municipality i. Recall the definition of our treatment of interest: $D_i = 1$ if the council is fragmented (the marginal party has a vote share above the 5% threshold), and $D_i = 0$ if not fragmented. Also, define $R_i = 1$ if the largest party does not have a single-party majority – and, hence, must in general form a coalition – and $R_i = 0$ if it does.

In terms of notation, let $R_i(0) = 1$ be the case when the municipality does not have a single-party majority when it is not fragmented, and similarly for the other cases. Using this notation, we can describe the four possible cases in which the conditioning variable R can affect out treatment. First, there are the *always takers*, for which $R_i(1) = R_i(0) = 1$. For these municipalities, the largest party has such a high vote share that the entry of an additional party can never alter its majority status. Cases in which the largest party can never achieve a single-party majority, $R_i(1) = R_i(0) = 0$, are labeled *never takers*. Similarly, we have the *compliers*, for which $R_i(1) = 1$ and $R_i(0) = 0$, and *defiers*, for which $R_i(1) = 0$ and $R_i(0) = 1$.

It is reasonable to assume that there are no defiers, since the seat allocation rule excludes the possibility that there are municipalities where there is no single-party majority if the marginal party stays out, but there would be one if it entered. Intuitively, if the largest party has no majority when there are, say, three parties in council, it cannot have one when a fourth party enters the council.

We are interested in the reduced-form effect of fragmentation ($D = 1$) on stability Y_i for the municipalities in which there is no single-party majority when a new party enters the council, that is $R_i(1) = 1$. These municipalities could be always takers or compliers. Formally, the treatment effect is defined at the cut-off, where the running variable $V_i = 0$, so that we have

$$E(Y_i(1) - Y_i(0)|R_i(1) = 1, V_i = 0),$$

For simplicity, drop the subscript i and let $Y_1 = Y_i(1)$ and so on for the other variables. Following Anagol and Fujiwara (2016), the above expression can be written as

$$E(Y_1 - Y_0|R_1 = 1, V = 0)$$

$$= \frac{1}{E(R_1|V = 0)} \cdot [\underbrace{(E(Y_1R_1 - Y_0R_0|V = 0)}_{\text{RD effect on Y}} - \underbrace{Pr(R_1 > R_0|V = 0)}_{\text{RD effect on R}} \cdot \underbrace{E(Y_0|V = 0, R_1 > R_0)}_{\text{unobservable}}]. \quad (4)$$

All terms are estimable except the last one, which, since Y is an indicator, is equal to the probability of no-confidence vote if the marginal party stays out of the council for the compliers, i.e., municipalities that would have a single-party majority if this party stayed out of the council, but would lose it if the party entered.

The first term can be estimated as the inverse of the probability of a no single-party majority at the threshold, calculated for municipalities with a marginal party just above the threshold. The second term is the RD effect on Y. The third term is the jump in the probability of no single-party majority at the threshold (that is, the RD effect on R). The fourth and last term is unobserved. Given assumptions of the largest and smallest possible values for this term, we can calculate a lower and upper bound for the treatment effect of interest.[24]

Given that the unobserved term enters negatively, the upper bound for $E(Y_1 - Y_0|R_1 = 1, V = 0)$ can be obtained by replacing $E(Y_0|V = 0, R_1 > R_0) = 0$ in equation 4. Intuitively, the largest possible effect occurs under the assumption that there would be no no-confidence vote in case compliers who were just excluded from the council would have entered. For the lower bound, an assumption similar to (Anagol and Fujiwara, 2016) would amount to requiring that the probability of a no-confidence vote would be as high for compliers that were just left out as for compliers that entered the council and, by doing so, broke the single-party majority. For instance, it means assuming that the probability of a no-confidence vote, had the marginal party entered instead of being just left out, is no larger than the probability of no-confidence vote in the cases in which it just entered.

We present the results of this exercise in Table 4. We estimate a lower bound for the reduced-form of fragmentation of stability of 3.2 percentage points, statistically significant at the 10 percent level, and an upper bound of 4 percentage points, significantly different from zero at the 5 percent level. The lower and the upper bounds of the conditional effect of fragmentation on stability are relatively close to each other, suggesting that the potential selection bias affecting the estimates in Table D.4 in the Appendix is in our sample rather mild. Notice that the magnitude of these bounds is about three times as large as our baseline reduced-form estimates of Table 2, derived using the full sample that also includes single-party majorities.

TABLE 4

BOUNDS ON THE EFFECT OF FRAGMENTATION CONDITIONAL ON NO SINGLE-PARTY MAJORITY

	a) Lower bound	b) Upper bound
	Mayor Uns.	Mayor Uns.
Coefficient	0.032*	0.040**
95% conf. interval	[-0.004; 0.068]	[0.003; 0.077]
Mean of dep.var.	0.036	0.036
Bandwidth	0.017	0.017
Obs.	11293	11293

Notes: Estimates of the lower and upper bounds of the reduced-form effect of fragmentation on the probability of unseating the mayor conditional on not having a single-party majority. The dependent variable is an indicator taking value 1 if the mayor was unseated by a vote of no confidence during the legislature. The optimal bandwidth is calculated using the CCT method. 95% confidence intervals are calculated using the Delta method and based on standard errors clustered at the municipality level. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

[24]Notice that equation (4) assumes away the possibility that a mayor is unseated when she is supported by an absolute majority. This assumption finds support in the data in all but a handful of cases.

5. Additional Results and Robustness Checks

5.1. Additional Results

Changing Entry Thresholds and Stability

Our results indicate vote-share admission thresholds to Parliament may be used to affect government stability. To explore this possibility further, we use the estimates reported in Table 2 and the observed vote-share distribution to conduct a simple counterfactual analysis assessing how a change in the entry threshold would affect the probability of an early termination. The exercise amounts to re-computing the number of seats received by each party for different entry threshold values, applying the D'Hondt rule to allocate seats to parties.

Results are illustrated in Figure D.5 of the Appendix. Lowering the entry threshold from 5% to 4% and re-calculating the seat-share allocations leads to a 0.15 increase in the average number of parties with representation. Correspondingly, the probability of a no-confidence vote increases by 0.6 percentage points. On the contrary, increasing the threshold from 5% to 6% would reduce the average number of parties by 0.2 and the probability of a no-confidence vote by 0.8 percentage points. Compared to the 2% in-sample baseline probability of unseating the mayor, these results show that even moderate changes in the entry threshold could have substantial effects on stability. Note that this is a positive claim only: whether or not this has normative implications - e.g. an effect on welfare - will depend on the consequences of government turnover on political selection and implemented policies.

The results of this exercise depend crucially on whether the existence of an entry threshold has an effect on the distribution of vote-shares. Instrumental voters may be discouraged from voting for a party that is not expected to obtain representation. Yet, a glance at the histogram of party vote-shares in Figure D.3 of the Appendix does not show any differences in density at or around 5%, and previous work on this topic has not found evidence in this regard.[25]

Ideology

A final note is due to discuss the role of party ideology in our context. The mechanism described in the theoretical model is able to explain the effect of fragmentation and bargaining resources on stability even when parties are identical in terms of ideology. However, in practice, parties can have very different ideological positions, so that certain coalitions that could, on paper, be enough for a majority, are unfeasible.

In Table D.5 in Appendix D, we estimate our reduced form equation including, as additional covariates, different measures of ideological distance between the marginal party, defined as the party that is closest to the threshold, and the largest party (more details are available in Appendix C).

The information on ideology is drawn from Polk et al. (2017) and is available since 1999 and only for the parties that ran at the national level, so that the precision of the estimates

[25] Arenas (2016) suggests these types of strategic responses by voters may be small or absent. The author uses an increase in null votes prompted by the ban of a political party in the Basque country to study whether voters respond strategically to the effective vote threshold, and reports no evidence that they do.

in this exercise is reduced. Results in Table D.5 show that the entry of a party that is ideologically distant from the first has a positive effect on the probability of a no-confidence vote. This effect is, however, small in magnitude and imprecisely estimated. The entry of parties that are close ideologically, on the other hand, appears to offset the negative effect of fragmentation on stability, with a point estimate of the interaction between our instrument for crossing the threshold and an indicator for ideological closeness of about 2 percentage points.

These results suggest that, although ideological differences in the council might also be, in theory, an important driver of stability, we observe limited evidence that they play a first-order role. Putting together these results with the fact that we find, in our main analysis, that fragmentation decreases stability in the full sample of parties, suggests our proposed mechanism operates regardless of ideological differences between parties.

5.2. Robustness Checks

In this section we discuss the robustness of our main empirical results. We first consider changes to our specification in the definition of the sample, the running variable and the weights given to different municipalities in estimation. We then discuss robustness of our findings to RD bandwidth choices and, finally, present complementary estimates when choosing a counter-factual threshold or excluding selected years.

As shown in Figure 3, crossing the 5% vote-share threshold leads to an average increase of approximately 0.3 in the number of parties in a municipal council. This number is less than 1 because obtaining more that 5% of the vote does not guarantee a seat in the council when the number of council members is small. For councils with 17 or more seats, the 5% threshold is usually effective, in the sense that the number of parties increases by essentially 1 when crossing the threshold. As a result, the compliers in the baseline estimates provided in Table 2 are relatively large municipalities, that have a council large enough that obtaining 5% is usually sufficient to obtain a seat. Conversely, the contribution of small municipalities to the estimation of the parameter of interest is negligible.

To confirm that the effect of fragmentation is still present focusing on the set of compliers, we obtain estimates using a sample restricted to municipality-election pairs in which the 5% threshold is likely to be binding (those with 17 or more seats in the council). Results are provided in panel A of Table 5. Column 1 records the first-stage coefficient, which is almost three times as large as the coefficient obtained using the full sample. In column 2, we report the 2SLS estimate of the effect of fragmentation on stability for this exercise. The point estimate of 3.3 percentage points is slightly lower than the baseline estimate, although the coefficients fall within each other's confidence intervals.

To further explore how the identity of compliers affects our estimates, we conduct a separate analysis in which we construct a new running variable based on the effective entry threshold for each party in each municipal election. This variable is constructed as follows: for each party represented in each council, we start by removing 0.1 percentage points of their vote-share. We redistribute the corresponding votes to all other parties proportionally to their shares. In each step, we re-calculate the new seat-share allocation and keep iterat-

TABLE 5

ROBUSTNESS CHECKS - FRAGMENTATION AND STABILITY

	(1)	(2)
A. Large Councils Only (#seats $\geq$ 17)		
	First-Stage	2SLS Estimate (N. Parties)
	.871***	.033**
	(.079)	(.016)
Bandwidth	.012	
Obs.	3288	
B. Effective Threshold		
	First-Stage	2SLS Estimate (N. Parties)
	.921***	.012**
	(.023)	(.005)
Bandwidth	.03	
Obs.	20565	
C. Party 5% Only		
	First-Stage	2SLS Estimate (N. Parties)
	.33***	.048*
	(.047)	(.027)
Bandwidth	.011	
Obs.	6348	
D. No Weights		
	First-Stage	2SLS Estimate (N. Parties)
	.341***	.032**
	(.032)	(.016)
Bandwidth	.026	
Obs.	16596	
E. Global Quadratic Polynomial		
	First-Stage	2SLS Estimate (N. Parties)
	.241***	.048**
	(.032)	(.022)
Bandwidth	.05	
Obs.	32738	

Notes: Column 1 shows the first-stage estimate of our instrument when estimating equation 3. Column 2 reports the associated 2SLS estimate of the effect of number of parties on stability obtained from estimating equation 2. Each panel corresponds to a different robustness check as follows: A) estimates obtained restricting the sample to municipalities with 17 or more seats in the council; B) estimates obtained using an alternative definition of the running variable incorporating the effective entry threshold for different municipalities; C) estimates obtained restricting the sample to one observation per municipality, corresponding to the party with the vote-share closest to 5%; D) estimates obtained without using weights; E) estimates obtained using a large 5% bandwidth and a quadratic polynomial in the running variable. Standard errors clustered at the municipality level. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively. Bandwidths obtained using the CCT method in all panels.

ing until the party in question loses its last seat in the council. Finally, we record the total removed vote-share as the running variable. In the case of parties that were originally *not* in the council, we instead add votes – reducing other parties' vote-shares correspondingly – until they obtain a seat in the council. The effective threshold is then calculated as the difference between the original vote-share and the running variable.

We use this running variable in our baseline model of the effect of fragmentation on stability, and provide results in panel B of Table 5. As expected, the first-stage coefficient in column 1 is now very close to 1. Interestingly, the 2SLS estimate is still positive and significant but substantially smaller than in the baseline, at only 1.2 percentage points.[26] The difference in estimates can be seen as a result of including relatively smaller municipalities among the set of compliers. Therefore, from these results, we can infer that the effect is reduced in smaller municipalities. Also note that, although this approach has the advantage of using more information and giving a stronger first stage, it has some drawbacks. First, the specific choice of how to re-assign votes across parties affects the running variable, potentially inducing measurement error and compromising identification (Davezies and Le Barbanchon, 2017). Secondly, using the 5% threshold has the advantage of allowing us to quantify directly how this particular institutional feature affects fragmentation.

In panel C of Table 5, we present results obtained when restricting the sample to only one party per municipal-election pair. Specifically, we keep, for each municipality and in each election, only the party with vote-share closest to the 5% entry threshold. This approach restricts the sample substantially relative to the baseline, but the main effect of interest remains very close to the baseline coefficient at 4.8 percentage points. We also provide results using an unweighted specification, in which larger municipalities – where typically more parties run – will weigh more in estimation. Results are provided in panel D of Table 5. Second-stage estimates are slightly smaller than our baseline results and significant at the 5% level. Finally, in panel E we report estimates obtained when including polynomial terms in the running variable and using a fixed bandwidth of 5 percentage points on either side of the threshold. In this way, we can capture possible non-linearities in the conditional expectation of our outcome, at the cost of having to rely on more observations far from the threshold.

Collectively, the results in Table 5 reassure us that our qualitative findings for the effect of fragmentation on stability are not driven by methodological choices made when producing our baseline estimates.

We now show our baseline estimates are unaffected by bandwidth choice for a reasonable range of bandwidths. Figure D.6 displays estimates, together with 90% and 95% confidence intervals, obtained by estimating our models using different bandwidths around the threshold. The CCT optimal bandwidth is displayed as a vertical dotted line. The estimates are stable across bandwidths, and start to slightly attenuate only when using values of the bandwidth well above the optimal level. We do, however, observe that p-values oscillate around the 5% and 10% thresholds across the range of plausible bandwidths. To assail doubts about the stability of our findings, in Appendix Figure D.8, we report a estimates for a range of bandwidths for large municipalities with more than 17 council seats (Panel A) and our unweighted specification (Panel B). We can observe that point estimates are again

[26]Assuming the votes removed or added iteratively to each party become blank votes instead of reassigning them to the rest of the parties yields very similar results.

largely robust to bandwidth choice in both panels, indicating that the size of the estimated effect does not depend on bandwidth choice for these specifications.

In a separate analysis, we modify the entry threshold value by setting it at each integer value between 1% and 10%. We then estimate the reduced form of our baseline model for each of these values. The purpose of this exercise is to ensure that we can only detect an effect on fragmentation when using the 5% threshold. Figure D.7 in the Appendix shows that there are no observed discontinuities in government stability around these artificial thresholds, with point estimates being very close to zero and statistically insignificant. The only positive and statistically significant effect of fragmentation on stability is found at the 5% threshold, reassuring us that our baseline results are indeed capturing the effect of a party entering council as a result of crossing the entry threshold.

Finally, to ensure that our results do not depend on a specific group of outliers or are driven by a particular election, in Table D.6 in the Appendix we estimate our baseline model removing from the sample observations from each electoral term, one at a time. The effect of fragmentation remains positive and of a magnitude comparable to the full-sample estimate, suggesting that our results are fairly stable over time and not specific to a particular election.

6. Conclusions

The notion that legislative fragmentation can result in government instability has been widespread since, at least, the inter-war European years (see Karvonen and Quenter 2002 for a review). This paper provides theoretical support and empirical evidence for this hypothesis by developing a two-period legislative bargaining model with fragmentation and employing RD methods for estimation.

Understanding the determinants and consequences of government stability is important to design electoral rules that balance the need to hold politicians accountable with efforts to limit policy uncertainty. Our results are especially relevant in a context of increasing political fragmentation such as the one currently arising in Europe and elsewhere.

Is it possible to extrapolate results from our local level data to the national arena? These contexts differ in terms of both the institutional rules governing them and the stakes at play. However, we can reasonably assume the simple theoretical mechanism that we propose to interpret our results holds more generally in comparable bargaining settings, such as the coalition-formation stage in national parliaments. Additionally, the institutional traits of local governments that we use in our analysis present several commonalities with regional and national parliaments in Spain, as well as with a number of other countries' assemblies. For these reasons, we believe our results provide useful evidence informing the debate on the determinants and consequences of government stability in parliamentary democracies.

References

Alesina, Alberto, Sule Özler, Nouriel Roubini, and Phillip Swagel. 1996. "Political instability and economic growth." *Journal of Economic growth*, 1(2): 189–211.

Anagol, Santosh, and Thomas Fujiwara. 2016. "The runner-up effect." *Journal of Political Economy*, 124(4): 927–991.

Angrist, Joshua D, and Guido W Imbens. 1994. "Identification and Estimation of Local Average Treatment Effects." *Econometrica*, 62(2): 467–475.

Arenas, Andreu. 2016. "Sticky votes." *Journal of Economic Behavior & Organization*, 132: 12–25.

Arezki, Rabah, and Thiemo Fetzer. 2019. "Executive Branch Turnover, Policy Uncertainty, and Growth." IGC Working paper S-89326-CCN-1.

Artés, Joaquín, and Ignacio Jurado. 2018. "Government fragmentation and fiscal deficits: a regression discontinuity approach." *Public Choice*, 175(3-4): 367–391.

Baker, Scott R, Nicholas Bloom, and Steven J Davis. 2016. "Measuring economic policy uncertainty." *The Quarterly Journal of Economics*, 131(4): 1593–1636.

Baron, David P. 1998. "Comparative dynamics of parliamentary governments." *American Political Science Review*, 92(3): 593–609.

Baron, David P, and John A Ferejohn. 1989. "Bargaining in legislatures." *American political science review*, 83(4): 1181–1206.

Baron, David P, T Renee Bowen, and Salvatore Nunnari. 2017. "Durable coalitions and communication: Public versus private negotiations." *Journal of Public Economics*, 156: 1–13.

Barro, Robert J. 1991. "Economic growth in a cross section of countries." *The quarterly journal of economics*, 106(2): 407–443.

Bernanke, Ben S. 1983. "Irreversibility, uncertainty, and cyclical investment." *The Quarterly Journal of Economics*, 98(1): 85–106.

Bloom, Nicholas. 2014. "Fluctuations in uncertainty." *Journal of Economic Perspectives*, 28(2): 153–76.

Bloom, Nick, Stephen Bond, and John Van Reenen. 2007. "Uncertainty and investment dynamics." *The review of economic studies*, 74(2): 391–415.

Bordo, Michael D, John V Duca, and Christoffer Koch. 2016. "Economic policy uncertainty and the credit channel: Aggregate and bank level US evidence over several decades." *Journal of Financial Stability*, 26: 90–106.

Calonico, Sebastian, Matias D Cattaneo, and Rocio Titiunik. 2014. "Robust nonparametric confidence intervals for regression-discontinuity designs." *Econometrica*, 82(6): 2295–2326.

Cattaneo, Matias D, Michael Jansson, and Xinwei Ma. 2017. "Simple local polynomial density estimators." *University of Michigan, Working Paper*.

Cheibub, José Antonio, Adam Przeworski, and Sebastian M Saiegh. 2004. "Government coalitions and legislative success under presidentialism and parliamentarism." *british Journal of political science*, 565–587.

Costas-Pérez, Elena, Albert Solé-Ollé, and Pilar Sorribas-Navarro. 2012. "Corruption scandals, voter information, and accountability." *European Journal of Political Economy*, 28(4): 469–484.

Cruz, Guillermo Márquez. 2010. "Gobernabilidad local en España." *Política y sociedad*, 37–67.

Davezies, Laurent, and Thomas Le Barbanchon. 2017. "Regression discontinuity design with continuous measurement error in the running variable." *Journal of econometrics*, 200(2): 260–281.

Diermeier, Daniel. 2006. "Coalition government." In *The Oxford handbook of political economy*.

Diermeier, Daniel, and Antonio Merlo. 2000. "Government turnover in parliamentary democracies." *Journal of Economic Theory*, 94(1): 46–79.

Diermeier, Daniel, Hülya Eraslan, and Antonio Merlo. 2003. "A structural model of government formation." *Econometrica*, 71(1): 27–70.

Döring, Holger, and Philip Manow. 2019. "Parliaments and governments database (ParlGov): Information on parties, elections and cabinets in modern democracies." *Experimental version*.

Fiva, Jon H, Olle Folke, and Rune J Sørensen. 2018. "The power of parties: evidence from close municipal elections in Norway." *The Scandinavian Journal of Economics*, 120(1): 3–30.

Foremny, Dirk, Jordi Jofre-Monseny, and Albert Solé-Ollé. 2017. "'Ghost citizens': Using notches to identify manipulation of population-based grants." *Journal of Public Economics*, 154: 49–66.

Francois, Patrick, Ilia Rainer, and Francesco Trebbi. 2015. "How is power shared in Africa?" *Econometrica*, 83(2): 465–503.

Fujiwara, Thomas, and Carlos Sanz. 2019. "Rank Effects in Bargaining: Evidence from Government Formation." *The Review of Economic Studies*. rdz004.

Gagliarducci, Stefano, and M Daniele Paserman. 2011. "Gender interactions within hierarchies: evidence from the political arena." *The Review of Economic Studies*, 79(3): 1021–1052.

Groseclose, Tim, and James M Snyder. 1996. "Buying supermajorities." *American Political Science Review*, 90(2): 303–315.

Julio, Brandon, and Youngsuk Yook. 2012. "Political uncertainty and corporate investment cycles." *The Journal of Finance*, 67(1): 45–83.

Karvonen, Lauri, and Sven Quenter. 2002. "Electoral systems, party system fragmentation and government instability." In *Authoritarianism and Democracy in Europe, 1919–39*. 131–162. Springer.

Lee, David S. 2009. "Training, wages, and sample selection: Estimating sharp bounds on treatment effects." *The Review of Economic Studies*, 76(3): 1071–1102.

Lee, David S, and Thomas Lemieux. 2010. "Regression discontinuity designs in economics." *Journal of economic literature*, 48(2): 281–355.

Linz, Juan J. 1994. "Democracy, Presidential or Parliamentary: Does It Make a Difference?" *The Failure of Presidential Democracy: The Case of Latin America*, 3–87.

Lupia, Arthur, and Kaare Strøm. 1995. "Coalition termination and the strategic timing of parliamentary elections." *American Political Science Review*, 89(3): 648–665.

Mainwaring, Scott, and Matthew S Shugart. 1997. "Juan Linz, presidentialism, and democracy: a critical appraisal." *Comparative Politics*, 449–471.

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

Merlo, Antonio. 1997. "Bargaining over governments in a stochastic environment." *Journal of Political Economy*, 105(1): 101–131.

Merlo, Antonio. 1998. "Economic dynamics and government stability in postwar Italy." *Review of Economics and Statistics*, 80(4): 629–637.

Mouritzen, Poul Erik, and James H Svara. 2002. *Leadership at the apex: politicians and administrators in Western local governments.* University of Pittsburgh Pres.

Palguta, Ján. 2019. "Political Representation and Public Contracting: Evidence from Municipal Legislatures." *European Economic Review*.

Passarelli, Francesca, et al. 2017. "Análisis económico del transfuguismo político." *PhD Thesis. Universidad Pablo Olavide*.

Persson, Torsten, and Guido Enrico Tabellini. 2002. *Political economics: explaining economic policy.* MIT press.

Polk, J, J Rovny, R Bakker, E Edwards, L Hooghe, S Jolly, J Koedam, F Kostelka, G Marks, G Schumacher, et al. 2017. “Explaining the salience of anti-elitism and reducing political corruption for political parties in Europe with the 2014 Chapel Hill Expert Survey data.” *Research & Politics*, 4.

Pons, Vincent, and Clémence Tricaud. 2019. “Coordination and Bandwagon Effects of Candidate Rankings: Evidence from Runoff Elections.” National Bureau of Economic Research.

Taylor, Michael, and Valentine M Herman. 1971. “Party systems and government stability.” *American Political Science Review*, 65(1): 28–37.

UN. 2018. “World Economic Situation and Prospects.” *Executive Summary*.

Appendices for Online Publication

A. Theoretical Appendix

Party 1 Expected Pay-offs in Different Coalitions

If $s_1 < 0.5$, a party 1 will form a coalition in period 1 by making a proposal distribute the available resources θ_1. Party 1 will always be able to make a proposal that gathers a majority by offering $s_3\theta_1$ to party 3. The problem that party 1 faces when forming an initial coalition in the three party case can be written as:

$$\max_{g^1} \, (g_1^1 + \omega)\Big(1 + \beta(1 - \mu\mathbb{1}\{\theta_2 \geq g_3^1\})\Big) \tag{A.1}$$

$$s.t. \sum_{j=1}^{3} g_j^1 \leq \theta_1. \tag{A.2}$$

Expected payoffs for party 1 in each coalition are given by:

$$\begin{aligned} V_{mc}^S &= [\omega + \theta_1(1 - s_3)](1 + \beta) \\ V_{mc}^C &= [\omega + \theta_1(1 - s_3)][(1 + \beta)(1 - \mu) + \mu] \\ V_{block}^S &= [\omega + \theta_1 - \theta_2](1 + \beta), \end{aligned}$$

where V_{mc}^S is the payoff for safe minimum-cost coalitions, which is feasible when $\theta_2 < s_3\theta_1$. V_{mc}^C is the payoff for contestable minimum-cost coalitions, which are always feasible. Finally, V_{block}^S is the payoff for safe blocking coalitions, which are feasible when $\theta_2 < \theta_1$. The constraint in equation 1 can be obtained by combining V_{block}^S and V_{mc}^C.

The expressions in the 4 party case replace s_* instead of s_3. We can define s_* formally as $s_* = s_3 + (s_4 - s_3)\mathbb{1}\{s_1 + s_4 \geq 0.5\}$.

Expression for Prob. of Vote of No confidence $\pi(\mathrm{s})$ - Case with three parties and $s_1 < 0.5$

In the three party case, the probability of a vote of no confidence when there is no single-party majority $\pi(\mathrm{s})$ is given by:

$$\pi(\mathrm{s}) = \mu\Big(1 - \Big(\int_0^{\theta_k}\int_0^{\theta_1} g(\theta_1, \theta_2)\ \ d\theta_2\ d\theta_1 + \int_{\theta_k}^{1}\int_0^{h(\theta_1, s_3)} g(\theta_1, \theta_2)d\theta_2 d\theta_1\Big)\Big) \tag{A.3}$$
$$\text{with}\ \ \theta_k = \frac{\mu\omega\beta}{(1 - s_3)(1 + \beta - \mu\beta)},$$

where $g(\theta_1, \theta_2)$ is the joint density function of (θ_1, θ_2), $h(\theta_1, s_3)$ is defined in 1, s is a seat share vector satisfying $s_1 < 0.5$ and θ_k is the value of θ at the kink resulting from the intersection between constraints (see Figure 1). When $s_1 \geq 0.5$, the probability of a vote of no confidence is 0.

Proof of Proposition 1

In the first place, consider the case in which $s_1 \geq 0.5$. This condition implies party 1 forms a single party majority and $\pi(\mathrm{s}) = 0$. In this scenario, there are two relevant possibilities depending on whether $s'_1 \geq 0.5$ or not. If $s'_1 \geq 0.5$, we will have that $\pi(\mathrm{s}') = 0$ for the same reason. If, however $s'_1 < 0.5$, then we know $\pi(\mathrm{s}') \geq 0$ because for a section of (θ_1, θ_2) space, the probability of a vote of no confidence is different from 0. This completes the proof for the $s_1 \geq 0.5$ case.

In the case with $s_1 < 0.5$, the probability of a vote of no confidence will be larger than 0 under both s and s′. Two cases need attention when comparing these probabilities. Define $s_* \equiv s'_3 + (s'_4 - s'_3)\mathbb{1}\{s'_1 + s'_4 \geq 0.5\}$. If $s_* = s_3$, then integral A.3 is identical for s^3 and s^4, so that $\pi(\mathrm{s}) = \pi(\mathrm{s}')$. If, however, $s_* < s_3$, then the region of (θ_1, θ_2) space corresponding to safe coalitions is smaller under s′ than under s. As indicated in the right-panel of figure 1, this occurs because the linear constraint $h(\theta_1, s_*)$ will have the same intercept and a smaller slope than constraint $h(\theta_1, s_3)$ (see equation 1 in the main text). Given that, by assumption, $g(\theta_1, \theta_2)$ has positive density everywhere in the unit square, the change in the regions of integration translate into $\pi(\mathrm{s}') > \pi(\mathrm{s})$ if $s_* < s_3$.

■

Equilibrium with two Parties

The case with 2 parties is very straightforward as, necessarily, party 1 is always able to form a single-party majority in period 1 by approving a transfer of θ_1 to itself. Because no alternative majority can be formed, the probability of a vote of no confidence is 0 regardless of shares s_1 and s_2 or the values of (θ_1, θ_2).

An increase in the number of parties from 2 to 3 can result in an increase in the probability of a vote of no confidence if and only if $s_1 < 0.5$ in the 3 party case.

Equilibrium with five Parties

We now discuss the equilibrium when with 5 parties. If $s_1 \geq 0.5$, then party 1 forms a single-party majority, approves paying itself θ_1, and the probability of a vote of no confidence in period 2 is 0. When $s_1 < 0.5$, the contestable minimum cost coalition will result in an expected pay-off of $V^C_{mc} = (\omega + (1 - s_*)\theta_1)(1 + \beta(1 - \mu))$, with s_* corresponding to the combined seat share of the additional parties that party 1 needs to form a minimum winning coalition. This number will depend on the vector of seat shares, as detailed in table A.1.

The safe minimum cost coalition will be available to party 1 if and only if $\theta_2 < s_*\theta_1$ with s_* taking the values illustrated in table A.1. The associated pay-off will be $V^S_{mc} = (\omega + \theta_1(1 - s_*))(1 + \beta)$.

When considering blocking coalitions there are two cases that warrant separate attention, $s_1 + s_3 \geq 0.5$ and $s_1 + s_3 < 0.5$. In the first case, party 1 only needs one party to form a winning coalition, and can therefore offer θ_2 to one party (e.g. party 3) to form a blocking coalition. This is analogous to the case with 3 or 4 parties and yields a pay-off of $V^S_{block} = (\omega + (\theta_1 - \theta_2))(1 + \beta)$, which is feasible if $\theta_1 > \theta_2$. When $s_1 + s_3 < 0.5$, party 1 needs two parties to form a coalition, and hence will have to pay θ_2 to *both* for that coalition to be blocking. In this case, the pay-off from forming a blocking coalition is $V^S_{block} = (\omega + (\theta_1 - 2\theta_2))(1 + \beta)$, and is only feasible if $\theta_1 > 2\theta_2$.

TABLE A.1
VALUES OF s_* - 5 PARTY CASE ($s_1 < 0.5$)

	Case	s_*
Panel A		
$s_1 + s_3 \geq 0.5$	$s_1 + s_5 \geq 0.5$	s_5
	$s_1 + s_4 \geq 0.5$ & $s_1 + s_5 < 0.5$	s_4
	$s_1 + s_4 + s_5 \geq 0.5$ & $s_4 + s_5 < s_3$ & $s_1 + s_4 < 0.5$	$s_4 + s_5$
	$s_1 + s_4 < 0.5$ & $s_4 + s_5 \geq s_3$	s_3
Panel B		
$s_1 + s_3 < 0.5$	$s_1 + s_3 + s_5 \geq 0.5$ & ($s_1 + s_4 + s_5 < 0.5$ or $s_4 + s_5 > s_3$)	$s_3 + s_5$
	$s_1 + s_4 + s_5 \geq 0.5$	$s_4 + s_5$

In both cases we can determine when blocking coalitions are played in (θ_1, θ_2) space by using condition $V^C_{mc} \geq V^S_{block}$ to derive incentive compatibility constraints $\theta_2 \leq h(\theta_1, s_*)$, and the feasibility conditions for a blocking coalition as participation constraints.[27] The incentive compatibility constraints will be given by:

$$h(\theta_1, s) = \begin{cases} \dfrac{\mu\omega\beta}{1+\beta} + \dfrac{s_*(1+\beta-\mu\beta)+\mu\beta}{1+\beta}\theta_1 \text{ if } s_1 + s_3 \geq 0.5 \\ \dfrac{\mu\omega\beta}{2(1+\beta)} + \dfrac{s_*(1+\beta-\mu\beta)+\mu\beta}{2(1+\beta)}\theta_1 \text{ if } s_1 + s_3 < 0.5 \end{cases}$$

We can use these to write the probability of a vote of no confidence in the case with 5 parties as:

$$\pi_2(\Theta, \mathrm{s}) \equiv \begin{cases} 0 \quad \text{if} & \begin{cases} s_1 + s_3 \geq 0.5 \text{ and } \theta_2 \leq h(\theta_1, s_*) \text{ and } \theta_2 < \theta_1 \\ \text{or} \\ s_1 + s_3 < 0.5 \text{ and } \theta_2 \leq h(\theta_1, s_*) \text{ and } \theta_2 < \theta_1/2 \end{cases} \\ \mu \quad \text{Otherwise} \end{cases}$$

We can use this expression to prove the equivalent of proposition 1 in the 4 to 5 party case. Assume two seat share vectors $\mathrm{s} = (s_1, s_2, s_3, s_4)$ and $\mathrm{s}' = (s'_1, s'_2, s'_3, s'_4, s'_5)$ such that $s_j \geq s'_j \quad \forall j = \{1, 2, 3, 4\}$ and $s'_5 > 0$. For a given joint distribution $g(\theta_1, \theta_2)$ with positive density in the unit square, we have that $\pi(\mathrm{s}') \geq \pi(\mathrm{s})$. To prove this, it suffices to show that $s'_* \leq s_*$, where s_* is the seat share of the ally party 1 needs when building a minimum cost coalition in the 4 party case, and s'_* corresponds to the same figure in the 5 party case (see table A.1).[28] Because $h(\theta_1, s_*)$ is increasing in s_*, and a blocking coalition needs to satisfy $\theta_2 \geq h(\theta_1, s_*)$, a decrease in s_* will reduce the size of the region in (θ_1, θ_2) space for which this condition is satisfied. For a fixed $g(\theta_1, \theta_2)$ with positive support in the unit square, the will translate in a higher probability of a vote of no confidence. To show $s_* \geq s'_*$ it suffices to

[27] Because s'_* and s_* are both smaller than 0.5, we can guarantee that safe minimum cost coalitions will never be feasible if blocking coalitions are not feasible.

[28] If the minimum winning coalition requires two parties (e.g. 3 and 5), then this figure will be the combined share of both parties.

go over table A.1, compare them to expression $s_* = s_3 + (s_4 - s_3)\mathbb{1}\{s_1 + s_4 \geq 0.5\}$ for the four party case, and note that $s_j \geq s'_j \;\; \forall j = \{1, 2, 3, 4\}$, by assumption.

In this sense, going from 4 to 5 parties appears to be no different to going from 3 to 4 parties. However, adding a fifth party introduces an additional mechanism. Not only can the cost of a minimum cost coalition fall when adding a fifth party ($s_* \geq s'_*$), but also the cost of forming a blocking coalition can increase. This occurs because in the 5 party case we might have that $s_1 + s_3 < 0.5$ which implies party 1 needs *two* other parties to form a minimum coalition. To make this a blocking coalition, party 1 needs to pay θ_2 to each party. This doubles the cost of forming a blocking coalition, affecting both its feasibility and desirability.[29]

[29] It is also possible to show that an adapted version of the lemma in section 2 is satisfied in the five party case. Proof available upon request.

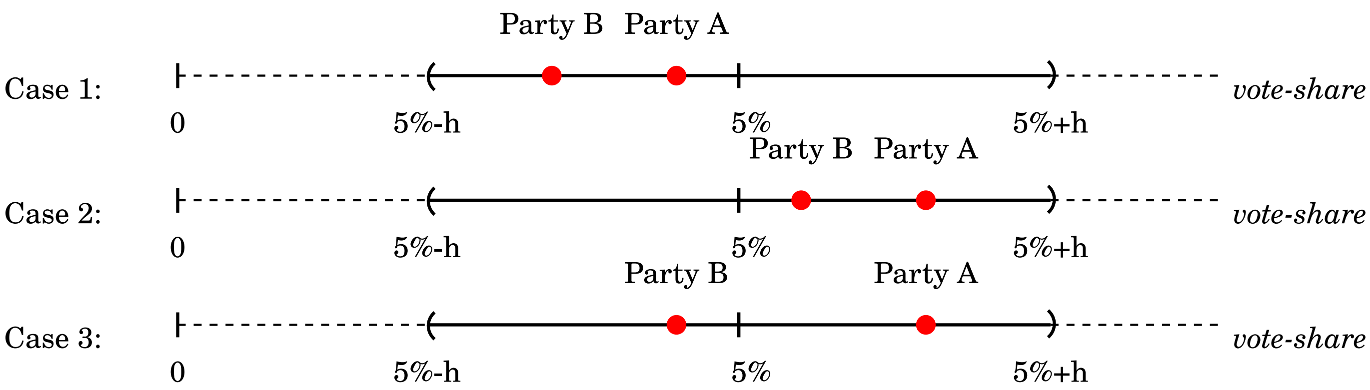
B. Construction of the instrument for fragmentation

To instrument for the number of parties in the council, we use an indicator D equal to one if, in a given election, a given party in a municipality obtained a vote-share above the 5% threshold. Given that the electoral rules exclude parties with less than 5% from the allocation of seats, parties above the threshold have a positive probability of being in the council, whereas parties below the threshold never receive a seat. Thus, the number of parties with seats in the council in a given municipality will be related to how many parties were able to cross this threshold. Our fuzzy-RD design is based on this intuition. It uses variation in the number of parties that crossed the 5% threshold to instrument for the number of parties in council, focusing on observations within a small bandwidth h from 5%.

The instrument is defined for each election, municipality and party. As an illustration, consider an example in which, after an election, vote-shares are determined in a way that there are only two parties that obtained vote-shares sufficiently close to the 5% threshold to be within the bandwidth h.

There are three possible cases, depicted in the figure below: both parties receive less than 5% (case 1), both receive more (case 2), or parties locate at either side of the 5% threshold (case 3). In case 1, our instrument D takes value 0 for both parties A and B. Similarly, in case 2 it is 1 for both parties, while in case 3 it equals 1 for party A and 0 for party B.

It is clear that the number of parties that enter the council is partially determined by the number of parties that manage to get at least 5% of the votes and are, hence, eligible to obtain a seat. In case 2, for example, if the vote-shares of party A and B are sufficiently high, the D'Hondt method will allocate both parties a seat, so that the council will have two additional parties. On the contrary, in situations like case 1, there will be two parties less in the council.



C. Data Appendix

C.1. List of Data Sources

Town Panel

We create a list of municipalities-by-year unique identifiers, gathering information on the official naming of municipalities, as well as municipality, province and region codifications. For years after 1999, we use the official list from the *Instituto Nacional de Estadistica*. This information is not available in earlier years, for which we use the election results as a basis for our towns panel instead. This town panel is used as a basis for all subsequent merges with the other datasets used in the paper.

Elections

We use municipal election data from the *Ministerio del Interior* (the Spanish Ministry of Internal Affairs), relative to all election years between 1979 and 2011. This source contains information about all parties running for office, as well as information on votes received by each party, number of citizens with the right to vote, voters, turnout, number of blank ballots, number of non-valid ballots. In the original data sources (http://www.infoelectoral.mir.es/infoelectoral/min/), around 400 elections are missing in 1979 and 1983.

Seats

We access data on the seat distribution across parties in all municipality councils from the *Ministerio del Interior*, relative to all election years between 1979 and 2014. The data contain information on the number of seats that each party received, as well as the total number of seats in the municipality council.

Mayors

We use yearly information on mayors in all municipalities from the *Ministerio del Interior* between 1979 and 2014. The data contain information about the party affiliation of the mayor, as well as the date in which the mayor entered in office.

We aggregate the data at the election level. In the case in which the identity of the mayor changes within a term, we keep the information relative to all mayors who have served. Our main dependent variable, *Mayor Unseated*, is an indicator equal to one if, at some point during the term, the identity of the mayor changes and her party affiliation is different from the one of her predecessor. In the original data sources, information on the mayor's identity is missing in 39 cases (mainly in Navarre, 1999).

Ideology

We obtain information on ideology by merging our dataset to the 1999-2014 Chapel Hill Expert Survey (CHES) trend file. This dataset was constructed by Polk et al. (2017) and contains ideology measures of parties represented in the national Parliament between 1999 and 2014. These parties are *PP, BNG, CC, CHA, CiU, EA, EH, ERC, IU, PA, PAR, PNV, PSOE, and UV.*

To define our measures of ideological distance, we use the variable *lrgen* in the CHES dataset, which measures the general ideology of each party on a scale from 1 (far left) to 10 (far right), after standardizing it and taking the absolute value. In addition to using the continuous variable, we also generate an indicator *far* equal to 1 if the distance between the largest party and the *marginal party*, defined as the party closest to the 5% entry threshold, is above the 75^{th} percentile of the distance distribution. Similarly, we define *close* if the distance is below the 25^{th} percentile. *Same*, instead, is an indicator for these two parties being both on the left or both on the right of the mean ideology among all parties represented in the Spanish Parliament between 1999 and 2014.

C.2. Sample selection

Fragmentation and stability

The dataset for the analysis of the effect of fragmentation on stability is a party-level panel of municipalities, observed for all election years between 1979 and 2011 and containing all information from data sources described above. We restrict the sample to municipalities with population above 250 residents since the ones below the are subject to a different voting rule, based on individual candidates rather than on party lists.

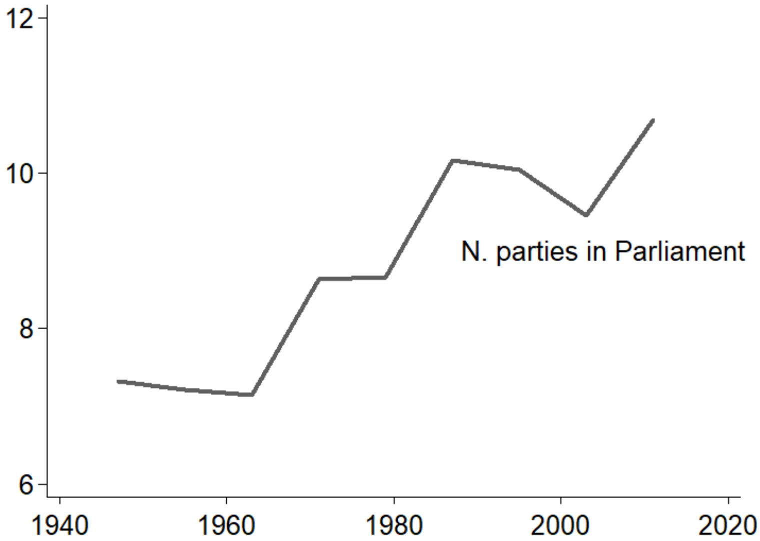
We drop a total of 840 elections, in which either i) we are unable to match electoral results and mayors, or ii) cases in which electoral results are inconsistent (e.g. if none of the parties received votes, or the number of voters is larger than the number of individuals with right to vote). Moreover, we exclude 4,608 cases in which the party of the mayor is not identified and 3,690 elections in which only one party participates in the election.

The final sample consists of 143,400 party-municipality observations from 42,259 unique municipal elections.

D. Additional figures and results

FIGURE D.1

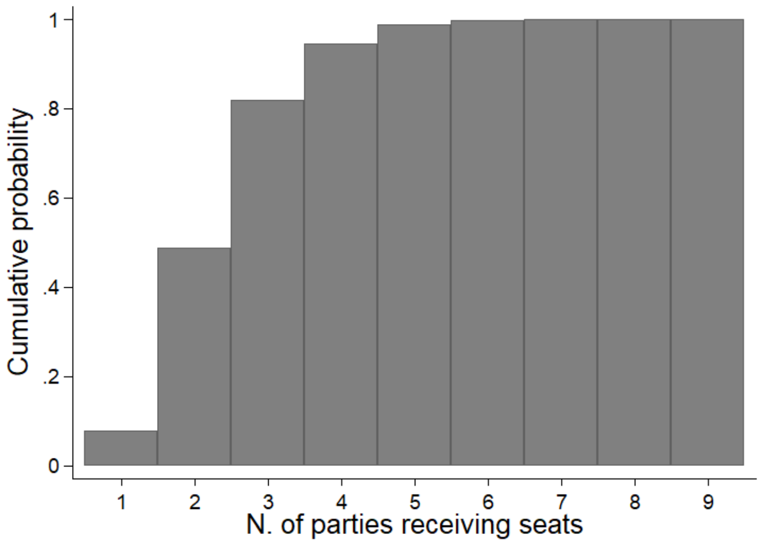
EVOLUTION OF THE NUMBER OF PARTIES IN PARLIAMENT OVER TIME



Notes: The vertical axis measures the average number of parties for all countries in the sample calculated in 8-year windows between 1947 and 2019. Time variable represented in the horizontal axis. Source: authors' elaboration based on the *parlgov* dataset (experimental version) by Döring and Manow (2019). The dataset contains information on national election results for 39 countries, including all EU and most OECD countries until 2019.

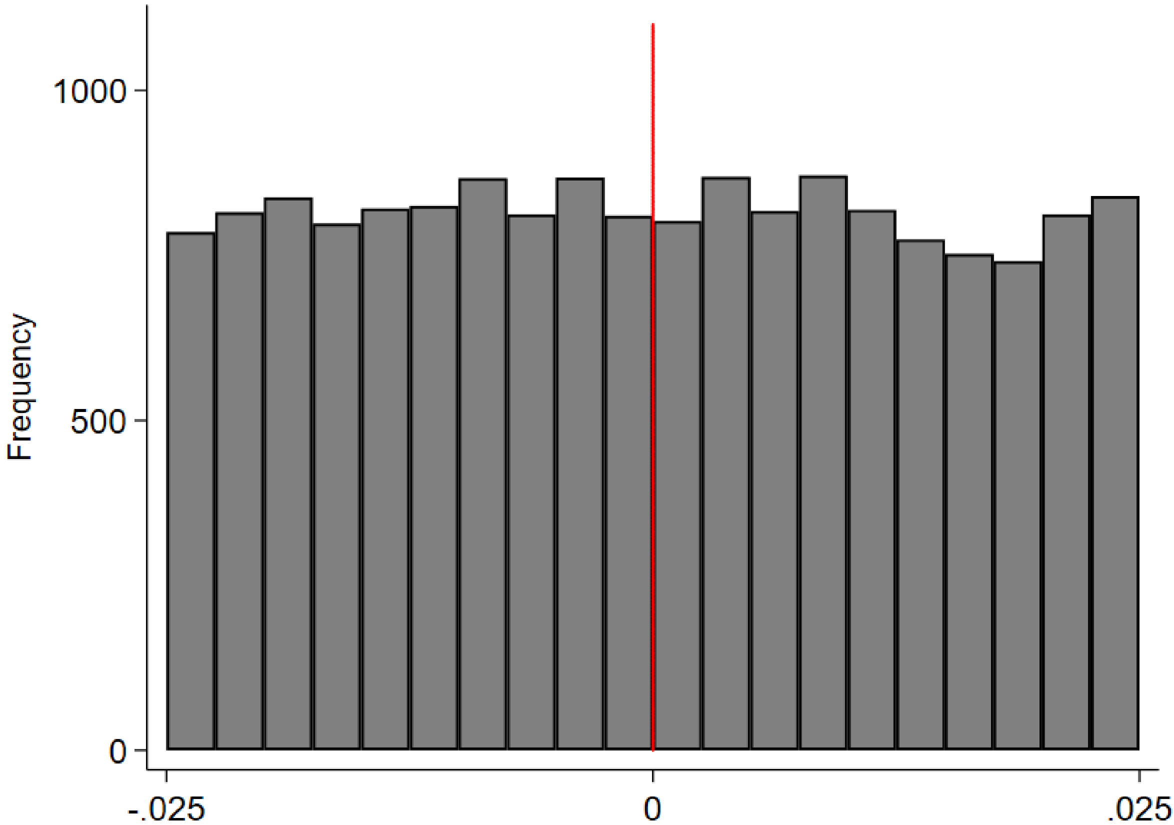
FIGURE D.2

NUMBER OF PARTIES IN MUNICIPAL COUNCILS



Notes: Cumulative distribution of the number of parties represented in Spanish municipal councils between 1979 and 2014.

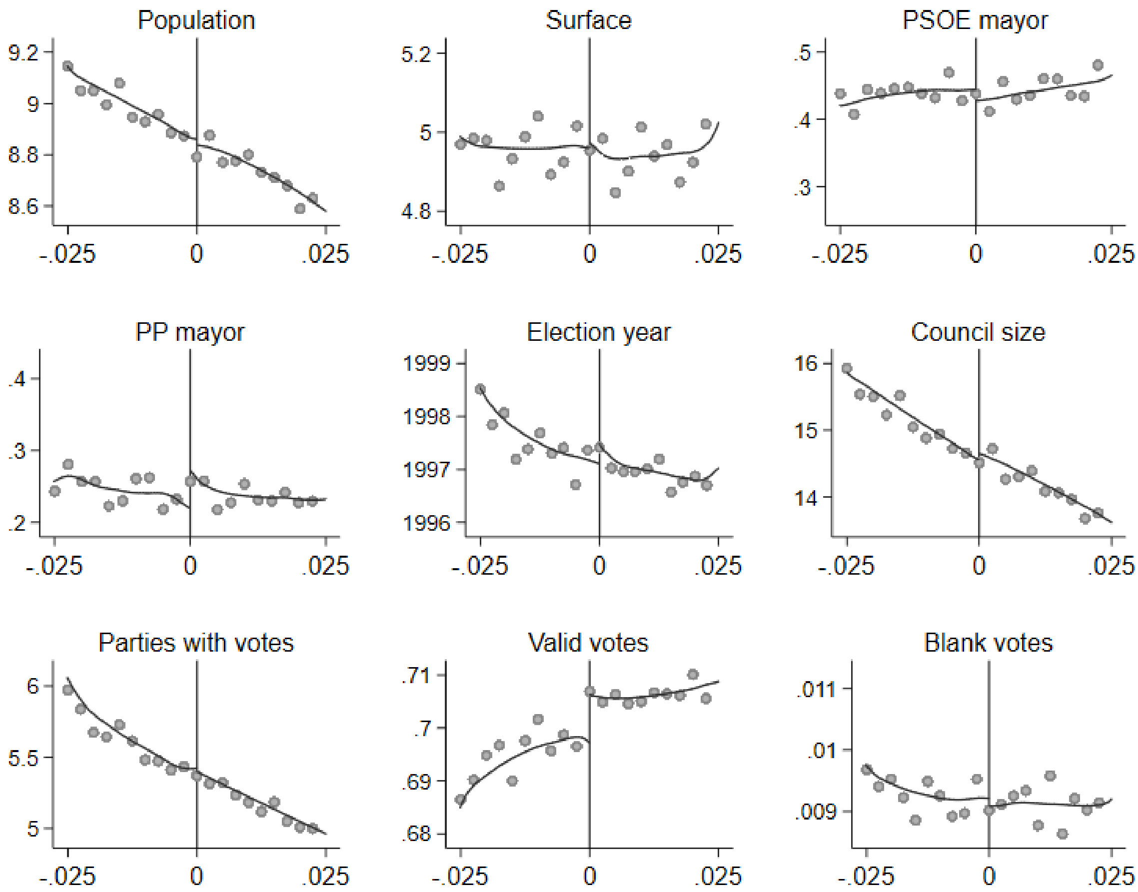
FIGURE D.3
DENSITY OF THE FRAGMENTATION RUNNING VARIABLE AROUND THE THRESHOLD



Notes: Frequency histogram of the running variable used in the RDD on the effect of fragmentation on stability, in bins of size 0.025%. A McCrary (2008) test of the null hypothesis of no discontinuous jump in the density at the threshold fails to reject the null with a p-value of 0.96. A Cattaneo, Jansson and Ma (2017) test, instead, yields a p-value of 0.72.

FIGURE D.4

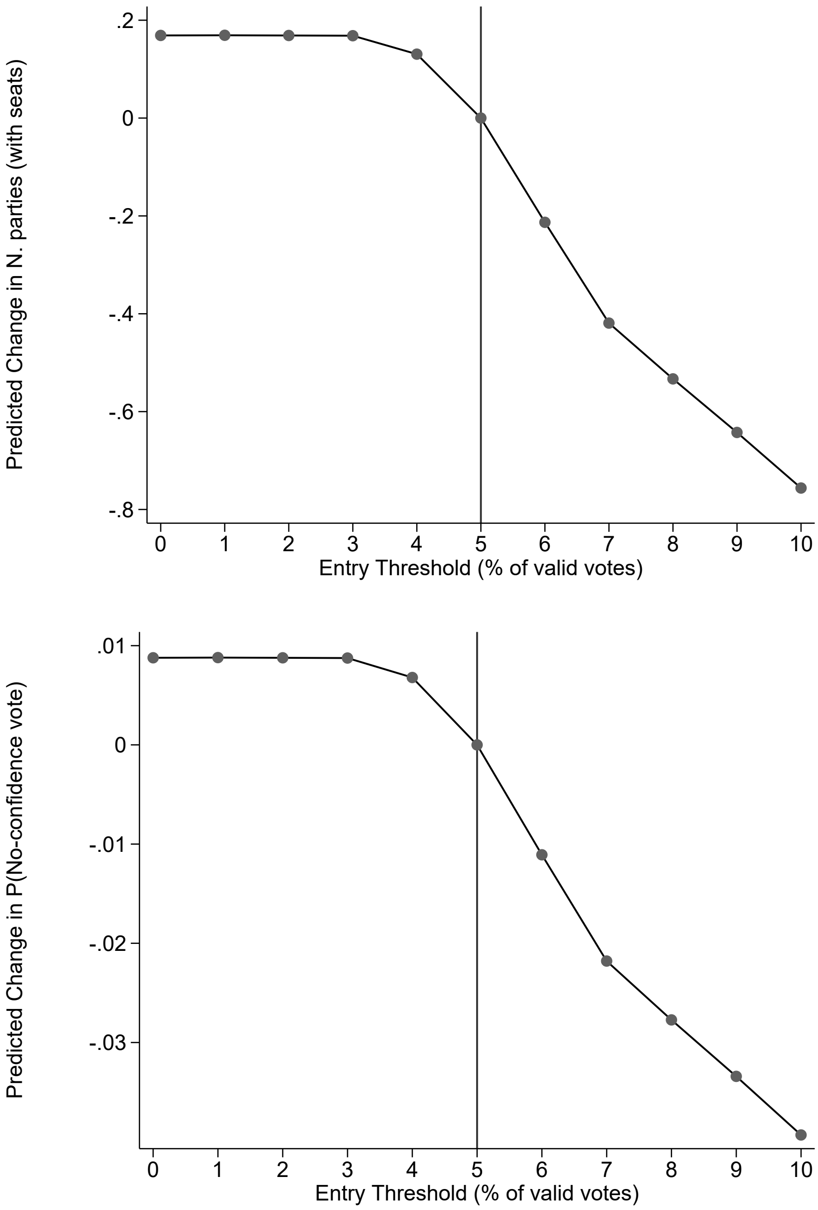
COVARIATE BALANCING PLOTS - FRAGMENTATION



Notes: Averages of different municipal characteristics near the threshold. Population and surface are in logarithms. PSOE mayor is an indicator for the mayor belonging to the socialist party PSOE and, similarly, PP mayor is an indicator for a mayor from the Popular Party. Council size is the number of available seats in the municipality. Parties with votes measures the number of parties that ran and obtained votes in the municipal election. Valid votes is the total number of valid votes cast (including blanks) divided by the total number of votes. Blank votes is the total number of blank votes divided by the total number of votes. Dots are averages in 0.25% bins of the running variable and lines are nonparametric local linear regressions estimates.

Figure D.5

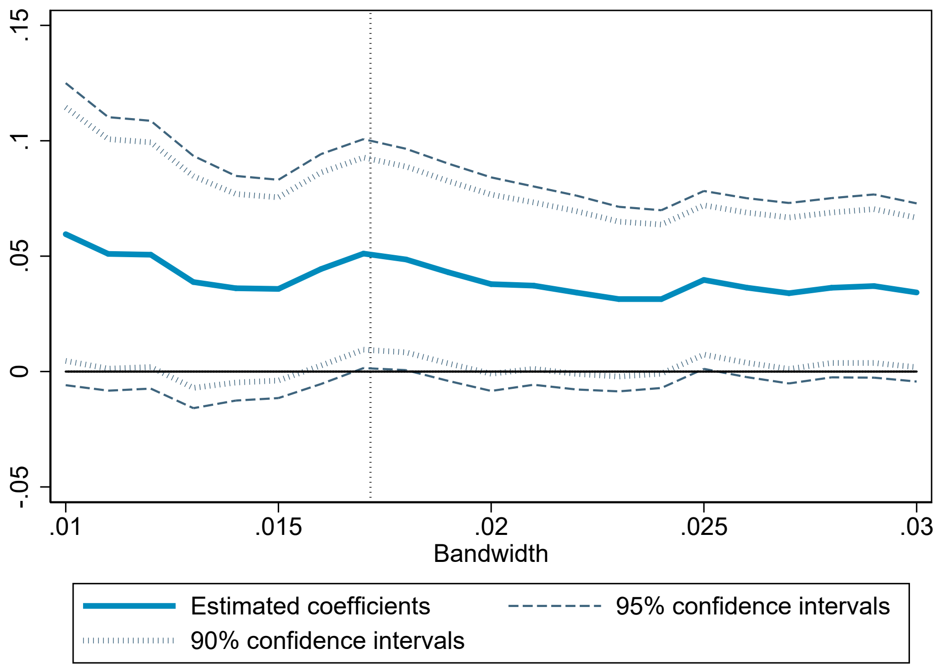
Predicted changes in stability as a function of the Entry Threshold



Notes: This figure reports the predicted number of parties as well as the predicted probability of a vote of no-confidence as a function of entry thresholds, holding the distribution of votes constant. We retrieve the number of parties for any variation in the admission threshold between 0% (no admission threshold) and 10% of valid votes, by applying the D'Hondt rule on observed election results in our sample. Then, we apply the coefficient estimated in Table 2 to retrieve, for each potential admission threshold, the change in probability of no-confidence vote compared to the case of a 5% entry threshold, observed in the data.

Figure D.6

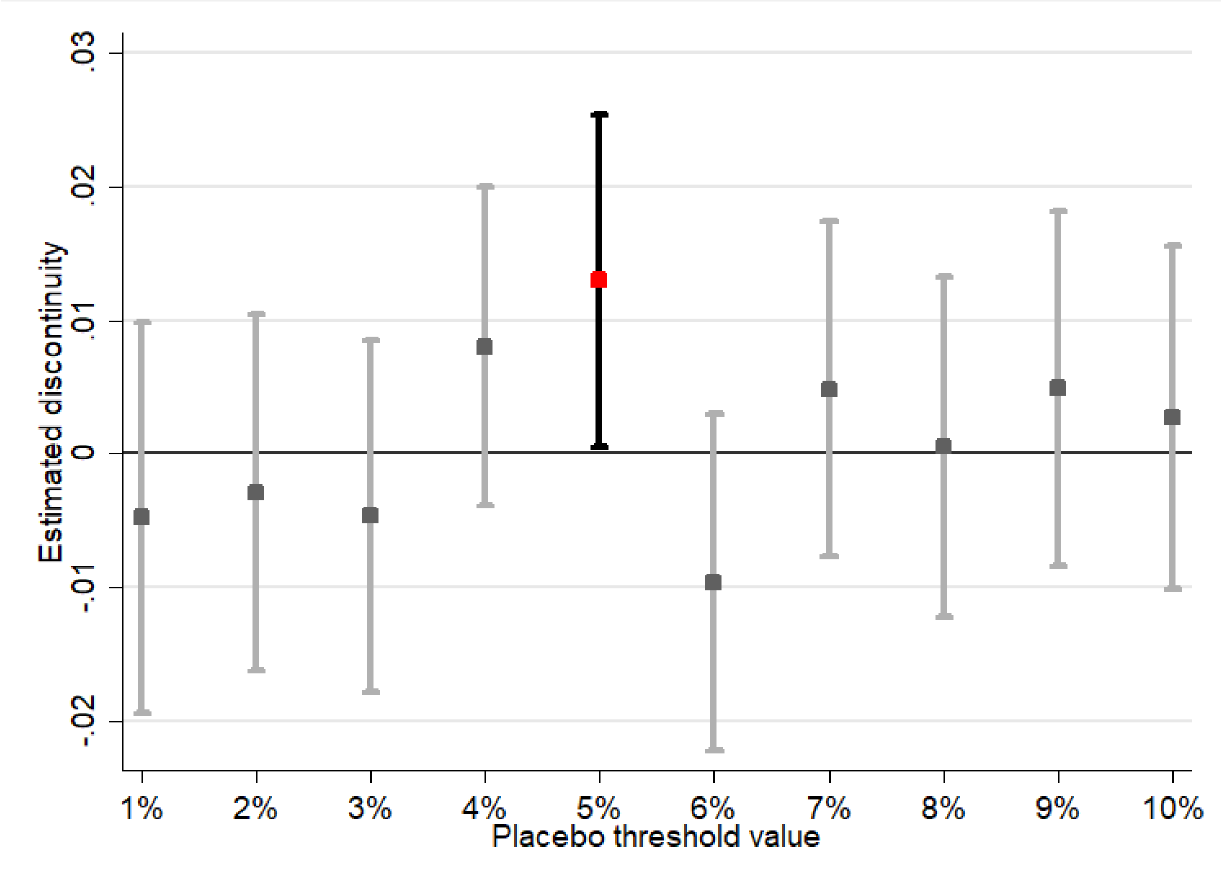
Robustness to Bandwidth choice



Notes: Estimates of the effect of fragmentation on the probability of a no-confidence vote for different bandwidth choices (eq. 2). Horizontal axis represent the relevant threshold size. The solid line shows the estimated coefficient values, the dashed lines are 95% confidence intervals, whereas the dotted lines are 90% confidence intervals. Controls: surface and population (in logs). FE: number of available seats and election year fixed effects. The vertical dotted line represents the CCT optimal bandwidth. Standard errors are clustered at the municipality level.

Figure D.7

Reduced form estimates for different placebo values of the threshold

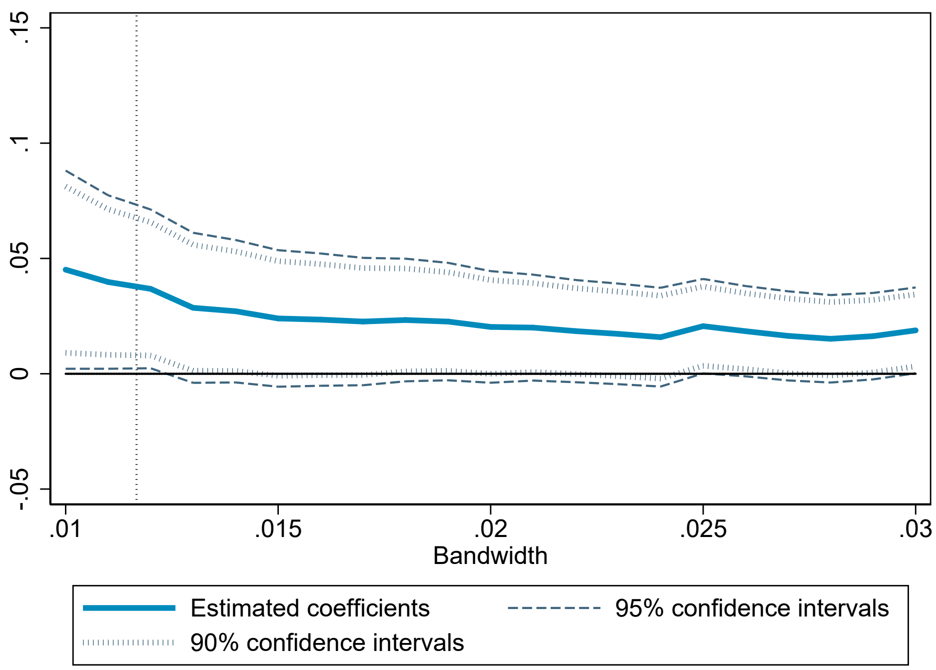


Notes: Reduced-form estimates of the effect of crossing the admission threshold on the probability of unseating the mayor for different placebo values of the entry threshold. The dependent variable is always an indicator taking value 1 if the mayor was unseated by a vote of no confidence during the legislature. Each point in the horizontal axis represent different values of the admission threshold, from 1 to 10%. For instance, the first point shows point estimates and 95% confidence intervals of the discontinuity present at the 1% vote-share threshold. The bandwidth is 1.7 percentage points at either side of the threshold in all specifications to be consistent with the baseline estimate. Standard errors clustered at the municipality level. The result for the 5% vote-share admission threshold is highlighted in the centre.

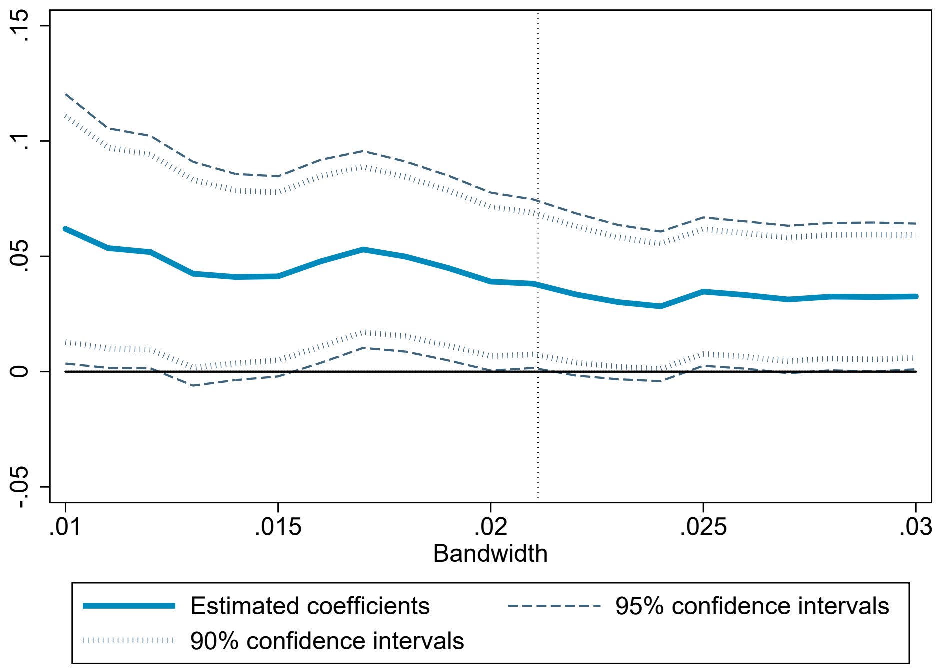
Figure D.8

Robustness to Bandwidth choice: Additional Specifications

Panel A



Panel B



Notes: Estimates of the effect of fragmentation on the probability of a no-confidence vote for different bandwidth choices (eq. 2). Panel A corresponds to estimates obtained for the subset of municipalities with 17 or more seats in the council. Panel B corresponds to estimates obtained without weighting for the number of parties running for election. Horizontal axis represent the relevant threshold size. The solid line shows the estimated coefficient values, the dashed lines are 95% confidence intervals, whereas the dotted lines are 90% confidence intervals. Controls: surface and population (in logs). FE: number of available seats and election year fixed effects. The vertical dotted line represents the CCT optimal bandwidth. Standard errors are clustered at the municipality level.

TABLE D.1

COVARIATE BALANCING CHECKS

	(1) Popul.	(2) Surface	(3) PSOE Mayor
Above threshold	-0.063	-0.051	-0.017
	(0.056)	(0.047)	(0.020)
Mean of dep.var.	8.868	4.950	0.441
Bandwidth	0.017	0.017	0.017
Obs.	11293	11109	11293
	PP Mayor	Election year	Council size
Above threshold	0.020	0.144	-0.047
	(0.017)	(0.391)	(0.192)
Mean of dep.var.	0.24	1997.17	14.68
Bandwidth	0.017	0.017	0.017
Obs.	11293	11293	11293

Notes: 2SLS estimates of the effect of the number of parties on different covariated. Population and surface are in logarithms. PSOE mayor is an indicator for the mayor belonging to the socialist party PSOE and, similarly, PP mayor is an indicator for a mayor from the Popular Party. Council size is the number of available seat in the municipality. Parties with votes measures the number of parties that ran and obtained votes in the municipal election. Valid votes is the total number of valid votes cast (including blanks) divided by the total number of votes. Blank votes is the total number of blank votes divided by the total number of votes. Estimation by local linear regression using a fixed bandwidth equal to the CCT optimal bandwidth used in table 2. No controls or FE are included. Standard errors are clustered at the municipality level. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

Table D.2

First-Stage Results

	(1) N. Parties	(2) N. Parties	(3) N. Parties	(4) N. Parties
Above threshold	0.244***	0.262***	0.258***	0.251***
	(0.044)	(0.036)	(0.035)	(0.035)
F-stat.	30.39	53.27	53.18	50.71
Mean of dep.var.	3.426	3.424	3.426	3.424
Bandwidth	0.017	0.017	0.017	0.017
Obs.	11293	11109	11293	11109
Fixed Effects	N	N	Y	Y
Controls	N	Y	Y	Y

Notes: OLS estimates of the first-stage for fragmentation (equation 3). The optimal bandwidth is calculated using the CCT method. Controls and FE are included as specified in each column. Controls: surface and population (in logs). FE: number of available seats and year fixed effects. Standard errors are clustered at the municipality level. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

Table D.3

2SLS Estimates - Fragmentation and Single-Party Majorities

	(1) P(Majority)	(2) P(Majority)	(3) P(Majority)	(4) P(Majority)
N. Parties	-0.092	-0.118**	-0.101*	-0.118*
	(0.064)	(0.058)	(0.059)	(0.061)
Mean of dep.var	0.628	0.628	0.628	0.628
Bandwidth	0.018	0.018	0.018	0.018
Obs.	11540	11353	11540	11353
Fixed Effects	N	N	Y	Y
Controls	N	Y	N	Y

Notes: 2SLS estimates of the effect of number of parties on the probability that the largest party has the absolute majority of seats. The dependent variable is an indicator taking value 1 if one party has strictly more than half of the seats in the municipality council. Controls and FE are included as indicated in each column. Controls: surface and population (in logs). FE: number of available seats and year fixed effects. The optimal bandwidth is calculated using the CCT method. Standard errors are clustered at the municipality level. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

TABLE D.4

2SLS ESTIMATES - FRAGMENTATION AND STABILITY BY SINGLE-PARTY MAJORITIES

	(1) Mayor Unseated	(2) Mayor Unseated	(3) Mayor Unseated	(4) Mayor Unseated
A. 2SLS Results (No Single-Party Majorities)				
N. Parties	0.083**	0.092*	0.099**	0.096*
	(0.041)	(0.049)	(0.048)	(0.050)
Mean of dep.var.	0.092	0.093	0.092	0.093
Bandwidth	0.017	0.017	0.017	0.017
Obs.	4187	4111	4187	4111
B. 2SLS Results (Single-Party Majorities)				
N. Parties	0.004	0.004	0.003	0.003
	(0.014)	(0.012)	(0.011)	(0.011)
Mean of dep.var.	0.002	0.002	0.002	0.002
Bandwidth	0.017	0.017	0.017	0.017
Obs.	7106	6998	7106	6998
Fixed Effects	N	N	Y	Y
Controls	N	Y	N	Y

Notes: 2SLS estimates of the effect of the number of parties on the probability of unseating the mayor (equation 2). The dependent variable is an indicator taking value 1 if the mayor was unseated by a vote of no confidence during the legislature. Panel A: only legislatures where no single party has more than half the seats. Panel B: only legislatures where there is a party with at least half the seats. Controls and FE are included as indicated in each column. Controls: surface and population (in logs). FE: number of available seats and year fixed effects. The optimal bandwidth is calculated using the CCT method. Standard errors are clustered at the municipality level. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

Table D.5

Reduced-form estimates of the entry of a marginal party, by ideology

	(1) Mayor uns.	(2) Mayor uns.	(3) Mayor uns.	(4) Mayor uns.	(5) Mayor uns.
D	0.011	0.006	0.009	0.017	0.018
	(0.011)	(0.012)	(0.010)	(0.011)	(0.012)
$D \times distance$		0.006			
		(0.009)			
$D \times 1(far)$			0.006		
			(0.015)		
$D \times 1(close)$				-0.019*	
				(0.011)	
$D \times 1(same)$					-0.015
					(0.013)
Mean of Dep.var.	0.026	0.026	0.026	0.026	0.026
Bandwidth	0.017	0.017	0.017	0.017	0.017
Obs.	3005	3005	3005	3005	3005
Fixed Effects	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y

Notes: Reduced-form estimates of the effect of crossing the entry threshold on the probability of unseating the mayor. The dependent variable is an indicator taking value 1 if the mayor was unseated by a vote of no confidence during the legislature. In column 2 we include, in addition to the indicator D for crossing the threshold, an interaction with a continuous measure of ideological distance between the largest party and the *marginal party* (defined as the party closest to the 5% threshold). In column 3 and 4 we include interactions with indicators for this distance being above the 75^{th} percentile or below the 25^{th} percentile of the distance's distribution, respectively. In column 5 we include an interaction with an indicator for these two parties being on the same size of the ideological spectrum (i.e. both to the left or both to the right of the mean ideology). The bandwidth is calculated using the CCT method. Controls and FE are included as indicated in each column. Controls: surface and population (in logs). FE: number of available seats and year fixed effects. Standard errors clustered at the municipality level. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

Table D.6

Robustness Checks II - Removing one election at a time

	1979	1983	1987	1991	1995
N. Parties	0.055**	0.051*	0.049*	0.057**	0.039*
	(0.027)	(0.027)	(0.028)	(0.027)	(0.023)
Mean of dep.var.	0.037	0.037	0.038	0.034	0.036
Bandwidth	0.017	0.017	0.017	0.017	0.017
Obs.	10456	10290	9850	9687	9913
	1999	2003	2007	2011	
N. Parties	0.047*	0.069**	0.037	0.062**	
	(0.025)	(0.028)	(0.029)	(0.028)	
Mean of dep.var.	0.035	0.036	0.032	0.037	
Bandwidth	0.017	0.017	0.017	0.017	
Obs.	9837	9760	9615	9464	

Notes: In each column, we report 2SLS estimate of the effect of fragmentation on stability obtained from estimating equation 2 excluding one full election term at a time, as specified by the column header. The CCT bandwidth is kept constant at the full sample value of 1.7 percentage points. No controls or fixed effects are included. Standard errors clustered at the municipality level. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.