Government Stability in Parliamentary Democracies

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Abstract

This paper studies how political fragmentation affects government stability. We develop a two-period coalition formation model with heterogeneity in bargaining resources to show that more fragmented parliaments lead to more unstable coalitions because i) the entry of new parties makes single-party majorities less likely; and ii) smaller members of the coalition are more easily bought off by potential challengers. We test these and other predictions from the model empirically using data on over 50,000 local parliaments in Spain. Exploiting the existence of a 5% vote share entry threshold to induce exogenous variation in the number of parties in parliament, we show that an additional party increases the probability of unseating the incumbent by 3.3 percentage points. We then study the effect of bargaining resources on stability by exploiting variation in support from upper tiers of government at the party level. Local governments that are aligned with the upper tier are three times less likely to be unseated. Finally, we find that challengers that replace the incumbent after a no-confidence vote are younger, more educated, and are more likely to win the following elections, suggesting that there may be positive consequences of stability.

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1. Introduction

It is widely held that one of the main obstacles to economic development is political instability (UN, 2018). On the one hand, frequent changes in the executive power can be harmful because of the increased policy uncertainty. On the other, being able to unseat and replace unfit politicians is one of the pillars of modern democracies. Notwithstanding the importance of stability, we still have an incomplete understanding of its determinants. One of the potential forces affecting stability is legislative fragmentation, with more fragmented legislatures often exhibiting higher government turnover. For example, the German Weimar Republic went through 16 governments in just over a decade, and was characterized by a heavily fragmented Parliament with as many as 15 parties achieving representation. Italy has had one of the highest rates of government turnover in recent history, while at the same time having regularly over 10 parties in Parliament. Finally, the young Spanish democracy faced its first successful vote of no confidence in 2018, after the two-party system was challenged by the entry of *Podemos* and *Ciudadanos*.[4]

In this paper, we study the effects of legislative fragmentation on government stability, where fragmentation is defined as the number of parties in Parliament. We first provide a two-period sequential game of coalition formation where the incumbent can be unseated via a vote of no confidence. The model can be seen as a straightforward extension of the canonical models in Baron and Ferejohn (1989) and Persson and Tabellini (2002), adding a two-period structure and heterogeneity in parties' bargaining resources. We show that the probability of a vote of no confidence 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. Secondly, coalition governments elected by more fragmented parliaments are more likely to be as coalition members tend to be smaller and are therefore more easily bought off by challengers. Our model yields additional testable implications. Namely, parties with more bargaining resources at their disposal are less likely to be removed from office. Conversely, the model predicts that incumbents are more likely to be replaced when they face a higher-quality challenger.

We test the main implications of the model using two regression-discontinuity designs (RDD) and a dataset of over 50,000 municipal governments, spanning all full terms since Spain's transition to democracy (1979-2014). This setup is ideal for our purpose because Spanish municipalities are institutionally akin to small parliamentary democracies, with the equivalent of a parliament and an executive. Our research design allows us to overcome some important limitations of previous studies of the determinants of government stability. First, data availability is usually an issue because government breakdowns (such as no-confidence and impeachment votes or *coups*) are rare events. Second, credible sources of exogenous variation in the variable of interest are hard to come by, so that the existing case-studies and cross-country regressions often cannot properly control for all political and

[4]Figure C.1 shows that the total number of parties represented in national parliaments and the number of opposition parties in OECD countries have been increasing over time since the second half of the XX century.

economic confounders.[5] We observe over 1,000 successful no-confidence votes, that is, cases in which the local executive (i.e., the mayor) is voted out of office by the municipal council. In addition, because all municipalities share a common institutional arrangement, we can take advantage of institutional and political aspects of Spanish democracy to generate quasi-experimental variation in both political fragmentation and the amount of resources at disposal of the incumbent.

When studying the effect of fragmentation on stability, we need to disentangle the influence of the number of parties in the local council from potential confounders, such as local economic conditions or politicians' skill. In order to do so, we exploit the discontinuity in the probability that a party is represented in the council generated by the existence of a 5% vote share admission threshold. Municipalities in which one party obtained a vote share just above the threshold have, on average, more parties in the council. We use this variation as an instrument for the number of parties in the council in a regression-discontinuity design, and find that the entry of an additional party in the council leads to a 3.3 percentage point increase in the probability that the local government is unseated. This effect amounts to almost doubling the baseline probability that the incumbent is unseated, and it is driven only in part by a change in the probability of single-party majorities. In fact, we find that the effect is even larger in municipalities led by coalition governments, suggesting that fragmented parliaments might lead to unstable governments through their effect on the bargaining among parties in the coalition formation stage.

We complement the main analysis by testing other relevant predictions from the model. In order to evaluate whether bargaining resources are a key determinant of stability, we test whether local government aligned with other tiers of government are less likely to be unseated. In doing so, we draw partly from the results from Solé-Ollé and Sorribas-Navarro (2008) and Curto-Grau, Solé-Ollé and Sorribas-Navarro (2018), which document an increase in regional transfers to municipalities when municipal governments belong to the same coalition in power in the region. We interpret partisan alignment as providing the aligned party with additional resources that can be used in the bargaining process. Comparing municipalities that are aligned with those that are not in a close-elections RDD, we show that, consistent with model predictions, aligned mayors are less likely to be unseated by a vote of no confidence. The quality of the mayor also appear to have an important effect on stability. Municipalities with low quality mayors, as measured by education levels and professional experience, are more likely to experience votes of no confidence.

Finally, we analyze what are the consequences of a government removal on both the quality of the newly established government, and on the electoral performance of both the initial mayor's and the challenger's party. Using difference-in-differences, we show that unseated governments are replaced by mayors of higher quality. Moreover, the parties of unseated

[5]Existing analyses usually have to rely on time series evidence from a handful of countries and relatively few government failures. For example, Merlo (1998) analyses the duration of Italian national governments, relying on the relatively large number of government failures that characterized Italian politics since the 50s. Diermeier, Eraslan and Merlo (2003) use data on 255 governments for 9 Western European countries to estimate a structural model of government formation.

mayors are heavily punished in the next elections, again suggesting that low quality politicians are the ones replaced by the legislative. Conversely, challengers that are successful at unseating the incumbent enjoy large electoral rewards.

The analysis of political instability here is motivated by concerns over the impact of stability on economic growth and politicians' performance. An impact on growth is possible because political instability can generate policy uncertainty, which in turn may slow down investment (Bernanke, 1983; 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 (Barro, 1991; Alesina et al., 1996; Bloom, 2014). On the other hand, there are also cases in which government *stability* can be harmful. This is the case in autocracies, where democratic institutions are inhibited or absent, and under-performing or corrupt incumbent politicians cannot be replaced, increasing the risk of capture. Insofar as it may affect stability, political fragmentation can be seen as influencing these countervailing forces.

Our results contribute directly to the literature trying to identify the determinants of political stability in parliamentary regimes. Theoretical models of legislative bargaining featuring government instability can be found in Baron (1998) and Diermeier and Merlo (2000). In Diermeier, Eraslan and Merlo (2003), a political economy model is laid out and its parameters are estimated structurally, allowing to study government stability and other outcomes under different counter-factual institutional arrangements.[6] Empirical results in this literature mostly come from structural models estimates.[7] While these models are a valuable tool to construct counter-factual scenarios under different institutional regimes, the identification of causal effects often relies on strong assumptions. Our contribution to this line of research is to provide rigorous causal evidence on two drivers of government stability that are directly related to the bargaining processes that much this literature has focused on.

Our paper also relates to the literature seeking to understand the effects of government instability and policy uncertainty on economic outcomes.[8] Alesina et al. (1996) uses changes in government induced by elections or *coups d'etat* to estimate the effect of government stability on economic growth. In their study of electoral business cycles, Canes-Wrone and Park (2012) develop a framework with private investment decisions to show policy uncertainty before elections can reduce investments with high reversal costs. More recent literature has used the economic policy uncertainty (EPU) index proposed by Baker, Bloom and Davis (2016) to study, e.g., the effect of policy uncertainty on investment decisions, bank lending (Bordo, Duca and Koch, 2016), and risk premia (Pástor and Veronesi, 2013). Our study re-

[6] The model in Diermeier, Eraslan and Merlo (2003) largely builds on Merlo (1997), which features a coalition formation game with no renegotiation and an ex-ante definition of the parties willing to form the coalition.

[7] One exception in this regard is the work by Gagliarducci and Paserman (2011), which focuses specifically on estimating how gender of the executive head affects government stability.

[8] Bernanke (1983) features a model with irreversible investment in which uncertainty has a negative effect on investment and output. The insights in this model have provided the foundation for a large body of subsequent work, both theoretical and empirical, linking government stability with investment decisions.

lates to this literature in two ways. First, these studies motivate our analysis by showing that government shifts induced by votes of no confidence can have substantial economic effects. Secondly, our study contributes to the literature by clarifying how other factors might themselves influence stability, and through it, these outcomes. In particular, our results for alignment show that government resources can affect political stability, and therefore induce a bias in estimation unless adequately dealt with.

Finally, we contribute to the literature on the effects of political representation on policy and economic outcomes (see, e.g., Ferreira and Gyourko 2009, Snowberg, Wolfers and Zitzewitz 2007 who study partisan differences in policies; Bracco et al. 2015 and Solé-Ollé and Sorribas-Navarro 2008 for the impact of being aligned with upper tiers of government on transfers). Most of this literature has focused on the effect of party affiliation on policy and economic outcomes. In this paper, we take another approach by i) focusing on government stability as the main outcome of interest; ii) emphasizing the bargaining process rather than ideological differences as the driver of policy decisions; iii) showing how government stability can be affected by changes in parties' bargaining power.

2. Theoretical framework

We start by presenting a theoretical framework that links the number of parties represented in Parliament and government instability. Our model draws 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 caused by the possibility that the incumbent party is unseated and replaced by a different party via a no-confidence vote. The number of parties affects government stability through two channels: i) it affects the probability that a single-party has a majority of seats, and ii) it has an effect on the size of the minimum winning coalition that can be used to secure a majority when no party has a majority of its own. Smaller coalitions are cheaper to form, but also easier to unpick by a competitor. Both channels exist under specific assumptions about how the entry of an additional party affects existing parties' seat shares, which we make explicit below.

2.1. Model setup and timing

This game features two rounds in which, with some probability, a selected agenda setter or *formateur* attempts to form a supporting coalition by providing transfers to the other players. This takes the form of a sequential 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 $s_1 \geq ... \geq s_J$. We can think of parties as representing groups of voters, each with a specific and exclusive policy-agenda. The pay-off function for parties depend both on the resource allocation defined in the coalition formation stage, and an ego rent for the successful *formateur* or *mayor*. In each period, the pay-off function 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 and implies that the agenda setter will always prefer to head its own coalition.

There are two potential *formateurs*, party 1 and 2, which coincide with the parties with the highest and second highest seat shares, respectively.[9] Parties 1 and 2 are heterogeneous 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 interval [0,1] and we assume that they are drawn before the start of the game and known by all players.[10] We assume that these parameters are independent of the seat shares $s_1, ..., s_J$.

The timing of the sequential game is as follows. In the first period, party 1 can attempt to form a coalition by offering a vector $g^1 = [g_1^1, ..., g_J^1]$ to all parties with $g_j^1 \geq 0, \forall j$ and $\sum_{j=1}^{J} g_j^1 \leq \theta_1$. Other parties decide whether or not to accept the proposal by party 1. If the proposal is accepted by the majority of the Parliament, a coalition is formed. If this happens, payments are materialized and each party receives pay-off $g_1^1, ..., g_J^1$. 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 share-dependent default option assumption ensures that parties' reservation transfers are increasing in their seat shares.

In the second period, there is a lottery which determines whether party 2 has an opportunity to become a new *formateur* and make an alternative assignment proposal $g^2 = [g_1^2, ..., g_J^2]$ with $g_j^2 \geq 0, \forall j$ and $\sum_{j=1}^{J} g_j^2 \leq \theta_2$. The probability that party 2 has such opportunity is μ. If the proposal is accepted by a majority of seats, a new coalition headed by party 2 is formed and we say that there was a successful vote of no confidence. 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 $1 - \mu$), then period 2 pay-offs are the same as those determined in period 1.

2.2. Equilibrium with 3 parties

We now assume that $J = 3$ and solve for the equilibrium by backward induction. In period 2, with probability $(1 - \mu)$, party 2 is not selected as the new agenda setter, hence pay-offs are the same as in period 1, so $g^2 = g^1$. With probability μ, party 2 can make an alternative coalition proposal which, in this case, amounts to make an offer to party 3.[11] Party 2 maximizes its utility which is the sum of the ego rent ω and the total budget, θ_2, net of the transfers to party 3, such that $\sum_{j=1}^{J} g_j^2 \leq \theta_2$.[12] Given that party 3 is indifferent between staying in the current coalition or joining the new one, party 2 can gain its support by offering the continuation value $\overline{g_3^1}$ carried over from period 1. Whether or not party 2 has enough resources to make this offer depends on how large its endowment of bargaining resources is, that is, how large θ_2 is with respect to θ_1. In particular, if party 2 has enough resources to match party 1's offer to party 3, that is if $\theta_2 > g_3^1$, party 2 will make such proposal

[9] If the seat shares are equal, we can consider that party 1 is picked randomly.

[10] The upper bound of the distribution can be made arbitrarily large as long as it is the same for both distributions and that the value of ω is adjusted accordingly. The model can be adapted to accommodate differences in the distributions of θ_1 and θ_2 at the cost of imposing conditions on their support.

[11] Note that the new coalition will never include party 1, because there is no feasible transfer g_1^2 larger than party 1's continuation value.

[12] Because g_2^2 is one of the elements in g^2 and enters additively in the objective function, the budget constraint holds with equality.

and create a new coalition. Otherwise, party 1 remains in power and everyone receives their continuation value.

Having characterized the decisions by parties in period 2, we can now move to period 1. In the case where $s_1 > 0.5$, party 1 can always form a *single-party majority*, therefore earning a pay-off of $\omega + \theta_1$ in both periods, with other parties obtaining zero. If $s_1 \leq 0.5$, instead, a coalition is needed. In this case, party 1 makes a proposal g^1 to distribute the available resources θ_1. As mentioned above, if this proposal does not gather the support of the majority, a default allocation is implemented and each party receives $s_j\theta_1$. It is important to note that party 1 will always be able to make a proposal that gathers a majority, because it can always propose at least the default option which is always feasible.[13] The problem faced by party 1 when forming a coalition can be written as:

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

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

$$s_1 + s_3 > 0.5 \tag{3}$$

Party 1 will maximize its expected pay-off, which, in period 1, equals $(g_1^1 + \omega)$, because party 1 can always form a majority successfully. The period 2 pay-off will also be $g_1^1 + \omega$, but it is only realized if party 2 is unsuccessful at unseating, which depends on the lottery and on whether party 2 has enough resources to get party 3's support. $\beta \leq 1$ is a discount factor. If, in the second period, a vote of no confidence succeeds, party 2 creates an alternative majority. Party 1 is unseated and receives a payoff of 0, as it receives no ego rents and no transfers by party 2. Condition 2 is the budget constraint and requires total transfers to all parties to be less than the available budget, θ_1. Again, this inequality will be binding in equilibrium.

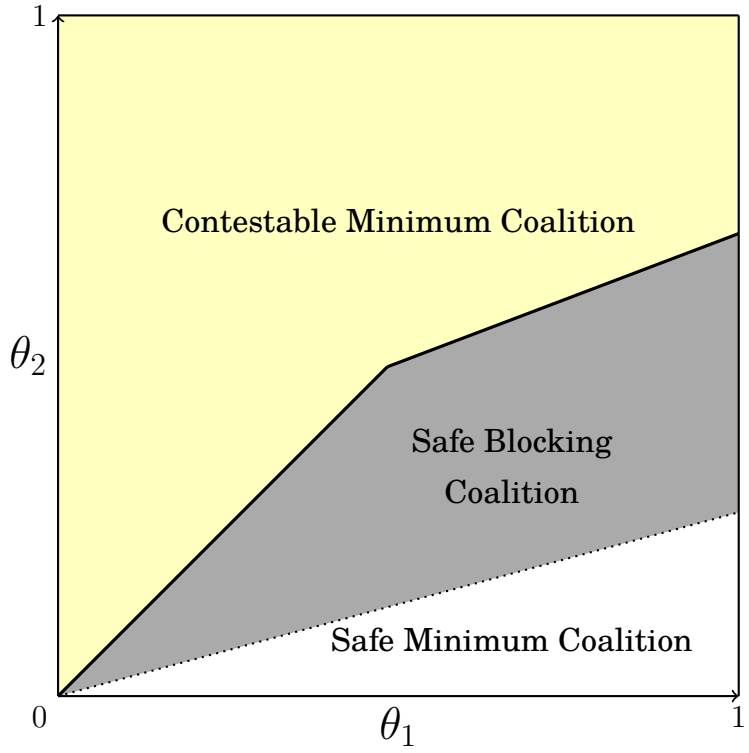
Party 1 needs to choose a set of coalition members (and the associated transfers) in order to solve the program above. However, a simple minimization of the costs of forming a coalition may not be the optimal choice, because of the response of party 2 in the second period.[14] Equilibrium choices, as well as the onset of a votes of no confidence, will depend on specific values for θ_1 and θ_2, the number of parties and the seat shares. Specifically, there are four different strategies party 1 can play in equilibrium: single-party majority, contestable minimum cost coalition, safe minimum cost coalition, and safe blocking coalition.

As noted above, in the case where $s_1 > 0.5$, party 1 can always form a *single-party majority*, therefore earning a pay-off of $\omega + \theta_1$ in both periods, with other parties obtaining zero. In this case, no-confidence votes are not possible, and party 2 will never be able to unseat the incumbent.

[13] This simplifies the problem, as we do no need to consider the cases in which party 1 presents an unsuccessful proposal.

[14] In particular, party 1 might prefer to form 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). However, in our case the size of the coalition is unchanged but allies enjoy larger transfers relative to those in a minimum cost coalition.

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



Notes: Optimal party 1 coalition strategies in period 1 in the (θ_1, θ_2) space. Case with $s_1 < 0.5$.

When $s_1 < 0.5$, instead, party 1 must form a coalition with party 3. Whether it is more profitable to form a safe or a contestable coalition depends on party 1's bargaining strength with respect to party 2, measured by the size of θ_1 relative to θ_2. In figure 1, we plot the optimal strategy by party 1 for every combination of θ_1 and θ_2.

If θ_1 is much larger than θ_2, party 2 will never be able to unseat in period 2, because it does not have enough resources to pay party 3 enough to make it change sides. This is represented as the white area in figure 1. In this area, it is optimal for party 1 to form a *minimum cost coalition*, that is, to form a coalition by offering party 3 its default option, $\theta_1 s_3$. Denoting the payoff for party 1 in this case as V^s_{mcc} (where the superscript *s* stands for *safe*), we have that:

$$V^s_{mcc} = [\omega + \theta_1(1 - s_3)](1 + \beta),$$

that is, party 1 enjoys the ego rents and the full budget, net of the transfers to party 3, in both periods, as it is never unseated.

The dotted line in figure 1 delimits the area in which party 2 starts to have enough resources to be a threat to party 1 in the second period. Indeed, when $\theta_2 > \theta_1 s_3$, party 2 has incentives to make an offer to party 3 and unseat party 1. In the region delimited by the dashed line from below and the solid piece-wise line (corresponding to the grey area) from above, the best strategy for party 1 is to form a *safe blocking coalition*, that is, a coalition that cannot be undone by party 2 in the second period. The only way to achieve this for party one is to offer party 3 an amount equal to θ_2, that is, the maximum that party 2 could ever

offer. The pay-off from playing this strategy is

$$V_{block} = [\omega + \theta_1 - \theta_2](1 + \beta).$$

A final possibility arises when the resources available to party 2 are so large that it is either undesirable or impossible for party 1 to prevent party 2 from unseating. This is the remaining area in figure 1. When θ_2 is greater than θ_1, party 1 knows that, if party 2 is drawn as the new agenda setter, it will always be unseated. Hence, the optimal strategy is to form a *contestable coalition*, in which party 3 is paid the minimum possible (equal to its default option). This coalition is still a minimum cost coalition as before, but now it is vulnerable and party 2 will always unseat it when given the chance. The pay-off for party 1 is denoted as V^c_{mcc}, where c stands for *contestable*, and equals

$$V^c_{mcc} = [\omega + \theta_1(1 - s_3)][(1 + \beta)(1 - \mu) + \mu],$$

A blocking majority will be preferred to a contestable minimum cost coalition if its pay-off exceeds that of the contestable minimum cost coalition, that is, if

$$[\omega + \theta_1 - \theta_2](1 + \beta) > [\omega + \theta_1(1 - s_3)][(1 + \beta)(1 - \mu) + \mu],$$

which, rearranging, leads to the following condition:

$$\theta_1 \geq \frac{\theta_2(1 + \beta) - \mu\omega\beta}{s_3(1 + \beta) + (1 - s_3)\mu\beta}. \tag{4}$$

This conditions generates the kink in the solid line that delimits contestable from safe coalitions in the figure. When θ_1 is very large, to the right of the kink, it becomes optimal for party 1 to pay party 3 the minimum and exposing itself to the possibility of a no-confidence vote. The reason is that, in this area, the pay-off from playing this strategy are so high that, for party 1, it is worth the risk. For a given triplet of seat shares, the probability of a vote of no confidence (conditional on party 2 being chosen as the agenda setter in period 2) is given by the complement of the area under the solid line. The unconditional probability of a no-confidence vote, which also takes into account the probability that party 2 is drawn as the new agenda setter, is therefore:

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

where $g(\theta_1, \theta_2)$ is the joint density function of (θ_1, θ_2) and $h(\theta_1)$ can be obtained by rearranging equation 4 and is equal to

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

To help fix ideas, notice that, assuming a joint uniform distribution over the $[0,1] \times [0,1]$ interval, the probability of a vote of no confidence simplifies to:

$$\begin{aligned} \pi =& \mu \left(1 - \frac{\theta_k^2 + (\theta_k + \theta_{top})(1-\theta_k)}{2}\right) \\ \text{with } \theta_{top} =& \frac{s_3(1+\beta) + (1 - s_3 + \omega)\mu\beta}{1+\beta}. \end{aligned} \tag{5}$$

This expression clarifies that the probability of a no-confidence vote is less likely the larger s_3. This happens because when party 3 is relatively large, party 1 needs to pay it more in order to gain its support. The resulting coalition is harder to undo in period 2, because party 2 has to offer relatively more. No-confidence votes are also more likely the larger the probability that party 2 is drawn as the new agenda setter.

2.3. Equilibrium with 4 parties

Consider the case of 4 parties, with seat shares $[s_1, s_2, s_3, s_4]$. We assume that the entry of party 4 does not alter voter's preferences, so the only effect on the seat shares of other parties is that these have to be reduced correspondingly. As before, if $s_1 > 0.5$, party 1 cannot be unseated and rules for both periods. When $s_1 < 0.5$, party 1 needs to form a coalition. In the case with 4 parties, party 1 (and later party 2) has two options to form a majority. It can always form a majority with party 3, since necessarily, $s_1 + s_3 \geq 0.5$.[15] Alternatively, it can form a majority with party 4 whenever $s_1 + s_4 \geq 0.5$.

In either case, we can proceed analogously as with 3 parties. The expected pay-offs from forming each type of coalitions are as follows:

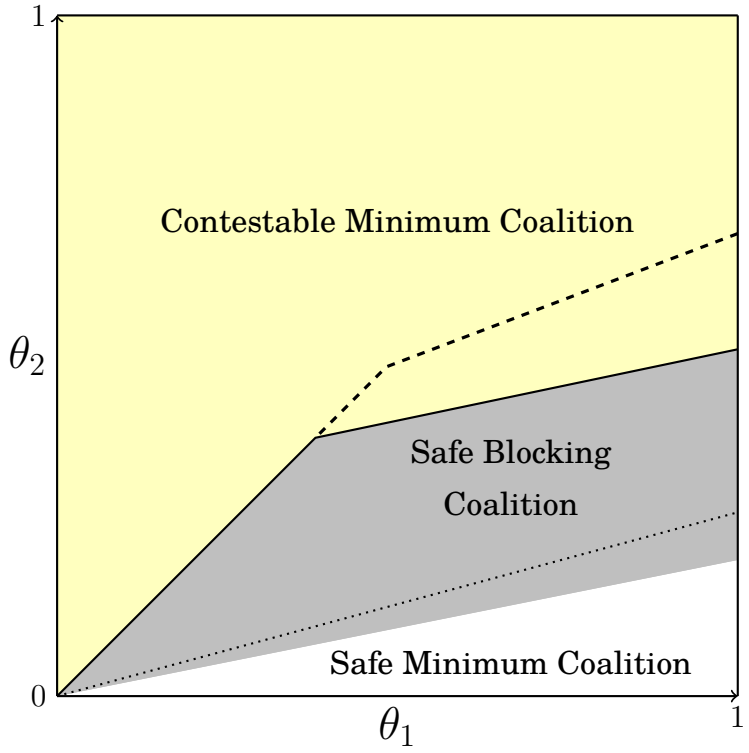
$$\begin{aligned} V^s_{mcc} &= [\omega + \theta_1(1 - s_*)](1+\beta) && \text{if } \theta_2 < s_*\theta_1 \\ V^c_{mcc} &= [\omega + \theta_1(1 - s_*)][(1+\beta)(1-\mu) + \mu] && \text{if } \theta_2 \geq s_*\theta_1 \\ V_{block} &= [\omega + \theta_1 - \theta_2](1+\beta) \end{aligned}$$

where $s_* = s_3 + (s_4 - s_3)\mathbb{1}\{s_1 + s_4 \geq 0.5\}$ is simply the seat share of either party 3 or 4, depending on which one allows party 1 to form the minimum winning coalition, that is, the smallest possible coalition that yields a majority of seats. The payoff from forming a blocking coalition for party 1 is the same as in the 3-party case, as the transfer required to block party 2 from unseating is always equal to θ_2, regardless of the identity and seat share of the party receiving it. The condition for party 1 to prefer a safe blocking coalition over a contestable minimum coalition is now given by:

$$\theta_1 \geq \frac{\theta_2(1+\beta) - \mu\omega\beta}{s_*(1+\beta) + (1-s_*)\mu\beta}. \tag{6}$$

[15] To see why, note that if it were the case that $s_1 + s_3 < 0.5$, then necessarily $s_2 + s_4 \geq 0.5$. Given that $s_1 \geq s_2$ and $s_3 \geq s_4$, this leads to a contradiction.

FIGURE 2
COALITIONS IN (θ_1,θ_2) SPACE - 3 TO 4 PARTIES



Notes: Optimal party 1 coalition strategies in period 1 on (θ_1, θ_2) space. Case with $s_1 < 0.5$. Shaded areas correspond to the strategies in the case of four parties. The dashed line represents the boundary of the safe blocking coalition region in the case with three parties. Similarly, the dotted line is the boundary of the safe minimum cost coalition region with three parties.

As above, this will only be feasible when $\theta_1 > \theta_2$. In the case in which $\theta_2 < s_*\theta_1$, party 1 pays its smaller ally the outside option because party 2 will never unseat (white area in figure 2). The different coalitions in the (θ_1, θ_2) space are similar to those depicted in figure 1. The probability of a vote of no confidence when the joint distribution of θ_1 and θ_2 is uniform is analogous to the one in expression 5, with:

$$\theta_k = \frac{\mu\omega\beta}{(1-s_*)(1+\beta-\mu\beta)}$$
$$\theta_{top} = \frac{s_*(1+\beta)+(1-s_*+\omega)\mu\beta}{1+\beta}$$

The key difference is in the term s_* that replaces s_3. Given that $s_* \leq s_3$ by definition, the entry of party 4 may create scope for a smaller coalition or not. This, in turn, 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.

2.4. Main testable implications

The equilibrium analysis above yields some implications of the model that can be tested empirically. Comparing the probability of no-confidence vote in the 3 and 4 parties case, we

immediately obtain the first implication.

Model implication 1 (Fragmentation): An increase in the number of parties leads to an increase in the probability of no-confidence vote.

In the model, the entry of an additional party creates instability because it decreases the probability of a single-party majority and because it affects the size of the smallest possible coalition that party 1 can form. This means that instability can either increase of be unaltered, depending on whether the additional party has enough seats to allow party 1 to form a coalition that is smaller than before.

Another consequence of the equilibrium strategies depicted in figure 1 is that no-confidence votes are less likely the more political resources party 1 has with respect to party 2, that is, the larger the difference $\theta_1 - \theta_2$. The probability of no-confidence vote is an increasing function of the integral of the area where party 1 forms a contestable coalition. Therefore, if high values of θ_1 become more likely (for instance because the mean of θ_1 is increased), no-confidence votes will become rarer. This intuition captures cases in which party 1 enjoys more bargaining resources than party 2. One example arises when party 1 is aligned to some upper tier of government, which may result in additional transfers. Another possibility is that the incumbent politician is of better quality than the challenger, and hence able to provide more transfers because, for instance, he has better contacts in the private sector, or can secure more convenient procurement deals. In terms of model parameters, we have the following implication.

Model implication 2 (Political Resources): The larger the difference in resources $\theta_1 - \theta_2$, the lower the probability of a no-confidence vote.

To test both implications, we implement two different regression-discontinuity designs in the following. To study the effect of *fragmentation*, we use the existence of a 5% vote share threshold for entering the local council, that generates exogenous variation in the number of parties. To quantify the effect of political resources of stability, we use a close elections regression-discontinuity design to vary exogenously the alignment status of the incumbent party instead.

3. 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 involve urban planning, transport networks upkeep, local services (e.g. sport facilities), waste disposal, public transit, etc.[16] Municipal financing is based on 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, there were 8,098 municipalities in Spain, covering all of the Spanish territory.

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

Municipalities are governed by the municipal council (*pleno municipal*), whose members are directly elected by residents; and a mayor, elected by the council. Hence, they share the parliamentary system that characterizes all levels of Spanish government, with the head of the executive being elected by a collective, legislative body. This is also the case for national governments in most OECD countries.[17] For municipalities with populations above 250 inhabitants, these elections are carried out under a single-district, closed list, proportional system.[18] 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. Municipal elections are held every four years. Municipal council seats are assigned following a D'Hondt rule with a 5% entry threshold, meaning that parties with a vote share below 5% will not be represented in the council. We will use this threshold in our regression-discontinuity analysis of the effect of legislative fragmentation on stability.

Mayors direct the administration, 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.[19] The mayor is elected by the council among its members, under a majority rule. If one party wins an initial majority of seats in the council, its candidate is automatically elected mayor. If no party has a majority, there is a bargaining process, by which a mayor can be elected with support of different parties.[20] If no candidate can secure majority support, the most voted party takes the mayoralty. Mayors are usually local leaders of the party branch which, together with the closed-list system, helps promote party discipline.

No-confidence votes

Under Spanish law, the municipal council can propose a no-confidence vote on the incumbent mayor (*moción de censura*).[21] Successful votes of no confidence have to be proposed by an absolute majority of the members of the municipal council. Unsurprisingly, votes of no confidence are almost exclusively found in municipalities were the initial incumbent's party has less than half the seats. Council members can only sign one no-confidence vote proposal per term. Votes of no confidence are *constructive*, in the sense that they should explicitly include an alternative candidate mayor, who will assume the office when the incumbent steps down. Our dataset identifies a total of 1,066 no-confidence votes taking place between 1979 and 2014, distributed uniformly across all areas of the country (see figure 3). These votes tend to take place in the first half of the legislature, especially around its midpoint, that is, two years after elections.

[17] Within the OECD, only Chile, France, Mexico, South Korea, Turkey and the United States are presidential democracies. Examples of parliamentarism outside the OECD include India, Pakistan, Serbia and South Africa.

[18] See Chapter IV of *Ley Orgánica del Régimen Electoral General*. Municipalities with populations under 250 inhabitants have an open list system with voters able to express multiple preferences for different candidates. These municipalities will not be used in our analysis.

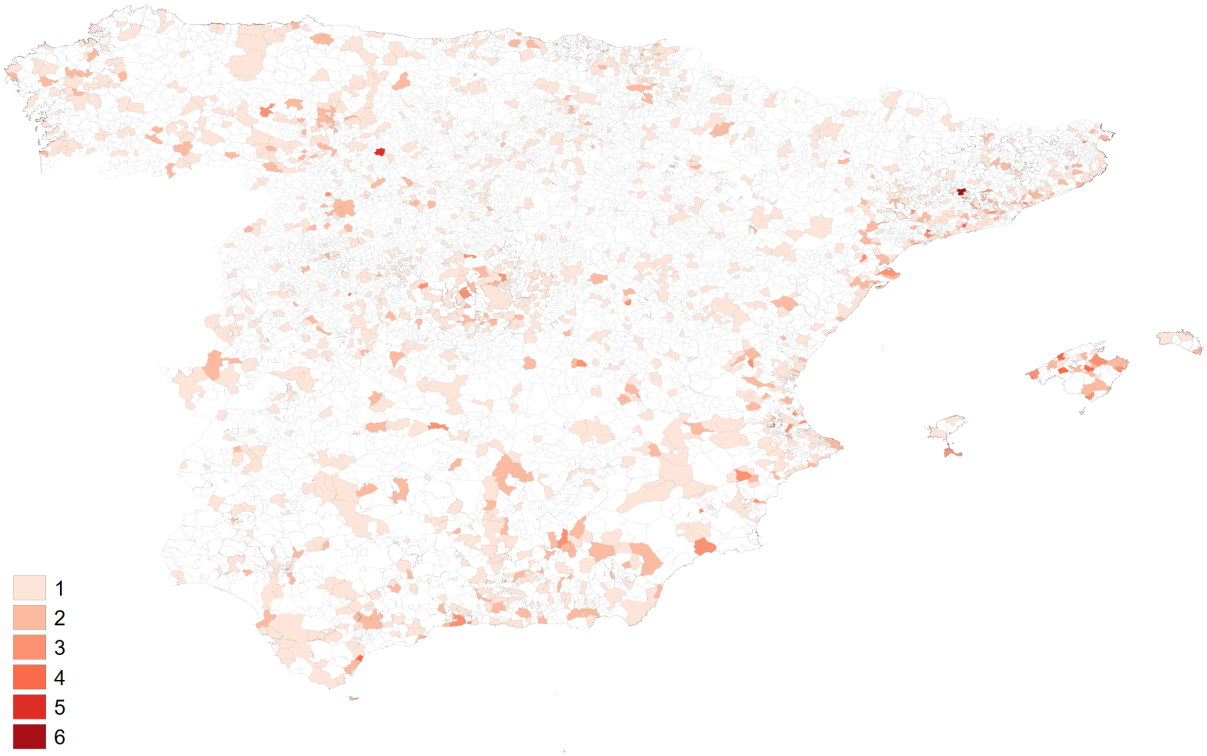
[19] The median wage in Spain in 2009 was EUR 19,000. See http://www.ine.es/prensa/np720.pdf.

[20] See Fujiwara and Sanz (Forthcoming) for a detailed study of the bargaining process in the formation of Spanish municipal governments.

[21] 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*.

FIGURE 3

DISTRIBUTIONS OF VOTES OF NO-CONFIDENCE ACROSS MUNICIPALITIES



Notes: Number of successful votes of no-confidence in each municipality between 1979 and 2014. Source: authors' elaboration on *Instituto Geográfico Nacional de España (Ministerio de Fomento)* geodata.

This empirical regularity motivates our choice of a two-period model in which we assume that a new bargaining takes place at the end of the first period. At that time, the opposition's main party evaluates whether it is profitable or not to try to form a new coalition to unseat the incumbent. The new coalition will then have two more years to carry out its policies and prepare for the subsequent electoral campaign.

The political landscape in democratic Spain

In the last decades, Spanish local politics were largely dominated by two large national parties, the centre-left socialists *PSOE*, and the center-right popular party *PP*. These parties provided over 65% of all mayors in our sample. The third party running in all jurisdictions in this period is IU, a left-wing platform including the Spanish communist party.[22] Several regional parties can be important players in their area of influence. For example, the centre-right coalition *CIU* ruled over 50% of all municipalities in Catalonia between 1979 and 2014. About 89% of all mayors come from parties that also participate in elections at national or regional level.[23] Regional elections are held every 5 years, and usually do not coincide with

[22] In the occasion of earlier elections, the center right party was labeled Alianza Popular and Partido Democrata Popular, while the left party was labeled Partido Comunista d'España.

[23] There is also a fringe of very local, municipality specific platforms which often rule mid sized towns. These are widespread in municipal councils.

municipal elections. It has been thoroughly documented that partisan alignment between a municipality's government and its regional counterpart can lead to substantial increases in transfer revenues for the former (see Solé-Ollé and Sorribas-Navarro 2008 and Curto-Grau, Solé-Ollé and Sorribas-Navarro 2018). This result is what motivates the question on whether alignment leads to increased stability. Aligned parties receive more resources from other government levels, and this may provide an advantage either in negotiations to choose a mayor, or eventually, in averting a vote of no-confidence.[24]

4. 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 regional and national party presence. Data on electoral outcomes in municipal elections are obtained from the Ministry of Internal Affairs, the body responsible for disseminating information on electoral results. We complement it with information on mayors and their political party of affiliation from the same source. Data on budgets for a subset of years are obtained from the Ministry of Finance[25], and yearly municipal populations from the residential registry.

Because of the different electoral system in small towns, we only include in our dataset municipalities with more than 250 inhabitants. This leaves us with 8 election of each of the 6,400 municipalities in the sample, for a total of about 51,000 elections. We impose additional sample restrictions based on missing data, or inconsistencies between sources and lose 664 elections (1.6% of the remaining total). 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.[26] These usually happen shortly after elections, but occasionally mayors change during the legislature. We identify votes of no confidence as instances in which there is both a change in the identity *and* the party of the mayor.

Panel A of table 1 provides municipal level descriptives for our sample. Average municipal population over the 1979-2014 period was 6.403 inhabitants, and average municipal surface was 202 km^2. In some cases, municipalities cross the 250 population threshold during the sample period, merge, or are newly formed, so we have an unbalanced panel with an average of 8.06 elections per municipality in our sample (out of a maximum of 9). Panel B includes some descriptives on municipal elections and local government. The average number of parties running in each municipal election is 3.2. The average election distributes 10 council seats, with specific council sizes determined by population thresholds (see, e.g., Foremny,

[24] Resources need not only come in the form of cash, but can also involve political support, advertising efforts, etc.

[25] http://serviciostelematicosext.minhap.gob.es/sgcal/entidadeslocales/ at *Ministerio de Hacienda*

[26] For a more detailed description of data sources and sample selections, see the Data Appendix (section B).

TABLE 1
DESCRIPTIVES - MUNICIPAL LEVEL DATA

	Mean	Std. dev.	Min	Max
A. General information				
Mean Population 000s (1979-2014)	6.40	50.84	0.3	3115
Surface (in km2)	202.58	229.03	0.1	1798
# of Elections in sample	8.06	2.13	1.0	9
Observations	6379			
B. Municipal Elections and Local Government				
# of Parties Running	3.22	1.63	1	25
# of Parties in Council	2.65	1.03	1	9
# of Council Seats	10.07	4.21	7	59
Party Alignment with regional gov. (%)	54.41	49.81	0	100
Vote of No Confidence (%)	2.07	14.25	0	100
Absolute Majority (%)	76.10	42.65	0	100
1st Mayor - PP (%)	28.89	45.33	0	100
1st Mayor - PSOE (%)	35.04	47.71	0	100
1st Mayor - IU (%)	2.66	16.10	0	100
1st Mayor - CIU (%)	6.47	24.60	0	100
Observations	51434			
C1. Local Government - Stable Mayor				
Party of mayor has absolute majority of seats	0.78	0.42	0	1
N. of parties receiving seats	2.63	1.02	1	9
Aligned Mayor (Block)	0.55	0.50	0	1
Observations	50368			
C2. Local Government - Vote of No Confidence				
Party of mayor has absolute majority of seats	0.11	0.31	0	1
N. of parties receiving seats	3.50	0.98	1	8
Aligned Mayor (Block)	0.45	0.50	0	1
Observations	1066			

Notes: Panel A provides figures for all the municipalities that appear at least once in our sample. Panel B provides descriptives at the election level. Panels C splits the sample by looking at councils approving votes of no confidence (C2), and those that did not (C1).

Jofre-Monseny and Solé-Ollé 2017). The average council includes 2.65 parties, although the number varies substantially by town, with some having up to 9 parties represented in the council.[27] In 56% of municipalities, the first elected mayor is aligned with her regional government. Importantly, successful no-confidence votes are passed in 2% of all legislatures.

The last two panels show characteristics of municipalities that had stable governments throughout the legislature (C1) and those that experienced a vote of no confidence (C2), respectively. We first observe that municipalities where a no-confidence vote is passed have more fragmented councils (3.5 vs. 2.6 parties in council) and are less likely to be aligned with the regional government (56% vs. 48% of the times). Unsurprisingly, motions of no-confidence are much more common in councils where no party has the absolute majority of

[27]The number of parties elected in municipality council is less or equal than 4 in more than 96% of cases. Equilibrium conditions derived in the theoretical model with three and four parties are prominent in our sample. See figure C.2 for details.

the seats, and the seat share of the minimum winning coalition is lower when more parties are admitted to the municipality council (see table C.1).

While encouraging, it is hard to extrapolate substantial conclusions from these mean comparisons. The number of parties in the council, or a town's alignment status, may themselves 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 observational methods like regression or matching are unlikely to be successful here. Likewise, a panel approach would require assuming unobserved heterogeneity is fixed, which is unlikely to be the case for 30 years, in a changing political and economic landscape. For this reason, in the following we recur to regression-discontinuity methods, which allow us to exploit exogenous variation in both council fragmentation and political resources. The limitation of this approach, as usual, is that all estimates are local, in the sense that causal effects are to be interpreted as local average treatment effects for the sub-population of compliers around the discontinuity (Angrist and Imbens, 1994).

5. Empirical Analysis and Results

In this section, we provide both a description of our empirical approach and its main results. We test the two main implication of the model detailed above: i) that governments formed by more fragmented legislatures are more likely be unseated by a no-confidence vote, and ii) that governments with more political resources are less likely to be voted out of office. Additionally, we also study whether – and to what extent – do these effects interact with each other. In the final part of the analysis, we study what are the consequences of the unseating the incumbent on the quality of the government in office and on its electoral performance in the subsequent election.

5.1. ***Legislative fragmentation decreases 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. The existence of this threshold causes parties with vote share close to 5% to be sometimes excluded from the council, generating exogenous variation in the number of parties represented. To implement our regression-discontinuity design, we first calculate, in each municipality i and for each term t, the difference between each party's vote share and 5%. This variable is denoted as V_{it} and serves as our running variable.[28]

Our baseline specification relates Y_{it}, an indicator equal to one if the mayor of municipality is unseated during term t, to our measure of fragmentation, N_{it}, the number of parties

[28]Notice that each municipality will appear in the sample as many times as the number of parties that ran in the election. We have omitted the additional party subscript for notational simplicity. Another possibility, in order to have only one observation per municipality, is to define the running variable only for the party that is closest to 5%. This approach gives nearly identical results.

with seats in the council, as follows:

$$Y_{it} = \alpha_1 + \tau_1 N_{it} + \beta_1 V_{it} + \beta_2 V_{it} D_{it} + \epsilon_{it}. \tag{7}$$

The number of parties N is instrumented with an indicator D for a party being above the threshold as follows:

$$N_{it} = \alpha_0 + \gamma_1 D_{it} + \delta_1 V_{it} + \delta_2 V_{it} D_{it} + u_{it}. \tag{8}$$

The instrument D is constructed for each party, election, and municipality. The intuition for why this instrument is relevant – that is, correlated with the number of parties – is that the number of parties in the council is related to how many parties have obtained a vote share larger than 5%, that is, have $D = 1$. The predictive power of the instrument is especially strong close to the 5% threshold. As an example, imagine the case in which there are two parties with vote shares close to 5%. If, by chance, they both get more that 5%, $D = 1$ for both, and the proportional rule assigns both of them a seat in the council, then the number of parties N will be relatively large. If, on the contrary, they both receive a vote share just below 5% ($D = 0$), they will be relegated out of the council, and N will be relatively small.[29]

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 the allocation rule might leave parties with 5% of the votes with no seats at all. For this reason, our design is akin to a *fuzzy* RD design with a continuous treatment.[30]

The validity of our instrument relies on the presence of the vote share threshold to generate exogenous variation in the number of parties. Given the uncertainty of election results due to, for instance, election day weather conditions, or last-minute events, it is reasonable to assume that parties are unable to perfectly manipulate their vote share to locate at either side of the threshold. We show in figure C.3 in appendix C 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 McCrary (2008) and Cattaneo, Jansson and Ma (2017)'s procedures indicate that there is indeed no significant jump at the threshold. Figure C.4 and table C.2 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 cutoff for a number of pre-election outcomes and municipal characteristics.

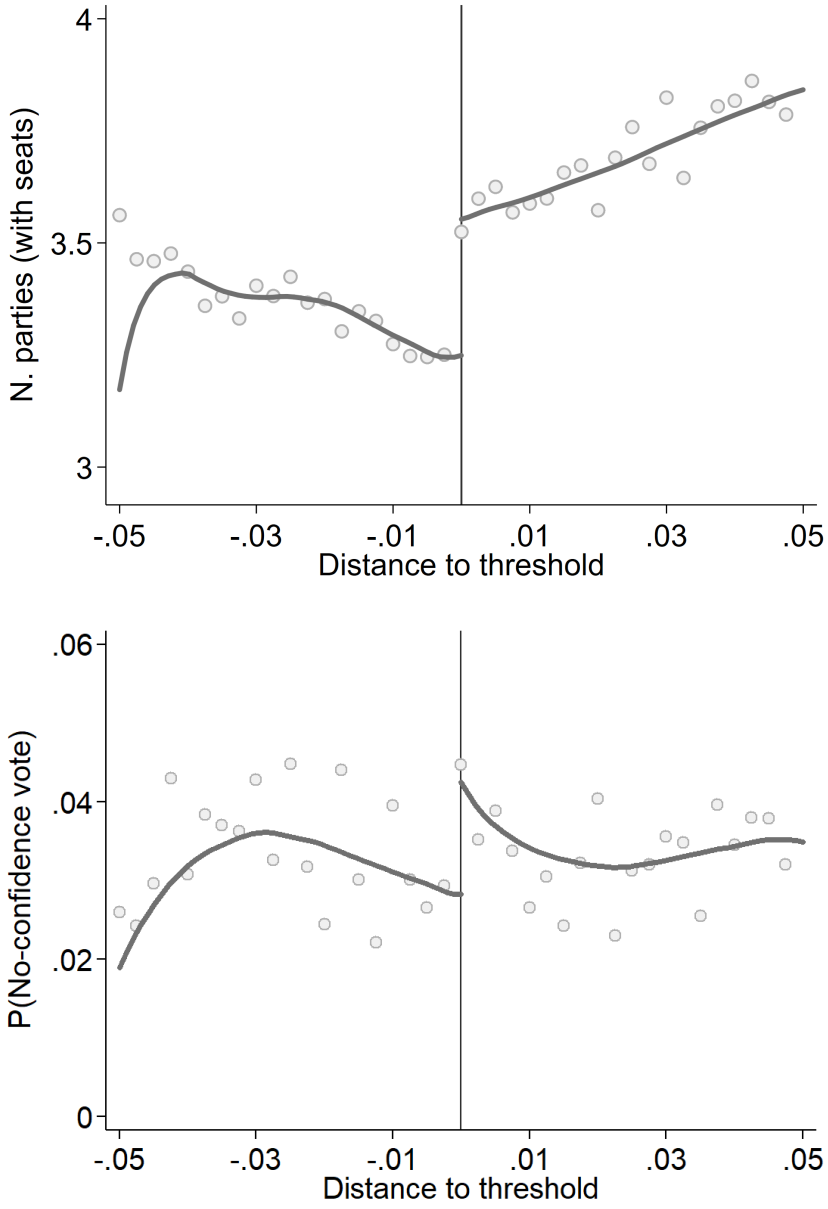
Following Lee and Lemieux (2010), our preferred estimation method is local linear regression, with different slopes at either side of the threshold. We estimate the baseline model

[29] For a more detailed description of how we construct the instrument, please see section A of the appendix.

[30] One alternative way to proceed would be to calculate the running variable as the minimum vote share change required, for each party, to lose its last seat in the council (or to gain its first seat, in case it has none). This method uses simulations to reallocate votes from a reference party to all other parties until the desired change in seats allocation is reached, for example, in half of the simulations (see, e.g., Fiva, Folke and Sørensen 2018). Such approach can in principle yield a stronger first-stage, especially in municipalities with small council sizes where just surpassing the 5% threshold is usually not enough to obtain a seat. Given that our first-stage is sufficiently strong (with an F-statistic of 56-92), we have decided to use the 5% threshold as it is simpler to construct and to interpret.

FIGURE 4

THE EFFECT OF FRAGMENTATION ON STABILITY - FIRST-STAGE AND REDUCED-FORM



Notes: In both panels, the horizontal axis corresponds to the distance between 5% and the vote share of the party closest to the threshold. The upper panel illustrates our first stage, where the vertical-axis measures the number of parties represented in the council. The lower panel plots the reduced-form, which relates the probability that the mayor is unseated to the instrument. Dots are averages in 0.25% bins of the running variable and lines are nonparametric local linear regressions estimated on both sides of the threshold.

in equations 7 and 8 by two stage least squares using only observations within a bandwidth h from the threshold. We start by including no covariates at first, and then add controls a set of fixed effects. Finally, we use Calonico, Cattaneo and Titiunik (2014)'s optimal bandwidth in all cases and show that results are robust to a variety of other bandwidth choices in section 5.4. We cluster the standard error at the municipality level to take into account the repeated observations within each municipality and the possible within-municipality serial

TABLE 2
IV ESTIMATES - FRAGMENTATION AND STABILITY

	(1) Mayor uns.	(2) Mayor uns.	(3) Mayor uns.	(4) Mayor uns.
N. Parties	0.032**	0.033**	0.034**	0.034**
	(0.016)	(0.017)	(0.016)	(0.016)
Mean of dep.var.	0.033	0.033	0.033	0.033
Bandwidth	0.022	0.022	0.022	0.022
Obs.	15540	15540	15540	15540
Fixed Effects	N	N	Y	Y
Controls	N	Y	N	Y

Notes: 2SLS estimates of the effect of number of parties on the probability of unseating the mayor (equation 7). The dependent variable is an indicator taking value 1 if there was a vote of no confidence in 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-region fixed effects. The optimal bandwidth is calculated using the CCT criterion. Standard errors are clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

correlation in the data.

The top panel of figure 4 illustrates our first stage by plotting the number of parties with seats in the council against our running variable. We see that 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. The size of the jump is about 0.3 parties, similar to the first-stage coefficient reported in table C.3 in the Appendix. The bottom panel of figure 4 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. Appropriately rescaling the reduced form by the first-stage coefficient shows that the entry of a marginal party in the council leads to an increase in the probability of a no-confidence vote of about 3.4%.

We report formal estimates of τ_1, the second-stage coefficient, in table 2, first estimating the baseline model without controls. The effect of fragmentation on stability is large. We estimate that the entry of an additional party in the council increases the probability that the mayor is unseated by 3.3 percentage points. This estimate is unaffected by adding, in column 2, population and surface (in logs), and, in columns 3 and 4, by including fixed effects for the number of available seats and election year-region fixed effects. The inclusion of controls and fixed effects is not required for consistency of the estimates but improves precision slightly. Results for a range of other bandwidths are all very similar and are reported in section 5.4.

This is the main result of our paper. Given that the average probability of unseating the mayor in the whole sample is 2.1% and around the threshold is 3.3%, the estimated effect of the entry of an additional party in the council of 3.4 percentage points is large, and suggests that fragmentation has a substantial effect in harming government stability.

The effect of fragmentation on stability operates via two channels, as in the theoretical model above. In the first place, the entry of an additional party decreases the probability that

TABLE 3
IV ESTIMATES - FRAGMENTATION AND STABILITY - EXCL. ABSOLUTE MAJORITIES

	(1) Mayor uns.	(2) Mayor uns.	(3) Mayor uns.	(4) Mayor uns.
A. No Single-Party Majorities				
N. Parties	0.072*	0.081*	0.080*	0.079*
	(0.041)	(0.046)	(0.044)	(0.043)
Mean of dep.var.	0.091	0.091	0.091	0.091
Bandwidth	0.017	0.017	0.017	0.017
Obs.	4085	4085	4085	4085
B. Single-Party Majorities				
N. Parties	0.007	0.005	0.003	0.003
	(0.015)	(0.011)	(0.010)	(0.010)
Mean of dep.var.	0.002	0.002	0.002	0.002
Bandwidth	0.016	0.016	0.016	0.016
Obs.	6679	6679	6679	6679
Fixed Effects	N	N	Y	Y
Controls	N	Y	N	Y

Notes: 2SLS estimates of the effect of number of parties on the probability of unseating the mayor (equation 7). Terms in which one party has the absolute majority of the seats in the council are excluded from estimation. The dependent variable is an indicator taking value 1 if there was a vote of no confidence in 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-region fixed effects. The optimal bandwidth is calculated using the CCT criterion. Standard errors are clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

the largest party has the absolute majority of seats.[31] Secondly, the number of parties can also affect the probability that the mayor is unseated in municipalities with no single-party majorities.

In panel A of table 3, we estimate the effect of fragmentation on the sample of legislatures in which all parties have less than 50% of the seats in the council. In this way, we ensure that estimates of the effect of fragmentation are not the result of changes in the probability of single-party rule. We find a large effect of fragmentation on stability, with point estimates being over twice the size of the ones reported in table 2. This is also consistent with model predictions, with the number of parties making coalitions less stable, when no party can rule alone.[32]

In panel B of table 3, we provide estimates when restricting our sample to municipalities where the largest party has more than half of the council seats. In these cases, the opposition cannot gather enough support to win a no-confidence votes against the mayor, so the entry of a new party that leaves the majority as it is should not have any impact on stability. Reassuringly, we find no impact of fragmentation on government stability: the estimated

[31] Estimates show the entry of an additional party reduces the probability of a single-party majority by 11 percentage points. See table C.4 in appendix C.

[32] Table C.5 shows the 2SLS estimate of the effect of the number of parties on the seat share of the minimum winning coalition. An additional party decreases the seat share of the minimum feasible coalition to form a majority by 2.7 percentage points.

effect of an additional party in this case is very small and statistically indistinguishable from zero at conventional levels in all specifications.

5.2. ***Political resources and quality increase stability***

Another determinant of stability, through its impact on the bargaining power, is the amount of resources available for negotiation to the agenda setter. These resources can either be monetary, for instance in the form of additional transfers from upper tiers of government, or they can be more generally thought of an increased bargaining power that is the result of the quality of the politician or of her political connections. High-quality politicians may be able to make a better use of the available resources and provide more public goods at the same cost because, for instance, they have better connections with the private sector or are more skilled at obtaining better deals. In the following, we turn to study the effect of two drivers of these political resources on government stability: the effect of being aligned with upper tiers of government, and the effect of the quality of the politician.

Being aligned increases stability

The effect of alignment on stability can proceed via different channels. Previous work has consistently shown that aligned local governments (i.e. with the same party affiliation of some upper tier of government) receive additional transfers. Alignment may also render other forms of support from the regional party, ranging from political support, aid in setting up campaigns, and coordination with other municipalities in the region. Some of these factors may also affect the bargaining position of that candidate. We can interpret these as also providing additional, non-pecuniary resources to distribute during the bargaining process.[33]

The alignment status of a municipality is likely to be correlated with unobservable determinants of government stability. Hence, to obtain exogenous variation in alignment, we implement a regression-discontinuity design with close elections, in which we compare municipalities where the coalition in power at the regional level just won the municipal elections (and obtained the mayor) with municipalities where it just lost. Defining A as an indicator for the mayor being aligned, i.e., belonging to the same coalition as the one ruling at the regional level, and Y, as before, as an indicator equal to one if the mayor is unseated during the term, we can write the relationship between stability and alignment status as follows:

$$Y_{it} = \alpha_2 + \tau_2 A_{it} + \beta_3 W_{it} + \beta_4 W_{it} D_{it} + \epsilon_{it}, \tag{9}$$

where W is the running variable, defined as the distance to the municipal seat majority of the regional bloc in charge of the regional government at the time, and D is an indicator for when $W \geq 0$. Given that having the seats majority does not always guarantee the mayoralty (so that, in our notation, $A = 0$ even if $D = 1$), our design is a fuzzy-RDD, and the alignment

[33] Naturally, alignment could have other effects related to political legitimacy, skill in bargaining and support. Whether these can be seen simply as additional resources or not depends on how the model is specified.

variable is instrumented with D as the following first stage equation shows:

$$A_{it} = \alpha_3 + \gamma_2 D_{it} + \delta_3 W_{it} + \delta_4 W_{it} D_{it} + u_{it}, \tag{10}$$

To construct our running variable, we build on recent work that adapted the RDD close election method to proportional systems (see, for example, Folke 2014 and Fiva, Folke and Sørensen 2018). In particular, we follow Curto-Grau, Solé-Ollé and Sorribas-Navarro (2018) and redistribute votes to the opposition bloc until a majority change happens. We first calculate the total vote share of the regional government and opposition blocs in the municipality by aggregating the corresponding vote shares in the two blocs. If the regional government block has a majority, defined as having more votes than the opposition bloc, we redistribute a fraction of its votes to the opposition, until a majority change is reached and the opposition becomes the bloc with most votes. Similarly, we add votes instead of subtracting them in the case where the regional government bloc does not have a majority in the municipality.[34] The running variable W is then defined as the minimum vote share increment (or decrement) needed to obtain a majority change. Positive values correspond to municipalities in which the regional bloc has a majority over the regional opposition bloc. Negative values correspond to cases in which the regional opposition bloc has the majority.

Before proceeding to estimation we show that the no-manipulation assumption is satisfied and that covariates are balanced around the threshold. Figure C.5 in appendix C reports the histogram of the running variable and shows that is exhibits no obvious discontinuity at the threshold. Formal tests (McCrary 2008; Cattaneo, Jansson and Ma 2017) fail to reject the null of no discontinuity with large p-values. There is an appreciable decrease in density near the threshold due to the fact that the minimum number of votes required to change majority cannot be very small, but this is merely a consequence of how the running variable is constructed and does not affect the results.

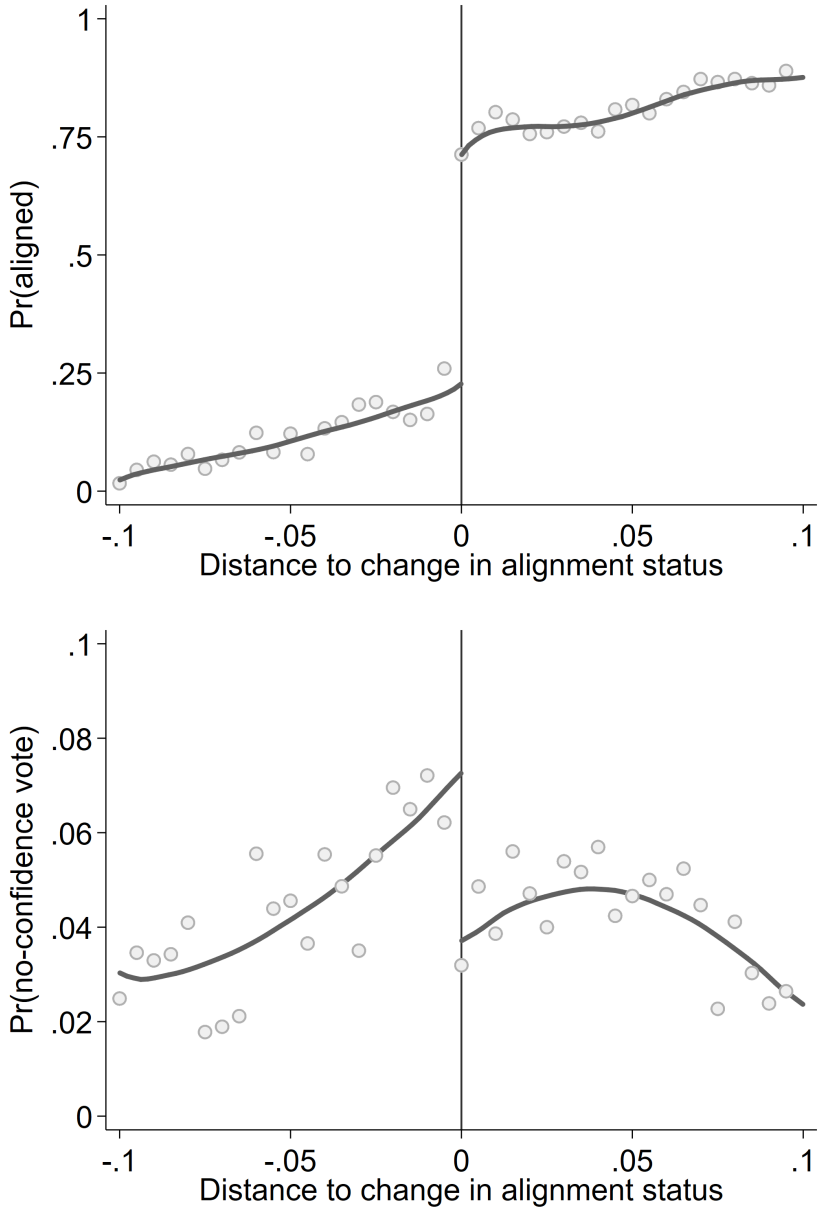
Figure C.6 in the appendix shows the balancing of different covariates around the threshold. On top of looking at municipal characteristics such as population or surface area, we also look at outcomes of the electoral process. Table C.6 provides estimates for these discontinuities. We observe that all estimates are statistically indistinguishable from 0 at the 5% significance level. Note that this table is built using the sample bandwidth used to produce the estimates below. We conclude that local randomization successfully leads to covariate balancing in our context.[35]

The upper panel of figure 4 illustrates our first stage. The horizontal axis represents our distance to regional bloc majority and the vertical axis represents the proportion of aligned municipalities. Points represent bin averages and independent local linear regression estimated below and above the thresholds are overlaid as gray lines. There is a substantial

[34] An alternative redistribution scheme is to assume that redistributed votes are not assigned to any party, but become blank votes. This approach yields very similar results.

[35] Spikes around the threshold in variables correlated with population size are due to the presence of two elections held in the municipality of *Palma de Mallorca*, for which the calculated running variable is -0.0001. In these cases, we do not observe any successful no-confidence votes.

FIGURE 5
THE EFFECT OF ALIGNMENT ON STABILITY - FIRST-STAGE AND REDUCED-FORM



Notes: In both panels, the horizontal axis corresponds to the vote share distance to a change in the council majority in the municipality. Observations to the left of the zero threshold are municipalities where the regional bloc coalition has the majority of seats in the municipal council. Correspondingly, to the right of the threshold are municipalities where the regional opposition has the majority. The upper panel illustrates our first stage, where the vertical-axis measures the probability of the mayor belonging to the regional bloc. The lower panel plots the reduced-form, which relates the probability that the mayor is unseated to the running variable. Dots are averages in 0.5% bins of the running variable and lines are nonparametric local linear regressions estimated on both sides of the threshold.

jump at the threshold. This is unsurprising, as municipalities where the regional bloc holds more seats than the regional opposition will typically be able to elect the mayor, who will be aligned by construction. The lower panel of figure 4 shows the reduced-form graph. The

TABLE 4
IV ESTIMATES - ALIGNMENT AND STABILITY

	(1) Mayor uns.	(2) Mayor uns.	(3) Mayor uns.	(4) Mayor uns.
Aligned	-0.049***	-0.049***	-0.048***	-0.048***
	(0.016)	(0.015)	(0.015)	(0.015)
Mean of dep.var.	0.047	0.047	0.047	0.047
Bandwidth	0.078	0.078	0.078	0.078
Obs.	13056	13054	13056	13054
Fixed Effects	N	N	Y	Y
Controls	N	Y	N	Y

Notes: 2SLS estimates of the effect of alignment on votes of no confidence. The dependent variable is a indicator taking value 1 if there was a vote of no confidence in the legislature. The optimal bandwidth is calculated using the CCT criterion. Controls and FE are included as indicated in each column. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

vertical axis is the fraction of votes of no confidence and the horizontal axis represents our running variable. We observe a clear discontinuity between the fitted lines, indicating that municipal governments where the regional bloc has the majority are substantially less likely to be unseated.

We control for separately estimated linear terms in the running variable as before. We again restrict the sample to observations close to the threshold using the CCT bandwidth selector. We will show that results are robust to bandwidth selection methods. We report results including controls and time or region effects. First-stage estimates of parameter γ_2 are provided in table C.7 in the appendix. Municipalities in which the regional bloc has more seats than the regional opposition bloc are more likely to be aligned. The difference in probability at the threshold is very large, standing at 0.52. As expected, adding controls, electoral-year times region and number of seats fixed effects to the specification has little impact on the estimated coefficients.

Second-stage estimates of τ_2, the effect of alignment on the probability of a no-confidence vote are reported in table 4. We find that alignment with the regional government results in a 4.8 percentage points decrease in the probability that the mayor is unseated through a vote of no confidence. This is again a large effect relative to a baseline probability of about 2% and of 4.7% around the threshold. The estimated coefficients are similar across specifications, and statistically significant at the 1% level in all specifications.

As discussed above, there may be more than one mechanism in operation here. One likely candidate is that aligned municipalities receive more resources from their region, as noted in the literature. In order to investigate this possibility we perform one additional exercise, by testing whether we can confirm with our data that municipalities indeed receive more transfers. In the second stage above, we simply replace the dependent variable for the log of average capital transfers received by the municipality in a legislature. Results for these estimates are reported in table C.8 in the appendix. We find a substantial positive effect of alignment status on capital transfers, with aligned municipalities receiving over 23% more

transfers of this type. Table C.9 in the Appendix shows qualitatively similar results using the capital transfers per capita variable from Curto-Grau, Solé-Ollé and Sorribas-Navarro (2018). The results in table 4 and table C.8 are consistent with a mechanism by which aligned incumbents receive more resources and can use these when bargaining with other local parties.

The results in this section showed that fragmentation and alignment have opposite effect on the stability of the government of roughly the same size. We now turn to study whether there are any interactions between the alignment and fragmentation effects. These effects may undo or reinforce each other. For example, alignment may help mayors deal with a fragmented council. To investigate whether the effect of fragmentation on stability varies by alignment status, we split our sample in two samples, with *aligned* and *unaligned* municipalities, and estimate the effect separately following the method outlined in section 5.1.

Estimates are provided in table 5, where we defined a municipal government as aligned if it belongs to the coalition in power at the regional level (panel A) or at the national level (panel B). In columns 1 and 2 we use only aligned municipalities in estimation and vary the bandwidth using the one chosen by the CCT criterion in table 4, and the CCT optimal bandwidth calculated using the subsample only, respectively. Columns 3 and 4 do the same for the subsample of unaligned municipalities. Both point estimates are positive, but the effect is about twice the size for unaligned municipalities. This suggests mayors may use the transfers and advantages provided by alignment to survive a fragmented legislature. To further explore this, we look at how our estimates change when looking at alignment with the *national* government in panel B. The effect of fragmentation appears to be very modest (or even absent, depending on the specification), for aligned municipalities, and much stronger for unaligned ones. The de-stabilizing effect of an additional party in the council seems to be offset almost completely by being aligned. Is is only when the mayor is unaligned that the challenger has a chance to unseat and replace him. This could be due both to the additional difficulty in having to overthrow an aligned mayor, who has the support of the upper tiers of government and additional resources to distribute, but also to obstacles in gathering support for a no-confidence vote among the opposition parties. By excluding the aligned party, the newly formed coalition would, in fact, have to renounce to all the benefits attached to alignment, including the additional transfers.

High quality incumbents are harder to unseat

Government instability can have a negative impact on economic performance because it may increase policy uncertainty. Yet the possibility of unseating low-quality or underperforming incumbents might also have a positive impact. One of the implications of our theoretical model is that politicians of relatively higher quality compared to that of the potential challenger (namely, large $\theta_1 - \theta_2$) are less likely to be unseated. One challenge is that, in a parliamentary democracy, the identity of the potential challenger is revealed only if a successful vote of no-confidence is approved. In addition, another issue relates to the measurement of the quality and performance of the incumbent government. Several measures have been proposed. Here, we start by measuring quality using the level of education and the

TABLE 5
FRAGMENTATION EFFECTS BY ALIGNMENT STATUS

	Aligned		Not Aligned	
	(1)	(2)	(3)	(4)
	Mayor Uns.	Mayor Uns.	Mayor Uns.	Mayor Uns.
A. Regional Partisan Alignment				
N. Parties	0.023	0.040*	0.102*	0.096*
	(0.028)	(0.024)	(0.053)	(0.050)
Mean of dep.var.	0.029	0.028	0.051	0.050
Bandwidth	0.011	0.016	0.011	0.012
Obs.	4419	6319	2668	2897
B. National Partisan Alignment				
N. Parties	0.016	0.013	0.086**	0.085***
	(0.039)	(0.033)	(0.035)	(0.032)
Mean of dep.var.	0.035	0.036	0.037	0.036
Bandwidth	0.011	0.014	0.011	0.012
Obs.	3336	4374	4012	4211
Bandwidth Choice	Fixed	CCT	Fixed	CCT
Fixed Effects	Y	Y	Y	Y
Controls	Y	Y	Y	Y

Notes: 2SLS estimates of the effect of fragmentation on stability, by alignment status. The dependent variable is an indicator taking value 1 if there was a vote of no confidence during the legislature. Alignment status indicated in table head. The optimal bandwidth is calculated using the CCT criterion in the full sample (columns 1 and 3), for comparison purposes, and using the CCT criterion on the subsample of aligned (col. 2) and unaligned (col. 4) municipalities only, respectively. Controls and FE are included in all specifications. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

occupation of politicians, as well as the number of past terms as member of the municipality council as proxies.

In table 6, we measure $\theta_1 - \theta_2$ in terms of the distance between the quality of the incumbent mayor, selected at the beginning of the term, and the average quality of the members of the second largest party in the municipality council. We estimate a simple panel regression using yearly data for the period 2007-2014, in which we have information on education and occupation, as well as past experience (observed only between 2007 and 2010) of the mayor and all members of the municipality council.[36] The results show that an increase in the distance between the quality of the mayor and the average quality of the members of the main opposition party is associated with an increase in istability. These results, despite a relative lack of precision, are large in magnitude compared to the baseline, and in line with the

[36]The empirical counterpart of the parameter θ_2 in the theoretical model would be the quality characteristic of the mayoral candidate belonging to party 2. Due to the institutional setup, however, only candidates who at some point are elected mayors are observable, while potential alternative ones are not disclosed. For this reason, we proxy for θ_2 using the average quality of all members of the municipality council belonging to party 2. If party 2 chooses among its highest quality member to potentially become mayor, then our regressor is going to suffer a measurement error.

TABLE 6

NO-CONFIDENCE VOTES AND QUALITY OF INCUMBENT MAYOR AND OPPOSITION PARTY

	All municipalities			Mayor from Party 1		
	(1)	(2)	(3)	(4)	(5)	(6)
	Dep. Var.: Mayor Unseated					
College	-0.004**			-0.002		
	(0.002)			(0.001)		
Professional		-0.001			-0.002	
		(0.002)			(0.002)	
Experience			-0.003***			-0.002***
			(0.001)			(0.001)
Mean of dep.var.	0.011	0.011	0.019	0.006	0.006	0.010
Obs.	21035	21035	18165	18280	18280	15671
Fixed Effects	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y

Notes: Estimates of the effect of the difference in quality characteristics between the incumbent mayor and the second largest party, that in most of the cases is the largest party in the opposition, on the probability of a no-confidence vote. All municipalities and terms for which we have information on personal characteristics of the members of municipality council (2007-2014). *Experience* is observed only between 2007 and 2010. *College*, *Professional* and *Experience* are computed to represent the difference between the value relative to the incumbent mayor and the average value among the members of the municipality council belonging to the second largest party (in the model notation, $\theta_1 - \theta_2$). In columns 4-6 the sample is restricted to the cases in which the incumbent mayor belongs to the party with the largest seat share in the municipality council. Controls and FE are included. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors are clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

theoretical prediction that government instability can be a tool to unseat low quality mayors before the next election period.

*5.3. **Consequences of government instability***

The results in the previous sections show that both the composition of the local parliament and the amount of the agenda setter's political resources have large effects on government stability. Specifically, the results in table 6 highlight that government instability may improve the selection of mayors that are better educated, have responsibility jobs and have served in the local council for long compared to the members of the largest opposition party. In this section we proceed by estimating, using difference-in-differences methods, the consequences of unseating a mayor in terms of personal characteristics and future electoral performance of the unseated incumbent compared to the one elected after the vote of no-confidence.

We report the results of the consequences of a vote of no-confidence on observable characteristics of the mayor in table 7. In panel A we use the full sample of municipalities and see, in line with results in table 6 that municipalities that experienced a vote of no confidence tend to have mayors with lower education or low-skill occupation, and who have very little experience in the municipality council. Unseated mayors also are more likely to be female and are slightly younger (although this coefficient is imprecisely estimated). The difference-in-differences interaction coefficient reveals that the mayor that replaces the un-

TABLE 7

CONSEQUENCES OF NO-CONFIDENCE VOTE ON THE MAYOR'S CHARACTERISTICS

	Quality			Personal	
	(1) College	(2) Prof.	(3) Experience	(4) Age	(5) Female
A. 2007-2011 Panel					
Mayor Unseated	-0.121***	-0.129***	-0.709***	-0.534	0.047*
	(0.039)	(0.040)	(0.112)	(0.641)	(0.026)
Post × Unseated	0.087*	0.098**	-0.087	-1.471*	0.003
	(0.048)	(0.049)	(0.148)	(0.791)	(0.030)
Mean of dep.var.	0.441	0.436	2.088	49.818	0.169
Obs.	29111	29111	21332	37621	42298
B. Munic. with at least one no-confidence vote					
Mayor Unseated	0.006	-0.068	-0.573***	-0.526	0.084***
	(0.054)	(0.058)	(0.209)	(0.965)	(0.031)
Post × Unseated	0.088*	0.145***	-0.037	-1.742**	-0.024
	(0.053)	(0.055)	(0.167)	(0.883)	(0.032)
Mean of dep.var.	0.426	0.437	1.588	48.705	0.193
Obs.	1271	1271	1092	1765	1976
Fixed Effects	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y

Notes: Difference-in-differences estimates of the effect of a no-confidence vote on observable characteristics of the mayor in office. Panel A: All municipalities and terms for which we have information on personal characteristics of the members of municipality council (2007-2014). Panel B: Only terms in municipalities that had at least one no-confidence vote in the sample period (2007-2014). *Experience* is observed only between 2007 and 2010. *College* is an indicator variable taking value 1 if the mayor has completed college; *Prof.* is an indicator variable taking value 1 if the mayor works as a professionist or phisicist; *Experience* is a count variable measuring the number of previous terms that the mayor has served in the municipality council; *Female* is an indicator variable taking the value 1 if the mayor is a woman. Controls and FE are included. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors are clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

seated incumbent after the no-confidence vote has quite different characteristics. To start, new mayors are almost 10 percentage points more likely to have attended college, 8.7 percentage points more likely to have a high-skill job, and 1.4 years younger on average, while they are instead not significantly different from their predecessors in terms of past experience and gender. The results using only the subset of municipalities that experienced at least one no-confidence vote during the 2007-2014 period are shown in panel B and are very similar qualitatively and slightly larger in magnitude.

Unseated mayors appear to be of lower quality, and are replaced by challengers who are better educated, younger, and coming from more qualified jobs. This is also reflected in their electoral performance. As shown in table 8, parties of unseated mayors obtain a 17.2% lower vote share in the next election compared to the parties of mayors who completed the term in office. The party of the challenger who successfully unseats the incumbent, instead, appears to be rewarded. In the rightmost column of table 8 we can see that the vote share of the second largest party in the following election is 6.6% higher when this party successfully

TABLE 8

THE EFFECT OF A NO-CONFIDENCE VOTE ON ELECTORAL PERFORMANCE

	(1) Mayor's share (t+1)	(2) Party 1 share (t+1)	(3) Mayor's party wins (t+1)	(4) Party 2 share (t+1)	(5) Party 2 wins (t+1)
Mayor Uns.	-0.172***	-0.101***	-0.391***	0.066***	0.474***
	(0.005)	(0.005)	(0.017)	(0.007)	(0.025)
Mean of dep. var.	0.522	0.523	0.727	0.337	0.014
Obs.	34948	35673	34948	32228	42185
Fixed Effects	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y

Notes: Estimates of the effect of a no-confidence vote on next election's electoral performance. $Mayor\ unseated$ is an indicator equal to one if the mayor was replaced at some point during the term. In column 1 the dependent variable is the vote share of the mayor's party in the next elections. In column 2 it is the vote share of the largest party. In column 3 the dependent variable is an indicator equal to one if the incumbent mayor is re-elected in the next election. In column 4 the dependent variable is the second most voted party's vote share in the next election. This party is in general the party that proposes the no-confidence vote. To ensure that we are measuring the effect of the no-confidence vote on the vote share of the challenger, in columns 4 and 5 we only include the no-confidence votes proposed by the second-largest party. In column 5 the dependent variable is an indicator equal to one if the second-largest party is elected mayor in the next election. Controls and FE are included. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors are clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

unseats and replaces the incumbent.[37] An additional consequence of being unseated is that the incumbent advantage is, to a large extent, reversed. As columns 2 and 5 show, the incumbent's party is much more likely to be win the mayor in the next election (72% of the times) than the challenger's party (1.4%). But when the challenger unseats the incumbent, its probability of winning the next election increases by 47.4 percentage points. At the same time, the incumbent's party chance to win drops by almost 40 percentage points. While there could still be unobserved factors that, at the same time, cause both the decline of the incumbent party and increase the likelihood of a no-confidence vote, these results are evidence of a large electoral punishment for unseated incumbents and, at the same time, show that the incentives for the challenger to try to overthrow the incumbent are strong.

Taken as a whole, the results in this section suggest that replacing the mayor has a positive effect on the quality of the government. New mayors that replace incumbents after a successful no-confidence vote are more educated, more likely to hold a high-skill job, and are younger. They also perform better in the following election. While our measures of government quality are not perfect, these results provide a different perspective on the consequences of government instability. While there is certainly a negative side to it due to, for instance, policy uncertainty, changes in government may also be desirable insofar as they lead to new governments of better quality.

[37] To ensure that we are properly measuring the effect on the vote share of a successful challenger (and not simply the effect on any second-largest party), in this specification we only consider no-confidence votes carried out by the second-largest party.

5.4. ***Robustness Checks***

This section shows the robustness of our main results. We start by showing that our estimates of the effect of fragmentation and alignment on stability are unaffected by bandwidth choice as long as the bandwidths are reasonably narrow. Figure C.7 displays estimates (vertical axis) obtained for different bandwidths around the corresponding threshold. The CCT optimal bandwidth is indicated in each case, with a vertical dotted line. Panel A shows fuzzy-RD estimates of the effect of fragmentation (equation 7), while Panel B shows estimates of the alignment effect (equation 9). In both cases, the coefficients are reasonably stable across bandwidths, and start to attenuate only using values of the bandwidth well above the optimal choice. We conclude that our main results are not driven by specific bandwidth choices.

The baseline estimates presented in table 2 are obtained by using our party-municipality-legislature dataset, so that the number of observations for each legislature in a municipality is equal to the number of parties in this legislature with a vote share within the optimal bandwidth range around 5%. Table C.10 in appendix C presents estimates using weighted 2SLS, with weights chosen so that all municipalities have equal weights in estimation. In panel A we report estimates obtained with the full sample, while panel B presents estimates for the subset of municipalities with no single-party majorities. Both sets of estimates indicate a positive and significant effect of fragmentation on instability, with point estimates being larger in the restricted sample. Note that, in panel B, all coefficients are now significant at the 5% level.

6. Discussion

Both fragmentation and the amount of resources available to the incumbent affect the stability of the government substantially. In our view, the main mechanism through which these two factors operate is by affecting the bargaining power of the politician that is forming the coalition. More parties in the council mean more potential allies for the *formateur* party, and with a more fragmented council it is more likely to find parties that are small enough to form a coalition that is just large enough to obtain the majority of seats in the parliament, but not more. Such a coalition will be cheaper to form but is also easier to dissolve, because the challenger can buy off the smaller allies by promising them a smaller amount of transfers. This mechanisms generates more unstable government coalitions when the council is more fragmented. Similarly, when the *formateur* is aligned with the regional or national governments it has more resources than the challenger that can be offered to potential allies to form a governing coalition. Coalitions headed by an aligned party are harder to unseat because the challenger has less resources to buy off some of the incumbent's allies.

Our theoretical model provides additional insights about the heterogeneous effects of legislative fragmentation on government stability by party losing seats. Specifically, the effect of the number of parties is larger when either party 1 or party 3 loses seats compared to cases in which party 2 does. To test this prediction empirically, we calculate, for each election in the dataset, the counterfactual seat allocation subject to the event of the party closer and below (above) the 5% vote share threshold had jumped exogenously to the other

side of it. The difference between the actual and the counterfactual seat allocations identifies the parties losing (gaining) one or more seats because the marginal party received more (less) than 5% of votes. In table C.11 in the appendix we estimate the reduced form relationship between the 5% threshold and stability by interacting the treatment dummy with indicators for the identity of the parties losing seats due to the admission of the marginal party. The results show that, in the full sample of municipalities, as well as in the subset of them in which none of the parties has more than half of seats, the effect of fragmentation on stability is stronger than the average reduced-form effect when either party 1 or party 3 loses seats, while the entry of a new party does not reduce stability if the marginal party enters at the expense of party 2 (i.e. the largest *opposition* party).

These mechanisms can explain our estimated effects even when all parties have no ideological differences, and are motivated uniquely by obtaining ego rents from office and the largest amount possible of transfers for their voter group. However, in practice, parties may also differ in terms of ideology, so that certain coalitions might not be feasible in practice because of large ideological differences between parties. In table C.12 in the appendix we estimate the reduced form of our model in equations 7 and 8 and include, as additional covariates, different measures of ideological distance between the marginal party, defined as the party that is close to the threshold, and the largest party. The information on ideology is taken from Polk et al. (2017) and is available only since 1999 and only for the parties that ran at the national level, so that the precision of the estimates is reduced in this exercise. Results in C.12 show that the entry of a party that is ideologically distant from the first might have a small additional effect on the probability of no-confidence vote, but only if this distance is very large (defined as being above the 75th percentile of ideological distance). The entry of parties that are close ideologically, on the other hand, does not appear to increase stability, with a point estimate of the interaction between our instrument for crossing the threshold and an indicator for ideological closeness being very small and statistically insignificant. These results suggest that, while ideological differences in the council might in principle be an important driver of stability, we observe limited evidence that it play a first-order role. Importantly, our main results are found in the whole sample of parties, suggesting that our proposed mechanism might operate regardless of ideological differences between parties.

7. Conclusions

Understanding the determinants of government stability is crucial to design constitutional rules that strike the balance between holding politicians accountable and giving them sufficient time to carry out their policies. In this paper, we start by asking how the fragmentation of the legislature can affect the stability of the government. In light of a simple bargaining model, we interpret our results that fragmented parliaments lead to unstable governments as the result of the entry of additional parties on the coalition formation process. We also find evidence in favor of the other model prediction that incumbents with more resources have more bargaining power and hence are harder to unseat. Additionally, challengers that are successful in unseating the incumbent are of higher quality, and are greatly

rewarded by voters in the next elections. In terms of policy implications, our results suggest that the entry thresholds that are found in most Parliaments across the world lead to more stable governments, but at a cost. While they are successful in limiting the influence of small parties and foster the creation of larger, more stable coalitions, this stability may become an obstacle in removing underperforming or corrupt politicians from office.

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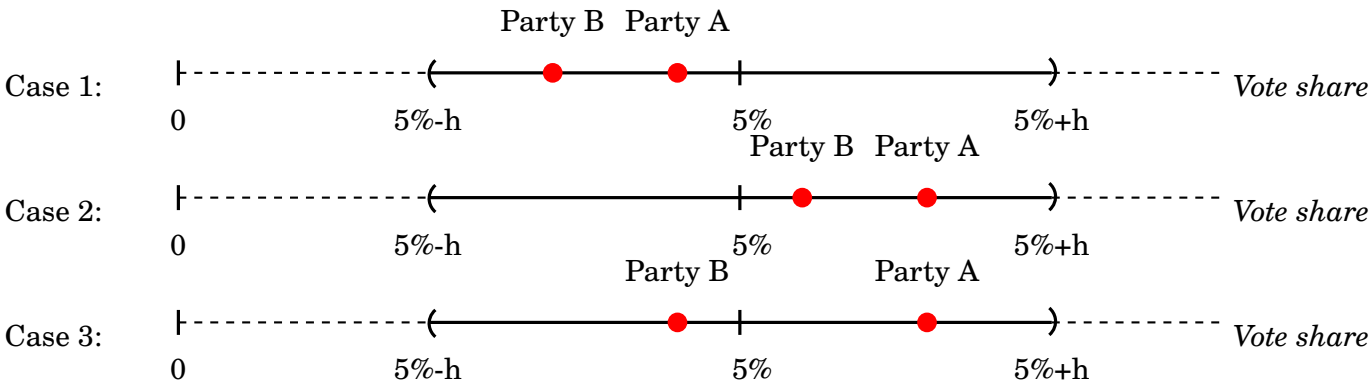
Appendices

A. Construction of the instrument for fragmentation

To instrument for the number of parties in the council, we use an indicator D that is 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, in part, related to the number of parties that manage to get at least 5% of the votes and are, hence, eligible to obtaine 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, on average, less parties in the council because, by chance, parties A and B received a vote share that was just short of the required amount to receive a seat and are, therefore, excluded.



B. Data Appendix

B.1. List of Data Sources

Towns 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. Since 1999, we use the official list from the *Instituto Nacional de Estadistica*, while this information is not available for the previous years and we use the election results as a basis for our towns panel. We later merge all other datasets to this town panel.

Elections

We append municipal election data from the *Ministerio del Interior* (the Spanish ministry for 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, 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. We address the quality of this data source by calculating with the help of the Stata user-written command *v2seats* the number of seats assigned to each party according to election results, the 5% vote share admission threshold, and the D'Hondt allocation rule. We detect that in only 414 cases the two approaches do not yield the same seat distribution.

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. In the cases in which there is an election during the year, the data report the latest mayor (i.e. the mayor appointed after the municipality election).

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, *Unseated Mayor*, is a dummy equal to one if at some point during the term a new mayor is elected, and her party affiliation is different to the one of her predecessor. In the original data sources, information is missing in 39 cases (mainly in Navarre, 1999).

Alignment

We access the outcomes of the votes held within the council of each *Comunidad Autonoma* (region) to select the President of the region in order to gather information about which parties have voted in favor of the elected President of the Region. We consider all parties who voted in support of the incumbent regional President prior to the current municipality election as part of the regional governing majority. Following Curto-Grau, Solé-Ollé and Sorribas-Navarro (2018), in the municipal election results, we sum the number of votes as well as the vote shares of all parties that are members of the regional governing majority.

At the national level, single-party majorities (or coalition governments between one very large party and other small or local parties) have been observed most of the times. Hence, we consider that a mayor is aligned with the national government if and only if she belongs to the party of the Prime Minister's, and that she is not aligned otherwise.

Capital Transfer

We use ex-post budget information of all municipalities from *Ministerio de Hacienda* (the Spanish ministry of finance), relative to the years 2002-2014. From this source, we obtain the capital transfers that each municipality received from upper-tier levels of government in the last year before a new municipality election. We perform on this variable a logarithmic transformation.

As a robustness check of both our measure of capital transfers and our approach to compute the running variable and the treatment groups for the alignment analysis, we use the variable *tk* (capital transfer per capita) from Curto-Grau, Solé-Ollé and Sorribas-Navarro (2018).

Personal Characteristics of Politicians

We have information from ... on gender, age, education and profession of all members of municipality councils and mayors elected in the occasion of 2007 and 2011 elections, as well as the number of previous terms that the individual has served in the council. We proxy for $\theta_1 - \theta_2$ in the theoretical model by comparing the observable characteristics of elected mayors and the average characteristics of members of the municipality council belonging to the party with the second largest seat share.

Ideology

We merge our dataset with information relative to Spain in Polk et al. (2017), containing ideology measures of parties represented in the national parliament between 1999 and 2014. We use the variable *lrgen*, measuring the general ideology of each party on a scale from 1 (far left) to 10 (far right). For each party, we both use the continuous measure of ideology, and we generate an indicator equal to 1 if the party has an ideological position to the right of the mean position among parties represented in the Spanish parliament between 1999 and 2014. Ideological distance between two parties is measured by the distance, in absolute value, between the continuous measures of the ideology of the two considered parties. Dummy variables for the same ideology take values equal to 1 if the two parties are both to the right

or both to the left of the mean ideology. Conversely, dummy variables measuring different ideologies between different parties take values equal to 1 if the two parties are on two opposite sides of the mean ideology.

B.2. Sample selection

Fragmentation and stability

The dataset for the analysis on fragmentation and stability is a party-level panel of municipality elections, observed for all election years between 1983 and 2011 and containing all information from data sources described above. We restrict the sample to municipalities above 250 residents since the ones below the population threshold are subject to a different voting rule, based on individual candidates rather than on party lists. We drop 414 elections in which the allocation of seats across parties observed in the official sources is not consistent with the election results, according to the 5% admission threshold and the D'Hondt allocation rule.

We also drop a total of 864 elections, in which either i) we are unable to match electoral results and mayors, or ii) the party of the mayor is not recognized among the ones participating in the elections, or iii) 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).

The final sample consists of 161,557 observations from 50,156 unique elections.

Alignment and stability

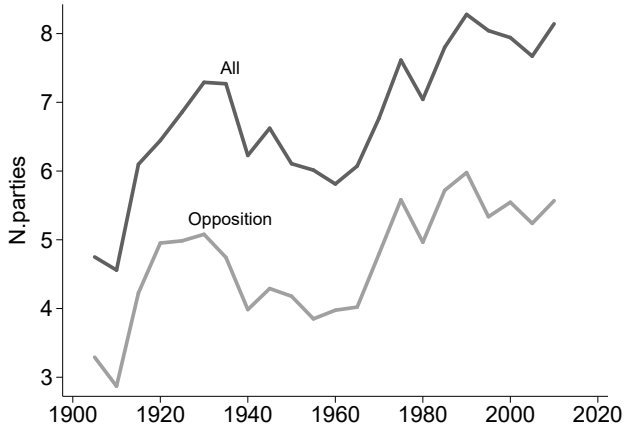
The dataset for the analysis on alignment and stability is a municipality level panel of municipality elections, observed for all election years between 1983 and 2011 and containing information from data sources described above. Elections held in 1979 are excluded from the sample since no regional government was already incumbent at the time of the municipality elections. We restrict the sample to municipalities above 250 residents since the ones below the population threshold are subject to a different voting rule, based on individual candidates rather than on party lists. We drop 414 elections in which the allocation of seats across parties observed in the official sources is not consistent with the election results, according to the 5% admission threshold and the D'Hondt allocation rule.

We also drop a total of 6,207 elections, in which either i) we are unable to match electoral results and mayors, or ii) the party of the mayor is not recognized among the ones participating in the elections or iii) the party of the mayor belongs to local lists by construction impossible to be aligned to the regional government, or iv) 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).

The final sample consists of 40,442 observations, each of which representing a unique election.

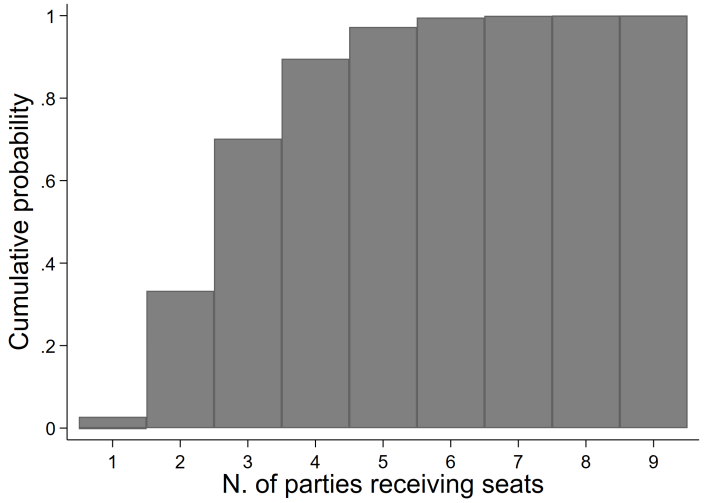
C. Additional empirical results

FIGURE C.1
NUMBER OF PARTIES REPRESENTED IN NATIONAL PARLIAMENTS (OECD)



Notes: Average number of parties represented in national parliaments among OECD countries following elections held between 1900 and 2017.

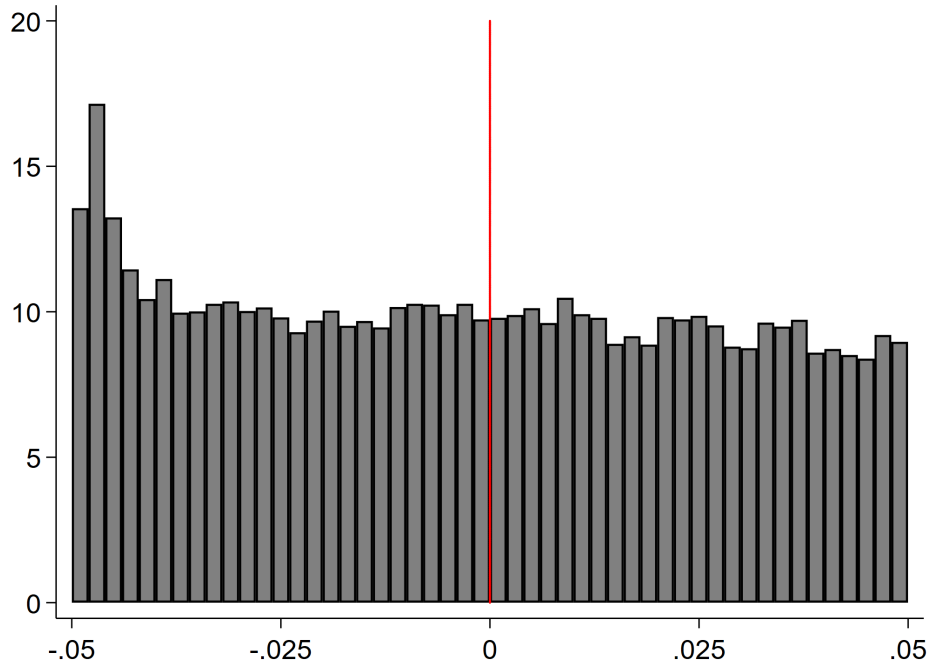
FIGURE C.2
NUMBER OF PARTIES IN MUNICIPAL COUNCILS



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

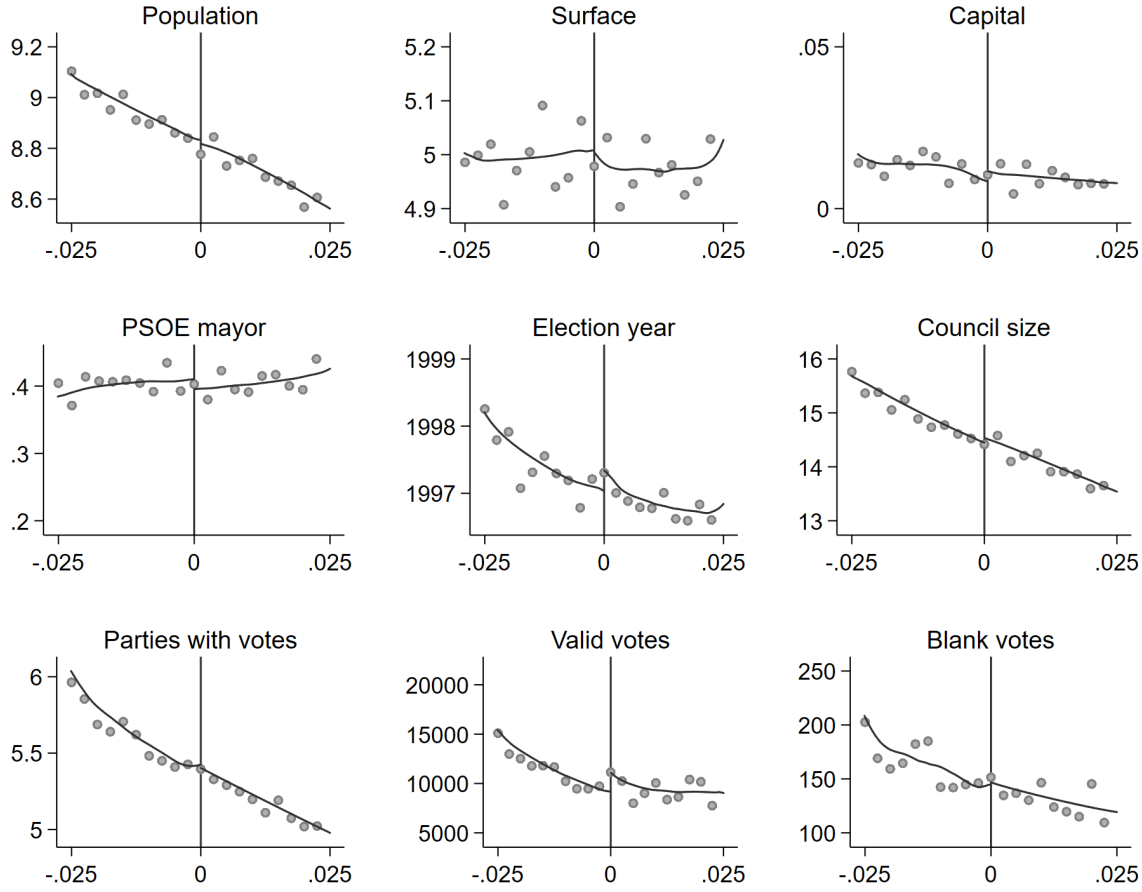
Figure C.3

Density of the fragmentation running variable around the threshold



Notes: Density histogram of the running variable used in the RDD on the effect of fragmentation on stability, in bins of size 0.1%. 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.

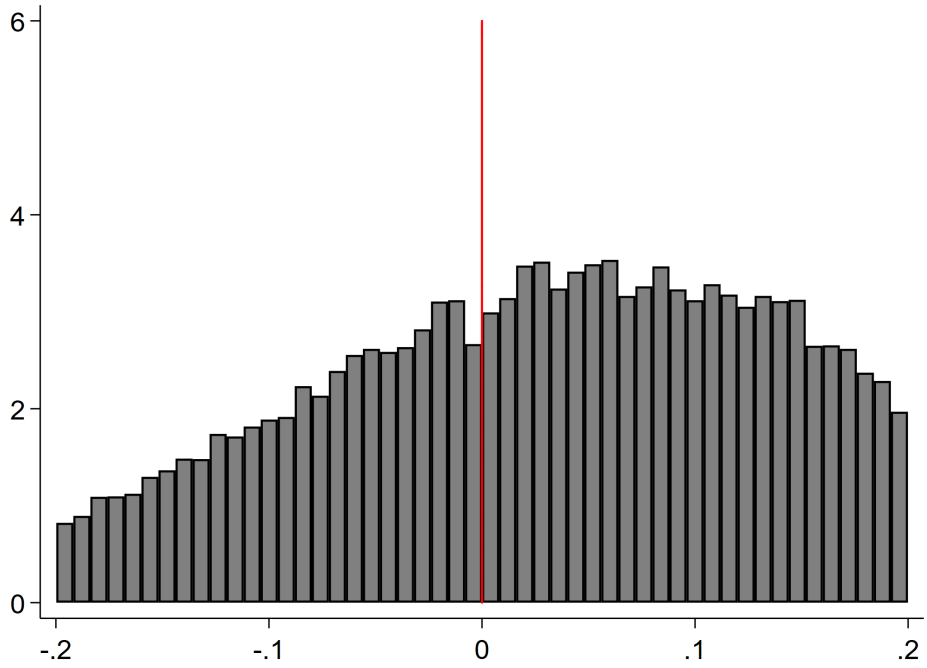
Figure C.4
Covariate Balancing Plots - Fragmentation



Notes: Averages of different municipal characteristics near the threshold. Population and surface are in logarithms. Capital is an indicator for being a regional capital. PSOE mayor is an indicator for the mayor belonging to the socialist party PSOE. 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. Dots are averages in 0.25% bins of the running variable and lines are nonparametric local linear regressions estimated on both sides of the threshold.

Figure C.5

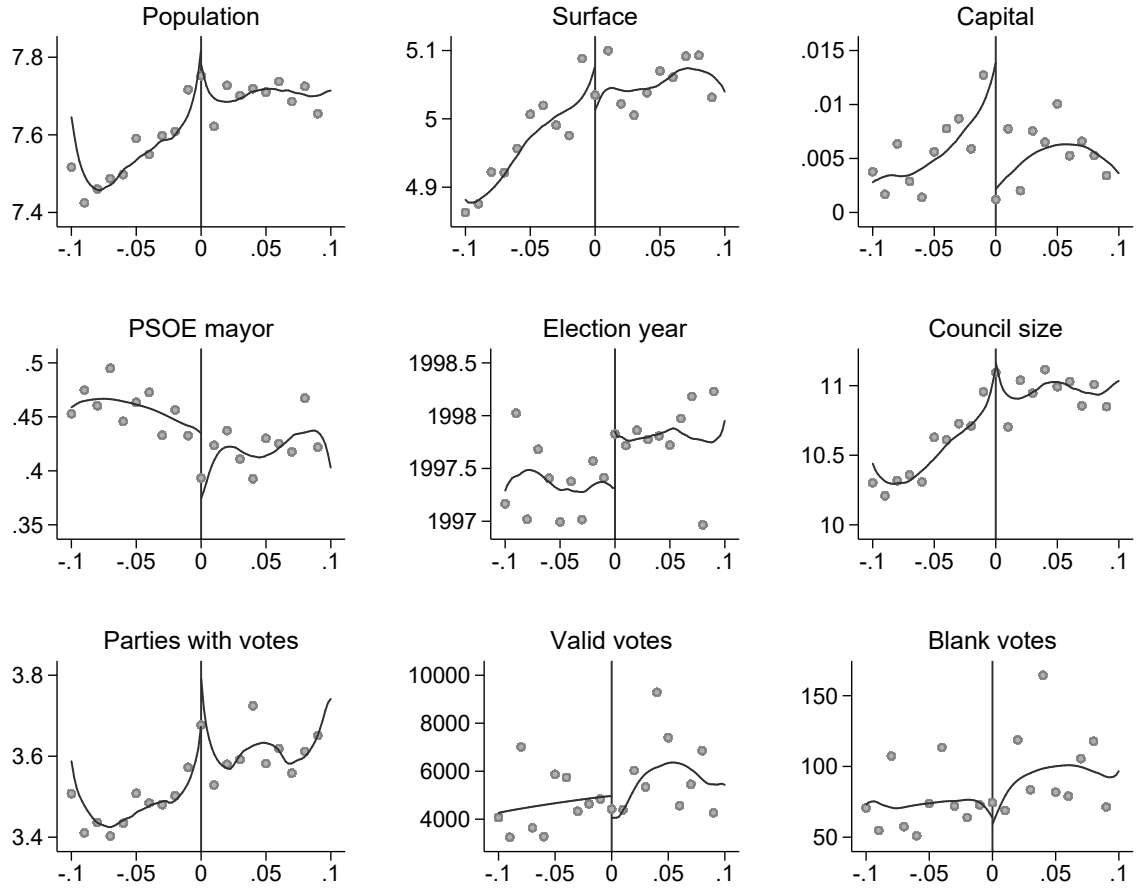
Density of the alignment running variable around the threshold



Notes: Density histogram of the running variable used in the RDD on the effect of alignment status on stability, in bins of size 0.08%. 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 0.51. A Cattaneo, Jansson and Ma (2017) test, instead, yields a p-value of 0.89.

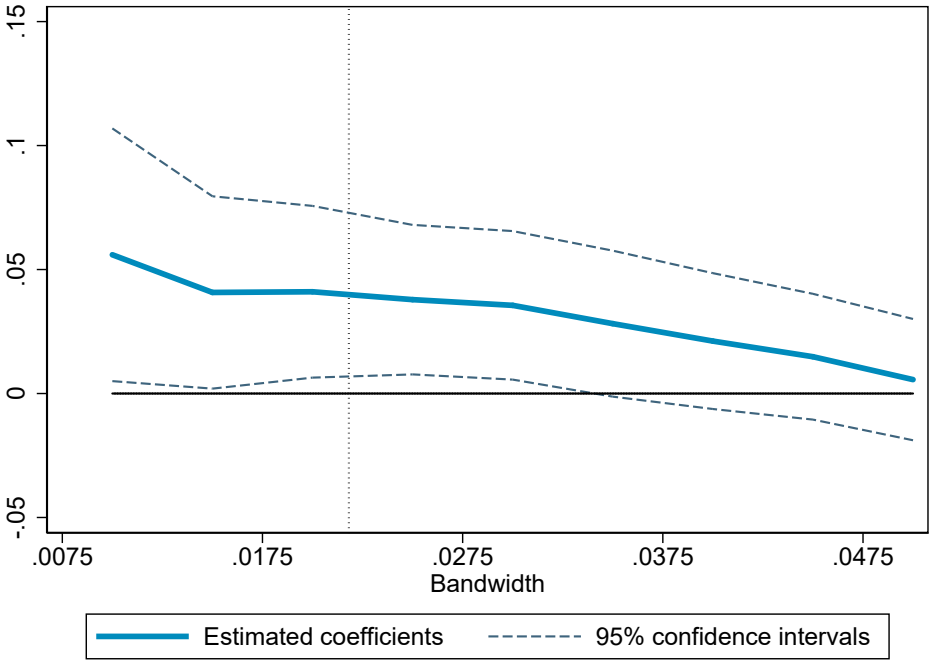
Figure C.6

Covariates balancing plots - Alignment

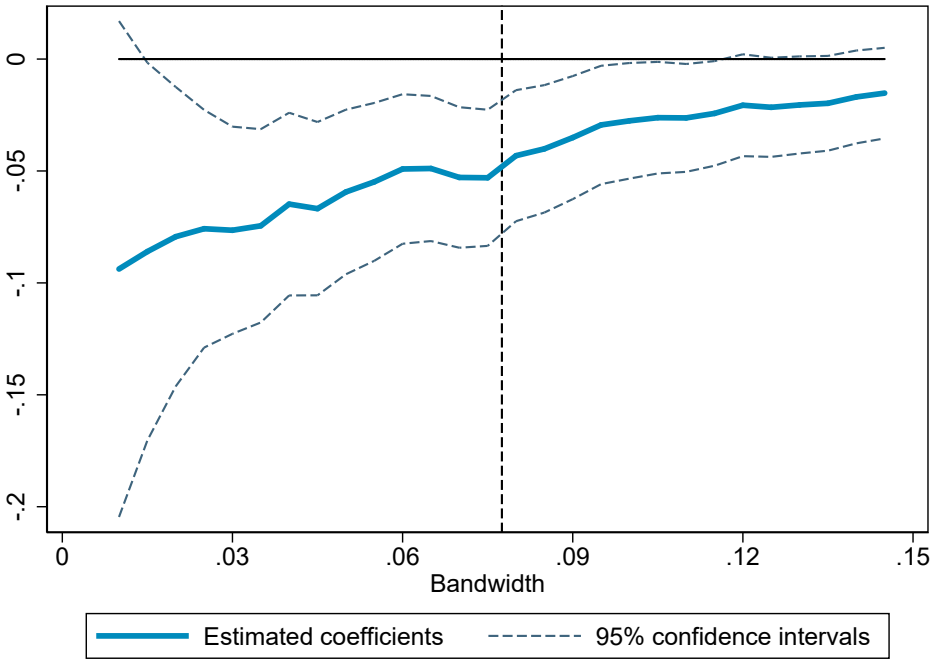


Notes: Averages of different municipal characteristics near the threshold. Population and surface are in logarithms. Capital is an indicator for being a regional capital. PSOE mayor is an indicator for the mayor belonging to the socialist party PSOE. Council size is the number of available seat in the municipality. Parties with votes measures the number of parties that ran and obtained votes in the municipal election. Dots are averages in 1% bins of the running variable and lines are nonparametric local linear regressions estimated on both sides of the threshold.

Figure C.7
Bandwidth Robustness - Fragmentation & Alignment



A) Fragmentation



B) Alignment

Notes: Panel A represents estimated coefficients of the effect of fragmentation on the probability of a no-confidence vote for different bandwidth choices. Panel B represents estimated coefficients of the effect of alignment on the probability of a no-confidence vote for different bandwidths. Horizontal axes represent the relevant running variable in each case. Solid lines represent coefficient values. Dashed lines represent 95% confidence intervals. Controls and FE are included as indicated in each column. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors are clustered at the municipality level.

TABLE C.1

DESCRIPTIVES - AVERAGE MINIMUM WINNING COALITION BY NUMBER OF PARTIES IN COUNCIL

	All municipalities	Excl. absolute majorities
	(1)	(2)
	Min. Win. Coalition	Min. Win. Coalition
2 parties	0.646	
3 parties	0.617	0.628
4 parties	0.568	0.559
5 parties	0.544	0.539
6 parties	0.534	0.530
7 parties	0.531	0.529
8 parties	0.531	0.531
9 parties	0.524	0.524
Mean	0.649	0.590
Elections	50156	10684

Notes: Average size, by number of parties in the council, of the minimum winning coalition, defined as the smallest coalition of parties that reaches at least 50% of the seats.

TABLE C.2
COVARIATE BALANCING - FRAGMENTATION

	(1) Popul.	(2) Surface	(3) Capital
Above threshold	0.011	-0.020	-0.000
	(0.045)	(0.040)	(0.003)
Mean of dep.var.	8.825	4.984	0.011
Bandwidth	0.022	0.022	0.022
Obs.	15540	15540	15540
	PSOE mayor	Election year	Council size
Above threshold	-0.018	0.135	0.147
	(0.015)	(0.315)	(0.173)
Mean of dep.var.	0.403	1997.110	14.523
Bandwidth	0.022	0.022	0.022
Obs.	15537	15537	15537
	Parties w. votes	Valid votes	Blank votes
Above threshold	0.042	1253.716	7.373
	(0.063)	(1382.093)	(18.827)
Mean of dep.var.	5.396	10161.857	144.967
Bandwidth	0.022	0.022	0.022
Obs.	15537	15537	15537
Fixed Effects	N	N	N
Controls	N	N	N

Notes: Covariate balancing regressions for the fragmentation RDD model (eq. 7 and 8). Population and surface are in logarithms. Capital is an indicator for being a regional capital. PSOE mayor is an indicator for the mayor belonging to the socialist party PSOE. 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. 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. *, **, *** respresent 10%, 5% and 1% significance levels.

TABLE C.3
FIRST-STAGE - FRAGMENTATION

	(1) N. Parties	(2) N. Parties	(3) N. Parties	(4) N. Parties
Above threshold	0.351***	0.351***	0.349***	0.349***
	(0.047)	(0.041)	(0.036)	(0.036)
F-stat.	56.58	75.14	92.58	92.93
Mean of dep.var.	3.430	3.430	3.430	3.430
Bandwidth	0.015	0.015	0.015	0.015
Obs.	10802	10802	10802	10802
Fixed Effects	N	N	Y	Y
Controls	N	Y	Y	Y

Notes: OLS estimates of the first-stage for fragmentation (equation 8). The optimal bandwidth is calculated using the CCT criterion. Controls and FE are included as specified in each column. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors are clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

TABLE C.4

IV ESTIMATES - FRAGMENTATION AND SINGLE-PARTY MAJORITIES

	(1) Abs. Majority	(2) Abs. Majority	(3) Abs. Majority	(4) Abs. Majority
N. Parties	-0.110***	-0.110***	-0.114***	-0.115***
	(0.041)	(0.041)	(0.041)	(0.041)
Mean of dep.var	0.625	0.625	0.625	0.625
Bandwidth	0.022	0.022	0.022	0.022
Obs.	14216	14216	14216	14216
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 receives the absolute majority of seats. The dependent variable is an indicator taking value 1 if one party has the absolute majority of 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-region fixed effects. The optimal bandwidth is calculated using the CCT criterion. Standard errors are clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

TABLE C.5

IV ESTIMATES - FRAGMENTATION AND MINIMUM WINNING COALITION

	All municipalities				Excl. abs. majorities
	(1)	(2)	(3)	(4)	(5)
	Dep. Var.: Minimum Winning Coalition				
N. Parties	-0.027***	-0.027***	-0.027***	-0.028***	-0.022***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.007)
Mean of dep.var.	0.601	0.601	0.601	0.601	0.565
Bandwidth	0.016	0.016	0.016	0.016	0.016
Obs.	11249	11249	11249	11249	3848
Fixed Effects	N	N	Y	Y	Y
Controls	N	Y	N	Y	Y

Notes: 2SLS estimates of the effect of number of parties on the size of the minimum winning coalition. The dependent variable is the seat share of the smallest coalition of parties (including a single-party coalition) entailing the absolute majority of members of 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-region fixed effects. The optimal bandwidth is calculated using the CCT criterion. Standard errors are clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

TABLE C.6
COVARIATE BALANCING - ALIGNMENT

	(1) Popul.	(2) Surface	(3) Capital
Above threshold	0.004	-0.020	-0.007*
	(0.052)	(0.040)	(0.004)
Mean of dep.var	7.647	5.024	0.006
Bandwidth	0.078	0.078	0.078
Obs.	13056	13054	13056
	PSOE mayor	Election year	Council size
Above threshold	-0.021	0.413	0.012
	(0.018)	(0.316)	(0.172)
Mean of dep.var	0.435	1997.606	10.806
Bandwidth	0.078	0.078	0.078
Obs.	13056	13056	13056
	Parties w. votes	Valid votes	Blank votes
Above threshold	0.046	437.008	13.824
	(0.064)	(885.076)	(21.696)
Mean of dep.var	3.550	5395.230	86.469
Bandwidth	0.078	0.078	0.078
Obs.	13056	13056	13056
Fixed Effects	N	N	N
Controls	N	N	N

Notes: Covariate balancing regressions for the fragmentation RDD model (eq. 9 and 10). Population and surface are in logarithms. Capital is an indicator for being a regional capital. PSOE mayor is an indicator for the mayor belonging to the socialist party PSOE. 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. Estimation by local linear regression using a fixed bandwidth equal to the CCT optimal bandwidth used in table 4. No controls or FE are included. Standard errors are clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

TABLE C.7
FIRST-STAGE - ALIGNMENT

	(1) Aligned	(2) Aligned	(3) Aligned	(4) Aligned
Above threshold	0.522***	0.523***	0.526***	0.526***
	(0.014)	(0.014)	(0.014)	(0.014)
F-stat.	1302.64	1305.93	1421.08	1418.79
Mean of dep.var.	0.500	0.500	0.500	0.500
Bandwidth	0.078	0.078	0.078	0.078
Obs.	13056	13054	13056	13054
Fixed Effects	N	N	Y	Y
Controls	N	Y	Y	Y

Notes: OLS estimates of the first-stage for alignment (equation 10). Bandwidth is calculated using the CCT criterion. Controls and FE are included as specified in each column. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

TABLE C.8

IV ESTIMATES - ALIGNMENT AND LOG(CAPITAL TRANSFERS)

	(1)	(2)	(3)	(4)
	Dep. Var.: Log(Capital Transfers)			
Aligned	0.238**	0.307***	0.229***	0.236***
	(0.106)	(0.097)	(0.079)	(0.078)
Mean of dep.var.	4.719	4.719	4.719	4.719
Bandwidth	0.066	0.066	0.066	0.066
Obs.	4932	4932	4932	4932
Fixed Effects	N	N	Y	Y
Controls	N	Y	N	Y

Notes: 2SLS estimates of the effect of alignment on capital transfers to the municipality, as recorded in municipal budgets, using D_{it} as an instrument. The dependent variable is the logarithm of the average capital transfers received by the municipality in each four-year period. Bandwidth is calculated using the CCT criterion. Controls and FE are included. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

TABLE C.9

IV ESTIMATES - ALIGNMENT AND CAPITAL TRANSFERS PER CAPITA (CURTO-GRAU ET AL.)

	(1)	(2)	(3)	(4)
	Dep. Var.: Capital Transfers p.c.			
Aligned	53.880**	59.478**	77.797***	77.912***
	(26.004)	(25.192)	(22.716)	(22.596)
Mean of dep.var.	117.613	117.613	117.613	117.613
Bandwidth	0.080	0.080	0.080	0.080
Obs.	2570	2570	2570	2570
Fixed Effects	N	N	Y	Y
Controls	N	Y	N	Y

Notes: 2SLS estimates of the effect of alignment on capital transfers per capita obtained from Curto-Grau, Solé-Ollé and Sorribas-Navarro (2018), using D_{it} as an instrument. The dependent variable is average capital transfers per capita. Bandwidth is calculated using the CCT criterion. Controls and FE are included as indicated in each colum. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

TABLE C.10

IV ESTIMATES FRAGMENTATION AND STABILITY - EQUAL WEIGHTS

	(1) Mayor Uns.	(2) Mayor Uns.	(3) Mayor Uns.	(4) Mayor Uns.
A. Full Sample				
N. Parties	0.047**	0.046**	0.042**	0.042**
	(0.024)	(0.023)	(0.021)	(0.021)
Bandwidth	0.022	0.022	0.022	0.022
Obs.	15540	15540	15540	15540
B. No Single-Party Majorities				
N. Parties	0.113**	0.130**	0.107**	0.108**
	(0.049)	(0.055)	(0.049)	(0.049)
Bandwidth	0.017	0.017	0.017	0.017
Obs.	4229	4229	4229	4229
Fixed Effects	N	N	Y	Y
Controls	N	Y	N	Y

Notes: Weighted 2SLS estimates of the effect of number of parties on the probability of unseating the mayor (equation 7). The dependent variable is an indicator taking value 1 if there was a vote of no confidence in the legislature. Weights are the inverse of the number of parties running for election. Panel A uses the full sample while panel B only uses municipalities with no single-party majorities. Controls and FE are included as indicated in each column. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. The optimal bandwidth is calculated using the CCT criterion. Standard errors are clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

TABLE C.11

REDUCED-FORM - FRAGMENTATION AND STABILITY BY PARTY LOSING A SEAT

	All Municipalities		No Abs. Majority	
	(1) Mayor uns.	(2) Mayor uns.	(3) Mayor uns.	(4) Mayor uns.
D	0.011**	0.016***	0.031*	0.039**
	(0.005)	(0.006)	(0.017)	(0.018)
$D \times 1(Party\ 2\ loses\ seat)$		-0.014***		-0.033**
		(0.005)		(0.015)
$D \times 1(Party\ 3\ loses\ seat)$		-0.003		0.003
		(0.006)		(0.016)
Mean of Dep.var.	0.033	0.033	0.091	0.091
Bandwidth	0.022	0.022	0.017	0.017
Obs.	15540	15540	4085	4085
Fixed Effects	Y	Y	Y	Y
Controls	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 there was a vote of no confidence in the legislature. The bandwidth is calculated using the CCT criterion. Controls and FE are included as indicated in each colum. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.

TABLE C.12

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	0.004	-0.005	-0.001	0.006	0.008
	(0.009)	(0.012)	(0.010)	(0.010)	(0.010)
$D \times distance$		0.012			
		(0.010)			
$D \times 1(far)$			0.026**		
			(0.013)		
$D \times 1(close)$				-0.004	
				(0.011)	
$D \times 1(same)$					-0.008
					(0.011)
Mean of Dep.var.	0.027	0.027	0.027	0.027	0.027
Bandwidth	0.024	0.024	0.024	0.024	0.024
Obs.	4145	4145	4145	4145	4145
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 there was a vote of no confidence in the legislature. The bandwidth is calculated using the CCT criterion. Controls and FE are included as indicated in each colum. Controls: surface and population (in logs). FE: number of available seats and year-region fixed effects. Standard errors clustered at the municipality level. *, **, *** respresent 10%, 5% and 1% significance levels.