

*Rafael Hortala-Vallve, Jaakko
Meriläinen, and Janne Tukiainen*
**Pre-Electoral Coalitions: Insights
into the Boundaries of Political
Parties**

Aboa Centre for Economics

Discussion paper No. 143

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ABSTRACT

Finnish elections use an open-list proportional representation system, and parties may form pre-electoral coalitions (PECs) in the form of joint lists. We document that PECs are more common between parties of equal size and similar ideology, and when elections are more disproportional or involve more parties. Using difference-in-differences and density discontinuity designs, we illustrate that voters punish coalescing parties and target personal votes strategically within the coalitions, and that PECs are formed with the particular purpose of influencing the distribution of power. They increase small parties' chances of acquiring leadership positions, lead to more dispersed seat distributions, and sometimes prevent absolute majorities. We discuss the implications of these findings for the boundaries of political parties.

JEL Classification: C23, D23, D72

Keywords: bargaining power, local elections, multi - party systems, open - list PR system, pre - electoral coalitions, strategic voting

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Why do parties exist? What is their function and what determines their scope? Political parties are essential in the running of democratic countries yet American voters today increasingly identify as being independent (Gallup 2020). At the same time, animosity between individuals that identify with one or other party has never been greater (Iyengar and Westwood 2015). It is difficult to imagine the creation of a new party in the US with its majoritarian party system (Duverger 1972). However, elsewhere in Europe, we have seen a burst of new parties after the Great Recession of 2007-2009. These new parties have not stayed on the fringe of politics and are now part of national governments. En Marche was created in 2016, and it won a landslide victory in the French National Assembly elections in 2017; the Five Star Movement was created in 2009, and it obtained the most votes of all parties for the Italian Chamber of Deputies in the 2013 general election; finally, Podemos was created in 2014, and after the 2019 Spanish general election, it entered a coalition government with the traditional socialist party, PSOE. Given the importance of political parties as mediators between governments and citizens, there has been much scholarly interest in analyzing their role and function, but we are still lacking a full understanding of their boundaries and the conditions that lead to their creation, merger, and extinction.

In very general terms, political parties can be seen as informal coalitions of alike individuals that aim to implement a political platform that would otherwise not gather enough support. Parties become the custodians of the policies announced during the election and put in place mechanisms to control elected officials' decisions (Cox and McCubbins 1993, 2005 and Levy 2004). One way to keep control on the elected officials decisions is by controlling their selection and selecting candidates faithful to the groups' policy priorities (see Cohen et al. 2008, Bawn et al. 2012 and McCarty and Schickler 2018). There are returns to scale to bigger parties, however the bigger the political party, the less homogeneous it becomes and members might need to compromise too much concerning policy and rents.¹

¹See Hortala-Vallve and Mueller (2015) on how these tensions can be placated by calling a primary election and committing to choose the policy preferred by a plurality of members. An

The problem in analyzing political parties is that changes to the *party system* are rare and it is extremely difficult to isolate their causes. The electoral system, voters' preferences or the pre-existing distribution of political parties in the ideological spectrum surely play a role in changes in the party system, yet the ideal experiment to identify its causes is not normally available. It is for this reason the current paper looks at an interesting feature of Finnish local elections to understand the conditions under which various political factions decide to run together in a particular election. This allows for an empirical evaluation that helps our understanding of what determines the size and number of political parties in a particular region at a given time.

Finland has an open-list proportional representation electoral system (about 64% of democracies employ a PR system, and a fourth of these use open-list procedures see Scartascini, Cruz, and Keefer (2018)). For our research, we are specially interested in the possibility of Finnish parties to form pre-electoral coalitions (PECs) by running joint lists. The parties have incentives to form PECs, because the (open-list) proportional representation system with D'Hondt method favors larger parties in the seat allocation (Benoit 2000). PECs can be formed without any commitment to a joint policy manifesto after the election. Moreover, the coalition partners' party labels remain visible in the ballot. These small *barriers to entry* to forming coalitions make such agreements frequent and yields rich large- N data for our study. Forming a PEC is much less demanding agreement than forming an actual party, and therefore, we are identifying lower bound effects on how voter responses create boundaries for parties and how institutional environment affects the nature of the party system. To this extent, the results are likely to generalize to party formation or more intense coalitions, because there are similar strategic considerations and effects (e.g., voter responses) in all cases. For example, if voters punish ideologically distant parties for forming a PEC, the punishment would likely be much larger if these parties had implemented an actual merger—for a comprehensive analysis on party mergers in Europe, see Ibenskas (2016).

excellent survey of the literature can be found in Dhillon (2003). Primaries have also been seen as a mechanism that incentivizes candidates to act on the voters' behalf (Caillaud and Tirole 2002).

The literature on coalition formation has mainly focused on post-electoral bargaining in proportional electoral systems (Müller and Strøm 2000). However, parties across the world are increasingly seen to join forces before elections (Golder 2005, 2006b; Powell 2000). Most recently in Spain, the two main right-wing parties formed an electoral coalition ahead of the 2020 regional Basque Country elections. Their intention was to prevent the division of the right-wing vote and avoid an overall majority of the Socialist Party. Even in the UK with a first-past-the-post system, there have been recent calls for a united front to defeat the Tories: “to defeat a common enemy, parties should set aside differences and cooperate.”² Intuitively there are two big advantages of pre-electoral coalitions vis-à-vis post electoral ones: they reduce uncertainty on the likely coalition after the election and result in a less disproportional allocation of seats.

We construct a new data set of parties and their coalitional ties in Finnish local elections to study various aspects of PECs. The seminal work on PECs by Sona Golder looks at the correlates of such coalitions (Golder 2005, 2006a,b), and we show the robustness of some of her findings to the Finnish case. Additionally, our study shows that a key driver for such coalitions is preventing the victory of a rival larger party as noted in the two examples above.

The case of the Alavieska municipality in Northern Finland in the 2012 election illustrates our point. Four ideologically diverse parties (the National Coalition Party, the Left Alliance, the Christian Democrats, and the Finns Party), as depicted in Figure 1 below, formed an electoral alliance to prevent the Center Party from obtaining an absolute majority of the seats. The municipality had been dominated by the Center Party for years, and the spokesman for the Left Alliance, Timo Takkunen, stated that they “wanted to make sure that the policies reflect the

²See an editorial “The Guardian view on a progressive alliance: divided they fall” in *The Guardian* (December 13, 2020), available online at <https://www.theguardian.com/commentisfree/2020/dec/13/the-guardian-view-on-a-progressive-alliance-divided-they-fall> (accessed January 20, 2021).

opinions of all inhabitants and not only the those of the Center Party supporters.”³ In the end, the coalition did not obtain its objective, possibly due to the lack of ideological cohesion.

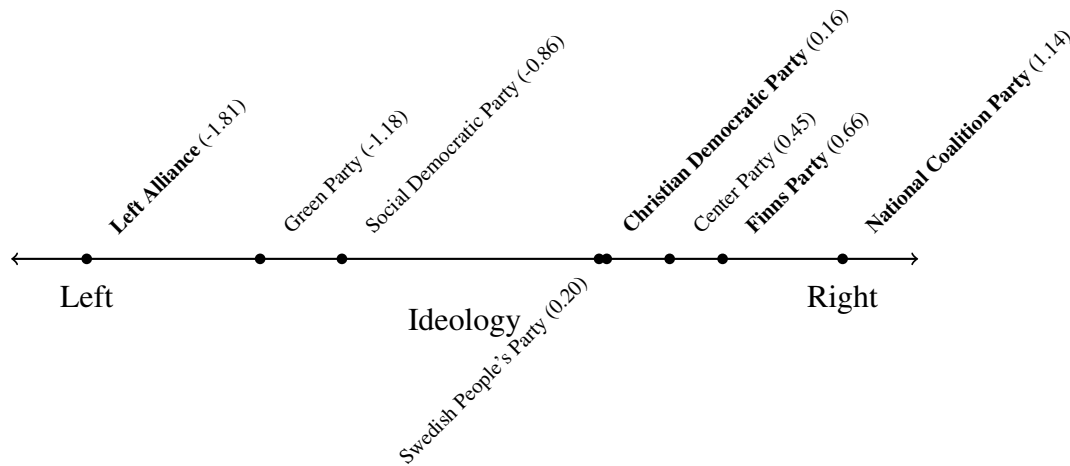


Figure 1. Ideological positions of Finnish main political parties. The ideological positions are drawn according to survey data on electoral candidates’ economic policy preferences from the Finnish Broadcasting Company YLE (see Appendix B for further information). The parties that formed a PEC in Alavieska to undermine the chances of the Center Party obtaining a majority of the seats are indicated in bold.

Another interesting example occurred in the municipality of Karvia. In the 2012 election, two ideologically proximate parties, the Social Democratic Party and the Left Alliance, formed a PEC that ensured the Center Party did not get a majority of the seats. The last elected candidate was from the Social Democratic Party, and the first non-elected candidate was from the Center Party. Had the PEC not formed, the Center Party would have obtained one more seat and reached an absolute majority of the local council seats.

In what follows, we begin with an initial descriptive analysis of the correlates of PECs at the municipality level, building on previous work. The findings from this investigation speak to some of the most prominent hypotheses in the PEC formation literature: PECs are more likely when more parties are present (possibly indicating the incentive for political leaders to signal the

³See an article in *Helsingin Sanomat* available at <https://www.hs.fi/kotimaa/art-2000-002575242.html> (accessed March 11, 2020).

likely voting coalitions after the election), and when the electoral system at the local level is very disproportional. We also assess how ideological polarization affects the likelihood of coalitions.

Our novel empirical contribution is to analyze the various effects of PECs. An advantage of considering Finnish municipal elections is that there is an open-list proportional system in place. Hence, we observe the party each citizen votes for, even when the party is part of a PEC. We leverage party-level data on both coalition formation and electoral outcomes to examine the effect of coalition formation on electoral support. Our difference-in-differences analysis suggest that coalescing affects especially vote shares but also seat shares negatively, on average. This contradicts the motivation behind larger parties to save electoral costs (Dhillon 2003; Montero 2016; Osborne and Tourky 2008). Voter punishment of coalitions is targeted particularly to coalitions with large ideological heterogeneity. We also find that PECs encourage intra-list strategic voting as voters from smaller coalition partners pool their votes into fewer candidates—hence increasing their electoral chances in the within-list competition against candidates from larger coalition partners. Strategic voting seems to benefit smaller parties within the coalition, which might explain why asymmetric coalitions are harder to form. We also find that some parties are willing to form PECs and give away important leadership positions to their smaller partners. Our work highlights a novel bargaining power hypothesis by which coalitions are strategically formed to influence the overall distribution of seats; more specifically, to influence the probability any party obtains an absolute majority of seats and gains full political control of the municipality. In order to causally identify the role of PECs on the likely government composition, we use density discontinuity design. The results suggests that PECs are an efficient tool for preventing absolute majorities when the largest party is close to obtaining more than half of the seats. This same rationale to coalesce is at the core of the study by Frey, Gabriel, and Montero (2020). They document that in Mexican mayoral elections, parties are willing to compromise ideology and form an electoral alliance to remove an entrenched incumbent party from office.

In all, we see that the incentives to run under a same platform depend on the relative electoral support of each group and their ideological differences. Most importantly, we show that the likelihood of coalitions depend on the electoral support of their rival parties.

In the next section, we introduce the institutional context of our study. We then lay out our central theoretical considerations and empirically testable hypotheses. After describing our data, we present our empirical findings on the correlates of PEC formation and the effects of electoral alliances on coalescing parties. Prior to our final concluding section, we discuss the robustness of our findings in considering dyadic data with all possible two-party combinations.

Institutional Context

Decision-making in Finnish municipalities is led by local councils which are responsible for their operation and economy.⁴ Decisions are taken by a simple majority of the council members –thus parties with absolute majority have full control of municipal activities.

Councils are elected using an open-list at-large proportional representation election system. Municipal elections take place every four years on the fourth Sunday of October (in the period that we analyze). Votes are directed to a single individual candidate and not to a party. Seats in the municipal council are distributed using the D'Hondt method: the number of seats for a political party depends on the total number of votes received by its candidates, and the seat allocation within the electoral list depends on the number of votes received by each candidate. The number of seats

⁴Municipalities have a very important role in the Finnish system. In our 1996-2012 data, they spend about 5,500 euro per capita annually, on average (in 2012 prices). The majority of this expenditure is used to take care of statutory responsibilities, including social care, health care and primary education. To cover these expenditures, Finnish municipalities are allowed to collect income taxes, property taxes and out-of-pocket payments from users of municipal services. In addition, municipalities receive a share of corporate taxes and fiscal grants from the central government.

in each municipal council is a deterministic step function of the population in the municipality, and varies between 13 and 85 with a median of 27.

Municipal elections held between 1996 and 2008 were dominated by three large parties from the political left, center, and right: the Social Democratic Party, the Center Party, and the National Coalition Party, respectively. In 2012, the populist party True Finns became the fourth largest party. Other parties that hold seats in both municipal councils and the national parliament include the Left Alliance, the Green Party, the Swedish People's Party and the Christian Democrats. Many municipalities have local, often independent or one-agenda political groups, that are not registered parties but hold seats in local councils. About one third of the municipalities are governed by single-party absolute majorities despite the proportional representation system (Meriläinen 2019). The Center Party is usually the party that holds the absolute majority in smaller rural municipalities; while the Swedish People's Party holds an absolute majority of seats in many coastal regions, where the majority of the Swedish speakers live.

Parties are allowed to form PECs in local elections. In the Finnish context, forming a PEC simply means that the parties set a joint list of candidates. A PEC between two or more parties is treated as a single party list when assigning votes to seats. Coalescing parties appear as separate parties on the candidate list provided to the voters at the polling booths, but the list clearly indicates the pre-electoral alliances that are in place. For an illustrative example, see Figure 2 that shows the candidate list in the Evijärvi local government election of 2017 where the Social Democrats and the Left Alliance as well as the Center Party and the Christian Democrats formed PECs.⁵

After the election, the newly elected council appoints a municipal executive board where parties are represented according to their seat shares in the council. The council elects by majority rule the *chairman of the municipal board*, which is considered to be the most important local political

⁵The order of parties (or PECs) on the candidate list is determined by lottery. Similarly, the order of parties within a PEC is randomized. The norm is that candidates are presented alphabetically within party lists. Parties are allowed to move away from alphabetical order but this rarely happens.

office (a “local prime minister”), and the *chairman of the council*, which is considered to be the second most important position.⁶ The council can also set up committees to deal with different functions of the local government. No official ruling coalition government is formed after the election, though sometimes parties may form informal coalitions. Councils vote on an issue by issue case, and post-electoral voting coalitions may change from one vote to another.

Evijärven kunnassa 9. päivänä huhtikuuta 2017 toimitettavia kuntavaaleja varten laadittu ehdokaslistojen yhdistelmä

Perussuomalaiset r.p.	Suomen Sosialidemokraattinen Puolue r.p.	Vasemmistoliitto r.p.	Kansallinen Kokoomus r.p.	Suomen Kristillisdemokraatit (KD) r.p.	Suomen Keskusta r.p.
2 Ahola Marika muovityöntekijä	7 Joutsen Vesa pääluottamus mies	11 Tolonen Jorma lakiasiantuntija, insinööri	12 Huhmarsalo Marita myymäläpäällikkö	18 Lassila Ulla postityöntekijä	20 Alkio Juha ensihoitaja
3 Kuitalahti Anni suurtalousohjaaja, kotiäiti	8 Kauris Teemu muovityöntekijä		13 Kattilakoski Markus vakuutusarkkustaja (eläkkeellä)	19 Forsbacka Keijo eläkeläinen	21 Anttikoski Jari maalousyrittäjä
4 Ranta-aho Pirjo maanviljelijä, eläkeläinen	9 Saari Anssi turkistarhaaja		14 Kattilakoski Vily sähköasentaja		22 Haapasaari Rita agronomi, toimittaja
5 Välikangas Maria lähivaihtajaopiskelija	10 Vertanen Lasse metsuri, luottamus mies		15 Mikkola Janne yrittäjä		23 Holm Matti yrittäjä
6 Välikangas Susanna laitoshuoltaja			16 Vinkanharju Juha myyjä		24 Joensuu Heidi koulunkäynninohjaaja
			17 Hernesniemi Heta-Mari ympäristöasiantuntija, diplomi-insinööri		25 Järvinen Jyrki yrittäjä
					26 Kirsilä Aapo yrittäjä
					27 Koivukangas Lauri eläkeläinen
					28 Kuitalahti Terhi toimistotyöntekijä, hallintotieteiden yo
					29 Kuusela Jukka metsuri / maanviljelijä
					30 Latukka Erkki maanviljelijä
					31 Mäkinen Pauliina lähivaihtaja
					32 Mäntylä Pasi metsäkoneyrittäjä
					33 Niemi Alina terveydenhoitaja, sairaanhoitaja
					34 Niemissalo Juha eläkeläinen, opettaja
					35 Pahkakangas Jarkko rakennusinsinööri
					36 Pesonen Sami turkistarhaaja
					37 Ritala Satu postityöntekijä
					38 Saarijärvi Mikko maanviljelijä
					39 Sulkakoski Sirkka eläkeläinen
					40 Vesala Pertti maanviljelijä

Vaaliuudistus

Figure 2. Candidate list in Evijärvi local government election of 2017. Parties from left to right are the Finns Party, the Social Democratic Party, the Left Alliance, the National Coalition Party, the Christian Democrats, and the Center Party. Lines connecting the parties indicate PECs that have been formed by the Social Democrats and the Left Alliance, and the Christian Democrats and the Center Party. Candidate numbers, names, and occupations are shown in boxes.

⁶See Meriläinen and Tukiainen (2021) for more information on the selection of the executive board, and Meriläinen and Tukiainen (2018) on the selection of political leaders in Finnish local politics.

Theoretical Considerations

We study the strategic formation of PECs and how PECs affect voting behavior and other electoral outcomes. We group our arguments into causes and consequences of PECs and discuss how these can be used to understand the boundaries of political parties.

Causes of Pre-Electoral Coalitions: Signaling, Proportionality, and Similarity

Taking cues from the seminal work by Sona Golder on pre-electoral coalitions (Golder 2005, 2006a,b), we are firstly interested in how the local election level circumstances might shape parties' incentives to form joint lists. This initial set of hypotheses, and the corresponding empirical analyses, can be seen as a sanity check for our study vis-à-vis previous work on PEC formation.

In proportional electoral systems, voters often face high uncertainty about the identity of future governments, which might discourage them from voting. The more political parties there are, the more difficulties voters have in anticipating the likely coalitions after the election. Under these circumstances, politicians might want to improve the information voters have by *signaling* the likely partners after the election:⁷ PECs should be more likely when there is a large number of parties.

The mechanical benefit of forming a coalition relies on the fact that bigger parties benefit from the apportioning of votes to seats. The key driver of this effect is the degree of *disproportionality* in each district which depends on the particular distribution of vote shares in the municipality,

⁷See also Gschwend and Hooghe (2008) and Eichorst (2014) for examples of studies arguing that PECs provide cues to the voters with regards to the future government composition. Moreover, Gschwend, Meffert, and Stoetzer (2017) use a survey experiment to show that providing voters with coalition signals increases the importance of coalition considerations and decreases the importance of party considerations in voters' decision-making.

the electoral rule, and the council size. Parties in municipalities with particularly disproportional representation should have the largest incentive to form a PEC (see Blais and Indridason 2007 and Parigi and Bearman 2008).

Whether two parties decide to join forces also depends on the characteristics of each party and not just the electoral context. A factor that might encourage two parties to form an alliance is a *shared ideology* (Allern and Aylott 2009; Debus 2009; Golder 2006b; Ibenskas 2015). For example, Golder (2006b) argues that coalitions amongst ideologically close parties should be more acceptable to voters of these parties, and should result in smaller expected policy costs for the parties.⁸

The similarity between coalition partners might not only concern their ideology but also their expected vote share. Asymmetry within coalitions should negatively affect the likelihood of forming an alliance as there might be more difficulties in agreeing a joint platform when bargaining between unequal partners. Bigger parties might feel smaller parties' ideology is over-represented in the coalition and smaller parties might feel their wishes are silenced by the bigger partner in the coalition.

In all, we should expect more PECs in a municipality when there are more parties, the degree of disproportionality is largest, when there are similar parties (in terms of ideology and expected vote share).

Consequences of Pre-Electoral Coalitions: Votes, Seats, and Leadership Positions

Our second group of arguments is related to the consequences of PECs. We focus on three key outcomes: votes, seats, and control of the municipality (via leadership positions and by obtaining an absolute majority of councillors). If PECs reduce campaigning and candidate selection costs

⁸For empirical evidence backing up this argument, see for instance Gschwend and Hooghe (2008) and Fortunato (2017).

(Dhillon 2003; Montero 2016; Osborne and Tourky 2008), we should observe such coalitions having more resources to attract votes. However, the opposite might hold true as voters might dislike their party identity diluted within a coalition. Seeing the specific candidates citizens are voting for (recall that Finland has an open-list PR electoral system) allows us to identify which parties gain or lose from forming a coalition. This characteristic also makes it possible to investigate whether voters are sophisticated (Downs 1957; Duverger 1954): voters of small coalition partners could pool their votes to fewer candidates who can then compete with the candidates from larger coalition partners on the list.

Votes are simply the means to seats and leadership positions. What is the effect of PECs on seats? Whilst joining a PEC could harm parties' vote shares, it is possible that the mathematics of apportionment improves the party's seat allocation. The D'Hondt seat allocation rule implemented in Finland favors larger lists (Benoit 2000). When looking at leadership positions, we should expect coalition parties to get a share of portfolios proportional to the seats they contribute to the coalition (Gamson 1961). This means that small parties within a PEC could sometimes get important nominations that would usually be reserved for larger parties.⁹

Finally, our novel key proposition is that PECs can be used as a way to influence whether a list obtains an absolute majority of seats. Obtaining an absolute majority in Finnish municipalities is critical as councils make decisions based on simple majority. Moreover, an absolute majority typically allows the winner to appoint both the *board chairman* (equivalent to the mayor of the

⁹In Finnish municipalities there are no stable ruling government coalitions, indicating that small parties cannot access leadership positions via the post-electoral bargaining in exchange for agreeing to participate in a coalition government. However, Carroll and Cox (2007) propose a link between PECs and post-electoral bargaining outcomes. Similarly, Bandyopadhyay, Chatterjee, and Sjöström (2011) present a formal model of PECs where parties can commit to seat-sharing agreements. They show that even ideologically distant parties may coalesce if there are potential post-electoral benefits of forming an electoral coalition. Christiansen, Nielsen, and Pedersen (2014), Debus (2009), and Eichorst (2014) also study the role of PECs in post-election bargaining.

municipality) and the *council chairman* (equivalent to the speaker of the local council). Avoiding this concentration of power might be driving many parties to coalesce. PECs might prevent a rival party obtain an absolute majority or might help coalescing parties reach such threshold.

Data and Variables

The main body of our data consists of election results for all Finnish local elections held between 1996 and 2012, obtained from the Ministry of Justice. We report the detailed summary statistics on our data in Appendix Table A1. We restrict our analysis of PEC formation and their effects to registered political parties and rule out all independent (local) groups, because they are not allowed to form PECs.¹⁰ We examine the votes and seats of all registered parties and obtain 11,063 observations at the local party-election year level. Around 16% of observations are part of an electoral coalition.

We complement the election results with information from two data sources. First, we use data on the party of local political leaders (council and board chairmen) for the years 2000-2012 from the Finnish Association of Local Authorities (Kuntaliitto 2013).

Second, we measure party ideology with the *voting aid application* from the public broadcasting company YLE. Voting aid applications are interactive online surveys that election candidates can fill before the election. Voters can then answer the survey and find the candidate who best matches their policy preferences (about 40% of Finnish voters use these surveys, so politicians are well incentivized to accurately represent their platform). Our voting aid application data come from the 2012 municipal election. These data contain a number of questions related to

¹⁰This means dropping 6.4% of the local party-election year level observations. However, these observations are correctly accounted for in measurement when needs be, for example, when defining absolute majorities or number of parties. Independent groups comprise merely around 3.4% of all candidates.

the local public sector and answers to these questions from roughly half of the candidates.¹¹ Using these data, we compute a measure of parties' economic ideology, which is arguably the most important area of policy-making in Finnish local politics.¹²

For some of our analyses, the unit of observation is at the municipality-election year level. We have 1,914 such observations. In 692 of these cases, there is at least one PEC in the municipality. The municipality-level data serve us to test both the causes and consequences of PECs. When looking at the conditions under which PECs are more likely to form, our *signaling hypothesis* is easily tested with the *number of parties* in the municipality. In order to test our *disproportionality hypothesis*, we could use the usual *district magnitude* variable which in our case would correspond to the number of seats in the municipal council. However, this variable fails to capture the disproportionality that might be present in a particular municipality due to the exact distribution of votes. Instead, we use a more accurate measure of disproportionality for each of our observations, namely, the modified Gallagher index (see Koppel and Diskin 2009).¹³ This measure captures the difference between the percentage of votes and the percentage of seats that

¹¹The respondents are slightly more likely to be female and younger than non-respondents. Respondents total vote shares and winning probabilities are also somewhat higher. This selection may lead to small amount of error in measuring party level ideology, but these errors do not systematically concern any single party and are unlikely to impact our analysis.

¹²In order to compress the data into a one-dimensional measure of ideology, we follow a standard practice in the literature and use a principal component analysis (Ansolabehere, Snyder, and Stewart 2001; Heckman and Snyder 1997). The first principal component captures the economic ideology of candidates. The higher the score, the more the party leans to the right. For further details, we refer to Appendix B.

¹³The Gallagher index is attractive because of its intuitive meaning and of ease of calculation, but Taagepera and Grofman (2003) argued that it fails to satisfy some relevant axiomatic properties that other indices achieve (e.g., Dalton's principles of transfers, scale invariance, orthogonality). Therefore, we use the modified Gallagher index in our empirical analysis. Formally, this index is

each party receives. The larger the number, the more disproportional the representation in a particular municipality.

The level of political polarization at the local level might also influence the likelihood of coalitions. We measure ideological dispersion in municipalities at a point in time as follows: $Polarization_{mt} = \sum_p v_{pmt} |x_{pmt} - \hat{x}_{mt}|$, where, v_{pmt} and x_{pmt} are the vote share and ideological position (respectively) of party p in municipality m at time t ; \hat{x}_{mt} is the vote-share weighted average of policy positions.

Causes of Pre-Electoral Coalition Formation

We start by evaluating how the characteristics of the political environment within the municipality shape coalition formation. This part of our empirical investigation is descriptive and complements and supports Golder’s seminal work on PEC formation (Golder 2005, 2006b). Because we are using municipality-level variables, our analysis deviates from that of Golder (2005, 2006b) who uses dyadic data to test for these hypotheses.¹⁴ We use municipality-election year level data and OLS to estimate the connection between the presence of PECs and different variables

defined as

$$Disproportionality_{mt} = \sqrt{\frac{1}{2} \times \sum_p \left(\frac{s_{pmt}}{\sqrt{\sum s_{pmt}^2}} - \frac{v_{pmt}}{\sqrt{\sum v_{pmt}^2}} \right)^2},$$

where s_p is the vote share of party p in municipality m at time t , and v_p is its vote share. Koppel and Diskin (2009) formalized the analysis by Taagepera and Grofman (2003) and actually showed that the modified version of the Gallagher index satisfies all the relevant properties. In the appendix, we show our analysis is not robust to considering the effective electoral threshold as a measure of disproportionality following Golder (2006b); see Appendix Table C3.

¹⁴Given that the theoretical predictions concern the political context in the municipality instead of the characteristics of potential coalition partners, aggregated data is better-suited than dyadic

characterizing the electoral conditions. We multiply the dependent variable by 100 so that the estimation results can be interpreted as percentages.¹⁵ Results are summarized in Table 1 below.

Table 1. Local political context and PEC formation.

	(1)	(2)	(3)	(4)
Number of parties	7.605*** [0.757]	9.543** [4.809]	7.711*** [0.946]	7.798*** [0.756]
Disproportionality	38.997*** [8.384]	48.185** [20.080]	38.524*** [9.274]	52.364*** [9.448]
Polarization	-2.003 [1.670]	-1.908 [1.676]	-1.344 [4.794]	36.450* [19.958]
Number of parties × Disproportionality		-2.104 [5.026]		
Number of parties × Polarization			-0.089 [0.564]	
Disproportionality × Polarization				-40.635* [20.826]
<i>N</i>	1884	1884	1884	1884
<i>R</i> ²	0.11	0.11	0.11	0.12

Notes: The dependent variable is an indicator for at least two parties forming a PEC, multiplied by 100. Standard errors clustered at the municipality level are reported in brackets. The estimation sample only includes municipalities that have at least three political parties. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Consider first the signaling argument that suggests that an increase in the number of parties should be associated with an increased likelihood of having electoral coalitions. The coefficient of *Number of parties* is systematically positive and statistically significant, suggesting that having one more party is associated with a 7 to 9% increase in the probability that a municipality has a PEC.

data to this study. Dyadic data can surely be helpful in reconciling the aggregate-level findings—we return to this in the last part of our analysis.

¹⁵We use OLS, as it is straightforward to interpret the estimation results as marginal effects. In Appendix Tables C1 and C2, we use probit and logit models, respectively, on a dummy outcome variable and obtain similar results.

We also find support for a higher likelihood to form an alliance when the electoral system is more disproportional. Note that PECs affect the values that our disproportionality index gets. To avoid any biases that could arise from this, we thus use the lagged disproportionality metric.¹⁶

With large ideological differences, the incentives to obtain higher seat representation increase thus we should expect a higher likelihood of PECs. However, we do not find a significant positive correlation between the level of polarization and the propensity to coalesce.¹⁷ Contrary to Golder (2005), we do not observe that a disproportional electoral system should increasingly affect the likelihood of PECs when there are many parties in the municipality (column 2) nor when the municipality is very polarized (column 4).

Consequences of Pre-Electoral Coalition Formation: Votes and Seats

We now zoom into political parties and ask what are the actual effects of joining a PEC at the party level, and whether coalitions benefit or hurt political parties' electoral performance. To do so, we estimate a standard generalized differences-in-differences specification at the local party level:

$$y_{mpt} = \beta PEC_{mpt} + \gamma Seat\ share_{mp,t-1} + \alpha_{mp} + \alpha_t + \varepsilon_{mpt}. \quad (1)$$

¹⁶Our results are robust to using current-term disproportionality. In the appendix, we present results from a specification with municipality and year fixed effects which hold all time-invariant municipality-level characteristics and time-specific common shocks constant (Appendix Table C4). Given that many features of the local political context are rather persistent, including municipality fixed effects leaves us with considerably less identifying variation: we find a strong relationship between the presence of PECs and the number of political parties, the result for disproportionality vanishes.

¹⁷Our polarization metric could also be influenced by PECs. We thus use lagged polarization. However, our findings are robust to using non-lagged polarization.

Here PEC_{mpt} is a dummy for party label p belonging to a PEC in election t in municipality m , α_{mp} is a local party label fixed effect (that is, municipality times party fixed effect), α_t is an election year fixed effect and ε_{mpt} is the error term. The estimate of our central interest is $\hat{\beta}$. It tells us the effect of forming a PEC on the outcome y_{mpt} .

In this setting, the treatment group consists of those parties that switch from not having a PEC to having one, or from having PEC to not having one. The control group are those parties that maintain the status quo. The standard identifying assumption in a difference-in-differences strategy is that the outcomes in the coalescing parties would have evolved in the same way as before, had they not formed a PEC. And identically in this generalized setting, the outcomes of parties that had a PEC before, but dissolved it, would have evolved in the same way had they maintained the PEC. If this common trends assumption does not hold (e.g., there are unobservable, time-varying factors driving the PEC formation that also affect our outcomes of interest), the estimates ought to be treated just as conditional correlations. A crucial time-variant factor that may shape both the outcome and propensity to join a coalition is party size: parties become less likely to coalesce the larger they are, but larger parties also tend to fare better in elections and the subsequent bargaining process. Thus, all our regressions control for party size, which we measure as the seat share the party obtained in the previous local election, $Seat\ share_{mp,t-1}$.

In order to analyze heterogeneous effects of electoral coalitions, we interact PEC_{mpt} with ideological differences within the coalition and the party p 's seat share in the previous election in some of our specifications. The former variable is simply computed as the distance between party p 's ideological position and the position of the party within the coalition that is most ideologically distant.

We report the party-level difference-in-differences results in Table 2. Perhaps surprisingly, we find that voters seem to punish parties for forming coalitions (column 1). This is at odds with the hypothesis that coalitions are formed for cost-sharing purposes which, in turn, should lead to an increase in coalescing parties' vote shares as resources should be more efficiently used to target voters (Dhillon 2003; Montero 2016; Osborne and Tourky 2008). Furthermore, this suggests that

Table 2. Effects of forming a PEC.

	Vote share		Seat share		Vote concentration	Board chair	Council chair
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PEC	-1.008*** [0.180]	-0.432 [0.304]	-0.491** [0.211]	0.033 [0.344]	8.241*** [1.212]	0.008 [0.009]	-0.010 [0.010]
Seat share (t-1)	0.152*** [0.019]	0.153*** [0.019]	0.119*** [0.019]	0.119*** [0.020]	-0.356*** [0.041]	0.002* [0.001]	0.002 [0.001]
PEC × Ideological range		-0.728** [0.294]		-0.660** [0.328]			
PEC × Seat share (t-1)					-0.233*** [0.037]	-0.002** [0.001]	0.003** [0.001]
<i>N</i>	8081	8072	8081	8072	8081	8081	8081
Adjusted <i>R</i> ²	0.96	0.96	0.95	0.95	0.76	0.67	0.63
Mean of dependent variable	17.31	17.32	17.40	17.42	23.81	0.17	0.18

Notes: Vote and seat shares are measured in percentages. The dependent variable in column (5) is Herfindahl index of within-party vote share concentration. Regressions control for lagged seat share, and year and party group fixed effects. Standard errors clustered at the local party level are reported in brackets. *, ** and *** denote statistical significance at 1%, 5% and 10%, respectively.

farsighted parties are not seeking votes when forming coalitions. Later in this section, we discuss the possibility that coalitions might form precisely because parties expected a lower than usual performance at the polls.

Our evidence also points towards ideological voting. On average, voters do not appear to punish coalescing parties that are ideologically similar yet punish parties that coalesce with ideologically distant parties (column 2).¹⁸ The latter provides support for our theoretical argument that parties do not have incentives to coalesce with ideologically distant parties when voters are punishing this behavior.¹⁹

Forming a coalition has a negative and statistically significant effect on seat shares (column 3)—though the effect is half the size of the effect on vote share. This suggests that the mechanical electoral economies of scale overcome to some degree the punishment that parties receive in

¹⁸Appendix Figures C1 and C2 visualize the interaction effects.

¹⁹The specifications that include $PEC \times Ideological\ range$ do not contain the term *Ideological range*. By definition, there can be variation in this variable only when there is a PEC. It is not possible to include the interaction, an indicator for a PEC, and the constitutive term, as this would lead to multicollinearity issues.

terms of votes. This supports the argument that parties are more likely to form PECs in more disproportional elections. Once again, we see that the negative effect is concentrated on coalescing parties that are ideologically distant from each other (column 4).

Both results on votes and seats suggest that some parties have a poor judgement when forming coalitions, as they do not seem to anticipate the negative consequences of such coalitions, in particular the ideologically asymmetric ones. Alternatively, parties might be strategically coalescing to influence the overall distribution of power in the municipality rather than seeking individual gains. We investigate this possibility in the next section.

In the Finnish open-list elections, we can trace the votes received by each candidate. This can help us identify whether voters of smaller PEC partners concentrate their votes to few candidates. Indeed, in column (5) we see that joining a PEC leads to a less dispersed within-party personal vote distribution (using the Herfindahl index of the within-party personal vote shares as the dependent variable). The interaction between joining a PEC and party size has a negative effect on vote concentration, indicating that smaller parties within coalitions are the ones whose voters concentrate votes more.²⁰ This might also explain why PECs with asymmetric party size are not commonly observed.

Finally, we analyze the impact of forming a PEC in the assignment of leadership roles at the municipal level. Column (6) in Table 2 shows that coalescing large parties are less likely to obtain the top position in local government: the board chairmanship. This might be a sign of the concessions big parties need to commit to forge coalitions with smaller parties. Finally, column (7) shows instead that coalescing large parties are more likely to obtain the council chairmanship.

²⁰The result is robust to controlling for partners' candidate shares to address endogenous candidate entry (Appendix Table C7).

Robustness Checks

It is possible that political parties that join PECs at some point are different from those that never do so. To alleviate this selection concern, we confirm that our results are robust to only including political parties that are (or have been at some point) part of an electoral coalition in Appendix Table C5. Furthermore, it is possible that there are underlying trends in party popularity that drive both the outcome variables and the propensity to run with joint lists. For instance, if parties form PECs in response to declining popularity, parties might not lose votes because of but despite joining a PEC. We tackle this problem in two ways. The results from these supplementary analyses can be found in Appendix C. We first conduct a validity test in which we rerun our difference-in-differences analyses controlling for party- or municipality-specific linear time trends. This does not alter any of our findings.

However, selection based on sharp and sudden decline in popularity would not be captured by lags or linear time trends. Nonetheless, even in this case, results on the interactions between PEC and other covariates would be valid as they are identified only from within the realized PECs. We also introduce additional control variables that aim at capturing the level of party popularity—namely, the number of candidates per council seats—and its change between two subsequent elections. Introducing these controls in our estimations does not change our conclusions; see Appendix Table C7.

Consequences of Pre-Electoral Coalition Formation: Distribution of Power

We do not seem to find evidence that being part of a PEC brings major electoral benefits to any party. However, there might be effects that are not observed at the individual party level. We conclude our empirical analysis by asking what are the effects of PECs at the municipal level.

By doing so, we tackle our argument that PECs could affect the distribution of power and, most importantly, affect the likelihood of absolute majorities in the council.

We again estimate a difference-in-differences specification, yet now aggregating our data to the municipality-election term level. The regression central to our interest takes the following form:

$$y_{mt} = \gamma PEC_{mt} + \delta_m + \delta_t + \mu_{mt}. \quad (2)$$

PEC_{mt} is now defined as a dummy that is equal to one if there is a PEC in municipality m in election t . δ_m and δ_t are municipality and time fixed effects, respectively, and μ_{mt} is the error term. Our estimation sample covers all municipalities that are observed at least twice.

Do PECs alter the number of parties that obtain representation in the municipality? Do they affect the concentration of the seat distribution in the municipality as captured by the Herfindhal index? Do they influence the seat share of the biggest party in the municipality? Or do they change whether a party obtains an absolute majority of seats? All of these questions help us understand the overall distribution of power in the municipality and whether PECs have an effect on it.

Table 3 presents our results. When parties form PECs, the number of political parties represented in the local council increases by about 0.3 parties (column 1); political power becomes less concentrated (column 2); and, the largest party's seat share decreases thus reducing the concentration of power on the most voted list (column 3). This last effect is rather small, about 0.8 percentage points, but recall that a small decrease could be crucial for some margins—in particular, the absolute majority threshold. Still, we do not find any significant evidence that PECs would make absolute majorities any less likely (column 4).

Detailed Analysis of Close Elections

While the reduction in the maximum seat share is quite small, it could be critical for the largest party to obtain an absolute majority. We start with a graphical illustration of our argument by plotting the distribution of the largest party's seat share in three different scenarios in Figure 3.

Table 3. Effects of PECs at the local government level.

	Parties	Seat concentration	Max. seat share	Absolute majority
	(1)	(2)	(3)	(4)
PEC	0.312*** [0.051]	-136*** [36.6]	-0.785** [0.361]	-0.007 [0.020]
<i>N</i>	1907	1907	1907	1907
Adjusted R^2	0.20	0.13	0.16	0.04
Mean of dependent variable	4.87	3455	48.17	0.40

Notes: Coalition is an indicator variable that gets the value 1 if there is at least one PEC in a municipality, an 0 otherwise. Seat concentration refers to a Herfindahl index of the seat shares of the parties that are represented in the local council. All regressions include year and municipality fixed effects. Standard errors clustered at the municipality level are reported in brackets. *, ** and *** denote statistical significance at 1%, 5% and 10%, respectively.

First, Panel A shows the distribution of the seat share in municipal elections with no coalitions. We see that there is no major jump in the density close to the 50% threshold. Second, in Panel B, we show the distribution for municipalities that have PECs: it exhibits a slightly different shape. There is a downward jump in the density at the cutoff for the largest party obtaining an absolute majority. The graphical evidence strongly points towards PECs sometimes being successfully used to prevent absolute majorities. Third, as a placebo check in Panel C, we consider the municipalities plotted in Panel B and reallocate the seats based on the parties' votes as if there had been no PEC. We then plot the distribution of the largest party seat share and observe no change in the density when we pass the 50% seat share threshold. This suggests that around the 50% threshold, PECs have an impact on whether the party that receives the most votes obtains an absolute majority of seats or not.

We address the possibility that PECs can act as an efficient tool in preventing absolute majorities in close elections formally using a density discontinuity test. We follow an approach typically used in regression discontinuity design settings to test for potential manipulation of the running variable. To operationalize this test, we adapt the testing strategy proposed by Cattaneo, Jansson, and Ma (2018, 2020) by implementing a robust bias-corrected density test. This means

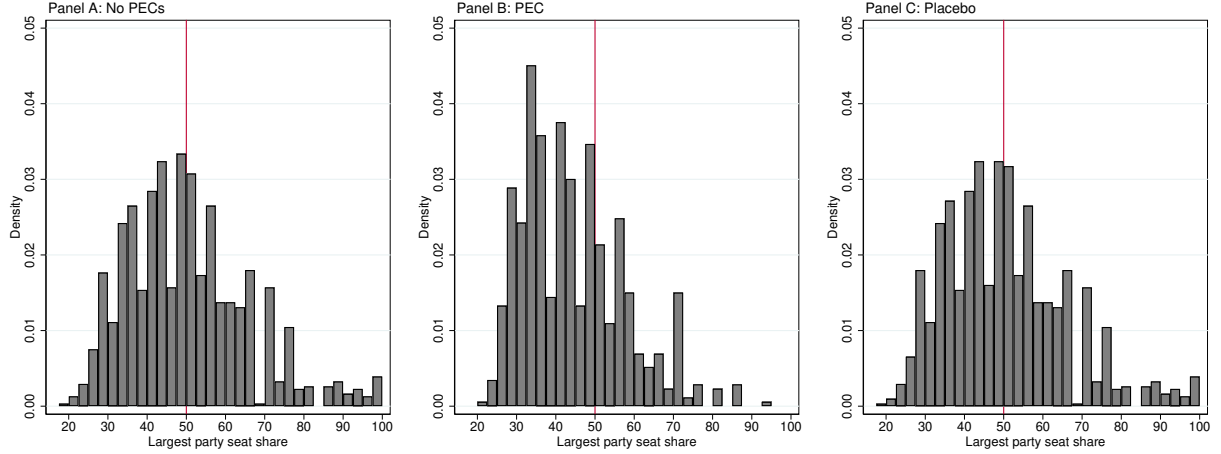


Figure 3. Distribution of largest party's seat share. The figures show histograms of the largest party's seat share. The placebo seat shares in Panel C are calculated by reassigning the seats according to the D'Hondt method, assuming that there were no PECs in municipalities where there actually are PECs.

that we find a local polynomial fit for the density curve on both sides of the threshold and then calculate the jump in density at the cutoff point.

The density test results can be found in Table 4 which reports the density test statistics, associated p -values, as well as a test for a difference in estimated discontinuities. A negative test statistic implies a jump downwards at the cutoff.²¹ We conduct the test using different degrees of polynomials, and we also vary the window around the cutoff point.²² Echoing the graphical

²¹Formally, the test statistic is given by

$$T = \frac{\hat{f}_+(\bar{x}) - \hat{f}_-(\bar{x})}{\sqrt{\hat{\sigma}_+^2 + \hat{\sigma}_-^2}},$$

where $\hat{f}_+(\bar{x})$ and $\hat{f}_-(\bar{x})$ are estimates of the density at the boundary point \bar{x} and $\hat{\sigma}_+^2$ and $\hat{\sigma}_-^2$ are the standard errors of these estimates. Under certain conditions, the finite sample distribution of T can be approximated by the standard normal distribution.

²²We optimize the bandwidths in two alternative ways. We use either MSE-optimal bandwidths that vary on different sides of the cutoff, or restrict the bandwidth to be the same on both sides.

illustration in Figure 3 we find that there is a downward jump in the density of maximum seat share at the 50% cutoff when there are PECs. Most of the density test results in the case of no alliances suggest no statistically significant jump at the threshold. Moreover, the density discontinuity test statistic is usually positive, unlike in the PEC sample. We also report the differences in discontinuities and test whether they are statistically significant. While the differences always have an expected (negative) sign, they are significant only for two of the specifications.

We then construct a placebo distribution of the largest party seat shares. We do so by taking municipalities that had PECs but distribute the seats according to the D'Hondt rule as if there were no alliances. The placebo distribution shows no hints of discontinuities close to the absolute majority threshold, as we verify more formally in Appendix C. This suggests that these PECs were able to prevent absolute majorities. As a further validity check, we explore covariate smoothness at the 50% seat share cutoff. We report and discuss these results in detail in Appendix C (see Appendix Table C10).

We summarize the key conclusion from the density discontinuity test graphically in Figure 4. The graph shows a non-parametric density fit under three scenarios: when there are no PECs (Panel A), when at least one PEC has been formed (Panel B), and a placebo test where we take data from the municipalities with PECs but redistribute the seats assuming that there were no alliances (Panel C). There is no jump at the cutoff when there are no PECs or when we look at the placebo distribution, but the density has a downward jump at the 50% seat share cutoff in municipalities that do have PECs.

Table 4. Density discontinuity test results.

Panel A: Separate bandwidths for each side										
	PEC				No PEC				Difference in	
	$\hat{h}_-(N_-)$	$\hat{h}_+(N_+)$	T	p	$\hat{h}_-(N_-)$	$\hat{h}_+(N_+)$	T	p	discontinuities	p
$T_2(\hat{h}_1)$	3.660 (70)	2.603 (37)	-1.308	0.191	4.381 (150)	3.460 (129)	-2.251	0.024	-0.012	0.832
$T_3(\hat{h}_2)$	6.947 (107)	9.017 (112)	-3.331	0.001	9.761 (325)	7.739 (228)	1.892	0.059	-0.146	0.000
$T_4(\hat{h}_3)$	12.442 (225)	14.116 (142)	-2.612	0.009	10.378 (336)	11.278 (280)	0.266	0.791	-0.082	0.049

Panel B: Same bandwidth for both sides										
	PEC				No PEC				Difference in	
	$\hat{h}_-(N_-)$	$\hat{h}_+(N_+)$	T	p	$\hat{h}_-(N_-)$	$\hat{h}_+(N_+)$	T	p	discontinuities	p
$T_2(\hat{h}_1)$	7.330 (135)	7.330 (99)	-1.442	0.149	4.381 (150)	4.381 (147)	0.2641	0.792	-0.020	0.351
$T_3(\hat{h}_2)$	6.879 (107)	6.879 (74)	-0.981	0.327	7.739 (249)	7.739 (228)	0.1912	0.848	-0.043	0.350
$T_4(\hat{h}_3)$	14.116 (277)	14.116 (142)	-1.165	0.244	10.378 (336)	10.378 (278)	0.2402	0.810	-0.038	0.347

Notes: The density test is conducted using `rddensity` package in Stata. $T_p(h)$ denotes the manipulation test statistic using p th order density estimators with bandwidth choice $h = (h_-, h_+)$. We employ uniform weighting (rectangular kernels) and vary the degree of local polynomials used. Moreover, we use two alternative ways to compute the optimal bandwidths \hat{h}_p . In Panel A, we use different bandwidths on different sides of the cutoff (bandwidth selection procedure `comb`), and the same bandwidth on both sides of the cutoff in Panel B (bandwidth selection procedure `sum`). N_- (N_+) is the effective number of observations on the left-hand (right-hand) side of the cutoff.

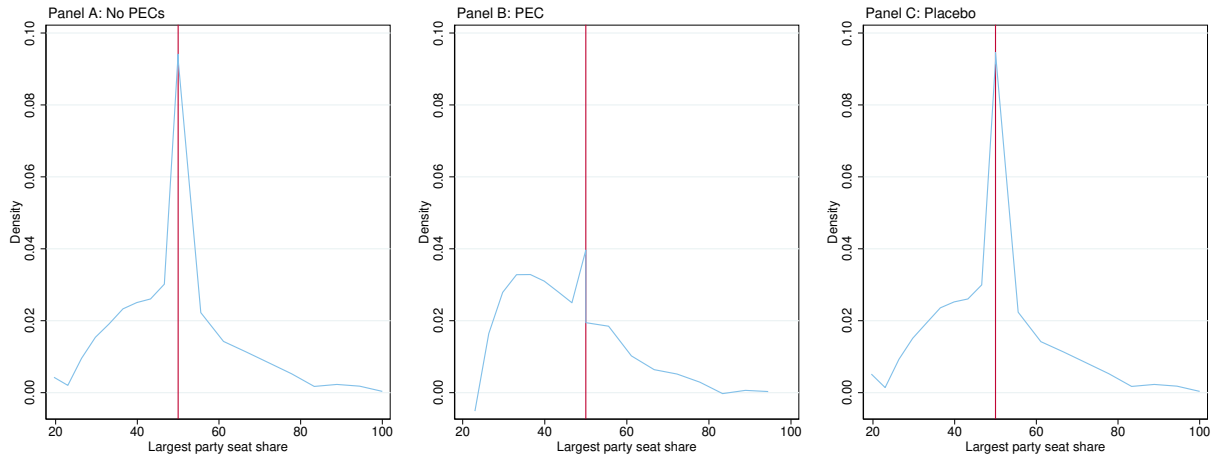


Figure 4. Graphical illustration of the density discontinuity test. The figures show fitted distributions of the largest party's seat share following the approach proposed by Cattaneo, Jansson, and Ma (2018, 2020). The placebo seat shares in Panel C are calculated assuming that there were no PECs in municipalities where there actually are.

Reality Check: Lessons from Dyadic Data

A different way to look at our data is by assessing which party characteristics are most conducive to PECs. This analysis serves as an important reality check. The results thus far suggest that an important goal of PECs is to exploit “electoral returns to scale” and prevent the largest party from obtaining an absolute majority. We have also shown that PECs lead to a more concentrated within-party vote distribution, especially among smaller parties. However, we could still learn more about the characteristics of coalescing partners. We examine this in Appendix D. Echoing the results that we have shown thus far, we find that coalitions are formed to maximize the probability of obtaining an absolute majorities of seats, parties avoid asymmetric coalitions, and ideologically distant parties are less likely to coalesce.

Discussion and Concluding Remarks

In this paper, we study the logic of PEC formation and their effects. We begin by analyzing the process descriptively, but more importantly, we then provide some of the first causal evidence of the direct benefits and costs of forming PECs for political parties. The two parts of our analysis are like two matching pieces of a puzzle. First, the descriptive analyses reveal that PECs are more likely to occur (possibly to signal the intention for future cooperation) when there are more parties in an election. Analyzing the causal effects of PECs at the level of local governments shows that they, indeed, shape the distribution of political power and influence which parties govern. Second, we find evidence suggesting that parties are more likely to coalesce in more disproportional electoral environments. Looking at the vote and seat share effects of PECs helps us understand why. Third, the expected coalition size and size asymmetry matter as well. The party-level results offer a rationale for why parties avoid asymmetric coalitions: they are more prone to strategic voting. Fourth, our analysis of the dyadic data shows that PECs are less likely

when parties are ideologically distant from each other. Additionally, the difference-in-differences results show that parties that join ideologically heterogeneous coalitions get punished by voters.

Taken together, our results indicate that coalition formation is not driven by purely vote-seeking motivations. Policy motivations appear to be more prevalent than the motivation to gain office, at least in part, because ideological proximity is an important determinant of PECs. Furthermore, PECs do not have a large impact on seat shares. Most importantly, we find that PECs prevent absolute majorities from forming. That is, PECs affect the overall distribution of power.

Our analysis has important lessons when thinking about party boundaries. The incentives created by the electoral rules and voter responses are similar in both cases. Moreover, given that PECs are a very light version of collaboration, our results can be seen as a lower bound when compared to more intense and formal coalitions, party mergers, and party formation. For example, we can conjecture based on our results that voter ideology and electoral rules combine to create natural boundaries for the parties (Grofman 2008; Matakos et al. 2018). Moreover, party formateurs are likely to consider how increasing or decreasing party boundaries affect the overall distribution of political power, not only the expected individual vote shares. Thus, our analysis can provide important insights on what parties and party systems actually are, the performance of alternative electoral systems, and their implications for representation and voter satisfaction with democratic institutions. These are relevant questions especially in light of growing discontent with democratic politics around the world in recent years.

Different motivations of coalition formation are, of course, not mutually exclusive. But there may be important trade-offs as suggested by Strøm (1990). Quantifying these trade-offs should help to shed further light on party behavior (Helboe Pedersen 2012). Some authors have argued that policy-seeking parties are more likely to form coalitions (Ibenskas 2015; Kellam 2017; Wahman 2011). Assessing these type of questions using a structural econometric approach could be an interesting avenue for future research. Such approaches have already been used to understand post-electoral coalitions (Diermeier, Eraslan, and Merlo 2003). Some steps in this direction in the

study of PECs have also been taken by Montero (2016) and Frey, López-Moctezuma, and Montero (2018).

Besides offering insights into the boundaries of political parties, our results can be useful for policy-making. Whether PECs should be allowed or not has been debated throughout the world. For instance, countries such as Estonia and Holland ban formal pre-electoral agreements. One argument against electoral coalitions has been that they may distort the electoral result and policies away from citizens' preferences. However, our paper indicates that PECs give parties an opportunity to guarantee a broader substantive representation of citizens' policy preferences, by preventing absolute majorities. However, PECs may play a different role in different electoral systems. We thus end with a call for more comparative research on the effects of different types of PECs across different electoral contexts.

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Pre-Electoral Coalitions: Insights into the Boundaries of Political Parties

Online Appendix

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A Descriptive Statistics

Our data set, obtained from the Ministry of Justice, covers all local elections held between years 1996 and 2012. We report the summary statistics on our data in Table A1. Panel A focuses on the party-level data. Around 16% of the parties are part of an electoral coalition. We see that the parties that are part of an electoral alliance are smaller both before and after the election than parties that do not belong to an pre-electoral coalition. Furthermore, they have more concentrated within-party vote shares, as measured by the Herfindahl index.

Using the party-level data, we construct a data set of all possible two-party dyads to study what parties are more likely to coalesce with each other. These data are summarized in Panel B. Out of around 30,000 potential coalition pairs, only about 4% become actual coalitions. Coalitions are more likely to actualize when parties are ideologically closer to each other. Furthermore, coalitions that are expected to be larger are less likely to form. Asymmetry of the party size does not appear to play a major role.

We also use data that are collapsed to the municipality level. We report the descriptive statistics for our municipality-level data in Panel C. These data are composed of 1,914 municipality-year observations. In 692 cases, some kind of electoral alliance has been formed.

Table A1. Summary statistics

	Full sample			Parties in PECs			Parties not in PECs		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Panel A: Party-level data									
Electoral alliance	11063	0.16	0.36	1741	1.00	0.00	9322	0.00	0.00
Vote share	11063	16.72	16.50	1741	12.27	14.78	9322	17.55	16.68
Seat share	11063	16.76	17.83	1741	12.54	15.58	9322	17.54	18.11
Herfindahl (within-party vote shares)	11063	26.08	27.15	1741	36.96	31.29	9322	24.04	25.80
Board chairman	8627	0.17	0.37	1252	0.13	0.34	7375	0.17	0.38
Council chairman	8627	0.17	0.38	1252	0.13	0.34	7375	0.18	0.38
Seat share (t-1)	8627	16.37	18.05	1252	12.16	15.52	7375	17.08	18.35
Panel B: Dyad-level data									
	Full sample			Actualized PECs			Non-actualized PECs		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Actualized PEC	29939	0.04	0.19	1134	1.00	0.00	28805	0.00	0.00
Difference in ideology	28381	1.41	0.88	1040	0.71	0.52	27341	1.44	0.88
Expected size	23499	29.03	21.82	777	22.76	17.96	22722	29.25	21.90
Asymmetry	23499	0.63	0.35	777	0.62	0.37	21556	0.63	0.35
Panel C: Municipality-level data									
	Full sample			PECs			No PECs		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
PEC in municipality	1914	0.36	0.48	692	1.00	0.00	1222	0.00	0.00
Number of represented parties	1914	4.86	1.42	692	5.42	1.29	1222	4.54	1.38
Seat share Herfindahl index	1914	3460.05	1377.66	692	3087.82	1084.38	1222	3670.84	1478.22
Max. seat share	1914	48.21	15.00	692	44.48	13.07	1222	50.33	15.61
Absolute majority	1914	0.40	0.49	692	0.30	0.46	1222	0.46	0.50
Number of parties in election	1914	5.78	1.92	692	6.63	2.00	1222	5.30	1.69
Disproportionality	1442	0.86	0.14	501	0.89	0.10	941	0.84	0.15
Polarization	1886	3.08	1.19	688	3.28	1.31	1198	2.97	1.10

B Measuring Party Ideology

We measure party ideology using so-called voting aid application data from the Finnish public broadcasting company *Yle*. Voting aid applications are interactive questionnaires, the purpose of which is to assist voters in finding a candidate with similar policy preferences to theirs. Candidates fill out the survey before elections, after which voters can take the same survey to find a suitable candidate. The voting aid applications include a number of claims mostly related to the size of the public sector and redistribution, such as: “Privatizing public services makes them more efficient and saves money” and “We have paid too little attention to marginalization of children and teenagers”. A stronger agreement with the first claim is associated with a more right-leaning ideology, whereas the stronger agreement with the latter two claims is related to a more liberal ideology. Overall, the data contain seventeen claims. The candidates would give their answers on a 1-5 scale (from “completely disagree” to “completely agree” where the middle option was “I do not agree or disagree”).

We employ a principal component analysis to compress the survey responses into a single measure of economic policy preferences. This is a commonly used approach to extract a one-dimensional measure of ideology from survey data (Ansolabehere, Snyder, and Stewart 2001; Heckman and Snyder 1997). See also Matakos et al. (2019) for further information and as an example of another study using these data. The first principal component captures the left-right dimension of economic ideology and explains about 15% of the variation in the data. We focus on this dimension of ideology, as it is more central for decision-making in local governments.

Table B1 reports results of the principal component analysis alongside with the questions included in our data. Claims where a stronger agreement implies more right-wing attitudes get larger positive values, whereas the opposite is true for claims where a stronger agreement is in line with more left-wing preferences. We multiply the resulting principal component by minus one in order to have a smaller score for left-wing parties. That is to say, the resulting ideology measure is the smaller the more liberal is a candidate. Table B2 reports summary statistics by party.

Table B1. PCA results.

	Loading	Mean	Standard deviation
Q1. The elderly should have a universal right to a retirement home similar to one enjoyed now by children and daycare.	-0.12	0.82	1.01
Q2. Privatizing public services makes them more efficient and saves money.	0.35	2.58	1.17
Q3. We can increase the user fees for public health care services.	0.32	2.62	1.24
Q4. Our municipality should take in refugees arriving in Finland.	-0.30	1.47	1.27
Q5. If one of the parents is at home, the right for public day care to children should be limited.	0.37	1.74	1.33
Q6. We have paid too little attention to marginalization of children and teenagers.	-0.09	1.38	1.17
Q7. It is too easy to obtain welfare benefits nowadays.	0.42	2.46	1.13
Q8. It should be possible to recycle trash in the public trash cans in my municipality.	-0.14	0.69	1.01
Q9. Our municipality should invest more in the maintenance of roads.	0.08	1.38	1.15
Q10. We should compromise on environmental protection if it can improve employment or citizens' welfare.	0.29	2.75	1.18
Q11. There is room for increasing the property tax in our municipality.	-0.14	2.54	1.19
Q12. If our municipality is planning to have a municipal merger, there should be an advisory referendum	-0.10	1.09	1.34
Q13. The voting age in the local elections should be decreased to 16 years.	-0.09	2.35	1.45
Q14. The user fees for local public services should be made higher for people with higher income.	-0.07	2.08	1.32
Q15. Members of the national parliament should not become candidates in local elections.	0.05	2.32	1.44
Q16. The five-year long dismissal period for the municipal employees in conjunction with municipal mergers is too long.	0.37	1.57	1.42
Q17. Public employees should not be allowed to be members of the municipal board.	0.25	1.92	1.45
Eigenvalue	2.54		
Proportion	0.15		

Table B2. Ideology by party.

	<i>N</i>	Mean	Std. dev.
Left Alliance	3301	-1.51	1.30
Green Party	3204	-1.06	1.11
Social Democratic Party	6521	-0.72	1.23
Christian Democratic Party	1852	0.05	1.18
Swedish Party	1477	0.17	1.33
Center Party	8887	0.42	1.21
True Finns	2585	0.54	1.28
National Coalition Party	8598	1.00	1.27

C Robustness and Validity Checks

This appendix contains a number of auxiliary robustness and validity checks.

C.1 Further Tests of the Disproportionality and Signaling Hypotheses

We use a linear probability model to empirically assess the disproportionality and signaling hypotheses. However, our results are robust to using non-linear probit and logit models that taken into account the binary nature of the dependent variable (see Tables C1 and C2).

In the main text, we measure disproportionality of the local electoral environment with the modified Gallagher index. Table C3 presents regression results where we measure disproportionality with the effective threshold instead. Columns (1) and (3) do not suggest that there is a relationship between PEC formation and electoral system disproportionality. If anything, there is an inverse relationship between disproportionality and PEC formation when there are very few parties (column 2). As the number of parties increases, this negative relationship gets diluted. Other than that, the regression results echo those that we report in the main text.

We present results from a specification with municipality and year fixed effects which allow us to hold all time-invariant municipality-level characteristics and time-specific common shocks constant in Table C4. Given that many features of the local political context are rather persistent, including municipality fixed effects leaves us with considerably less identifying variation. Indeed, while we still find a strong relationship between the presence of PECs and the number of political parties, the result we have for disproportionality vanishes.

Table C1. Testing disproportionality and signaling hypotheses (probit model).

	(1)	(2)	(3)	(4)
Number of parties	0.221*** [0.026]	0.583*** [0.183]	0.237*** [0.035]	0.232*** [0.026]
Disproportionality	1.480*** [0.336]	3.422*** [0.974]	1.421*** [0.359]	2.360*** [0.467]
Polarisation	-0.073 [0.048]	-0.058 [0.047]	0.020 [0.153]	1.833*** [0.654]
Number of parties × Disproportionality		-0.394** [0.193]		
Number of parties × Polarisation			-0.013 [0.019]	
Disproportionality × Polarisation				-2.021*** [0.687]
<i>N</i>	1884	1884	1884	1884
Pseudo- <i>R</i> ²	0.09	0.10	0.09	0.10

Notes: The dependent variable is an indicator for at least two parties forming a PEC. Standard errors clustered at the municipality level are reported in brackets. The estimation sample only includes municipalities that have at least three political parties. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Table C2. Testing disproportionality and signaling hypotheses (logit model).

	(1)	(2)	(3)	(4)
Number of parties	0.360*** [0.045]	0.978*** [0.313]	0.382*** [0.059]	0.376*** [0.045]
Disproportionality	2.497*** [0.588]	5.892*** [1.706]	2.416*** [0.628]	4.109*** [0.859]
Polarisation	-0.120 [0.079]	-0.096 [0.078]	0.008 [0.260]	3.143*** [1.135]
Number of parties × Disproportionality		-0.675** [0.330]		
Number of parties × Polarisation			-0.018 [0.032]	
Disproportionality × Polarisation				-3.457*** [1.192]
<i>N</i>	1884	1884	1884	1884
Pseudo- <i>R</i> ²	0.09	0.09	0.09	0.10

Notes: The dependent variable is an indicator for at least two parties forming a PEC. Standard errors clustered at the municipality level are reported in brackets. The estimation sample only includes municipalities that have at least three political parties. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Table C3. Testing disproportionality and signaling hypotheses (alternative measurement of disproportionality).

	(1)	(2)	(3)
Number of parties	7.814*** [1.045]	4.500*** [1.493]	7.850*** [1.045]
Effective threshold	-1.546 [2.404]	-10.299*** [3.641]	-3.324 [2.773]
Polarisation	0.322 [1.567]	-0.394 [1.624]	-3.908 [3.819]
Number of parties × Effective threshold		1.818*** [0.631]	
Effective threshold × Polarisation			1.694 [1.400]
<i>N</i>	1884	1884	1884
<i>R</i> ²	0.10	0.11	0.11

Notes: The dependent variable is an indicator for at least two parties forming a PEC, multiplied by 100. Standard errors clustered at the municipality level are reported in brackets. The estimation sample only includes municipalities that have at least three political parties. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Table C4. Testing disproportionality and signaling hypotheses (fixed effects included).

	(1)	(2)	(3)	(4)
Number of parties	11.270*** [1.610]	13.579** [5.710]	12.011*** [1.800]	11.260*** [1.622]
Disproportionality	3.960 [7.882]	15.008 [24.324]	-0.401 [8.725]	17.837* [9.105]
Polarisation	-2.007 [1.476]	-1.881 [1.521]	3.915 [3.900]	44.804* [23.115]
Number of parties × Disproportionality		-2.515 [5.892]		
Number of parties × Polarisation			-0.775 [0.474]	
Disproportionality × Polarisation				-49.117** [24.044]
<i>N</i>	1871	1871	1871	1871
<i>R</i> ²	0.62	0.62	0.62	0.62

Notes: The dependent variable is an indicator for at least two parties forming a PEC, multiplied by 100. Standard errors clustered at the municipality level are reported in brackets. The estimation sample only includes municipalities that have at least three political parties. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

C.2 Additional Difference-in-Differences Results

This subsection presents additional difference-in-differences results. We start by visualising the interaction effects in Figures C1 and C2.

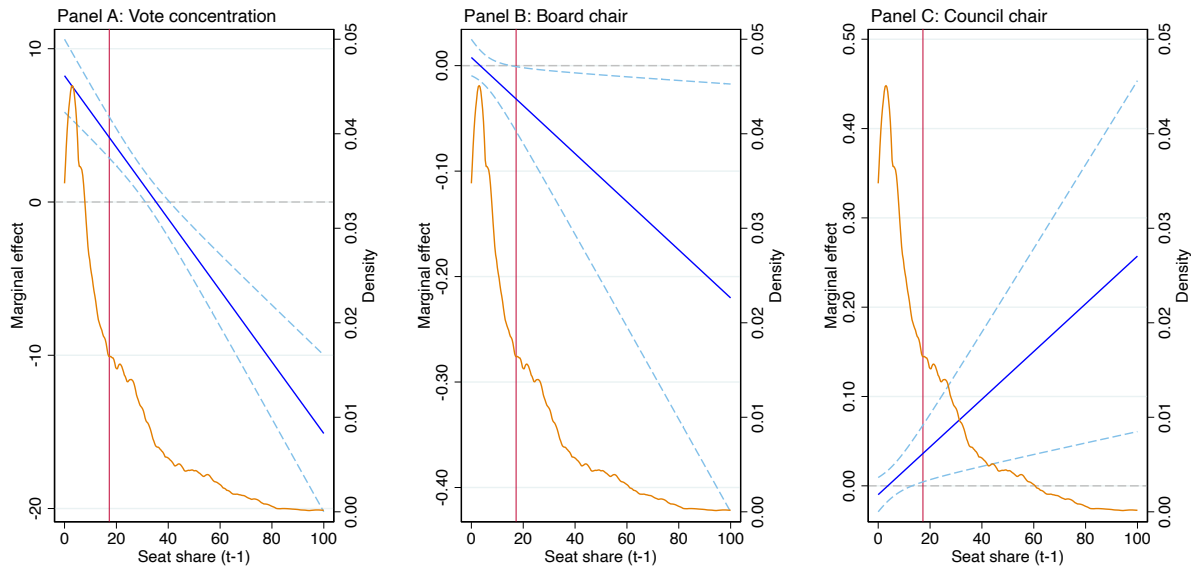
We have also re-estimated our party-level specification only using a sample of parties that belong to a PEC at least once during the time period included in our data. This allows us to address the caveat that parties that join a PEC at least once may be very different from those that never join a PEC. These regression results are presented in Table C5. The results remain mostly unchanged. Joining a PEC leads to a lower vote share (column 1), and the effect is driven by parties that join more ideologically dispersed PECs (column 2). This negative effect carries on to seat shares (columns 3 and 4). Becoming a part of a PEC also leads to a more concentrated vote distribution (5). Finally, there is no statistically significant evidence that joining a PEC would matter for post-electoral bargaining outcomes (columns 6 and 7). Qualitatively, the point estimates suggest that parties that are part of a PEC become more likely to acquire the board chairmanship and less likely to get to nominate the council chairperson.

We then rerun our regressions including group-specific linear time trends. Note that the estimation sample differs slightly from that used in our main text, as we can now only include parties that are observed at least three times. Table C6 shows that the party-level results remain unchanged. Coalition formation appears to influence vote shares negatively, and this effect is larger when the coalition is ideologically dispersed. However, the regression coefficients are not statistically significant (columns 1 and 2). We do not see any effects on seat shares (columns 3 and 4). Even when controlling for the trends, we find that coalition may induce strategic voting that is more prevalent among smaller parties (column 5). Finally, we show suggestive evidence that smaller parties become more likely to acquire the board chairmanship after joining a PEC in column 6, while the opposite is true in the case of council chairmanship (column 7).

Moreover, we introduce additional control variables that aim at capturing the level of party popularity—namely, the number of candidates per council seats—and its change between two

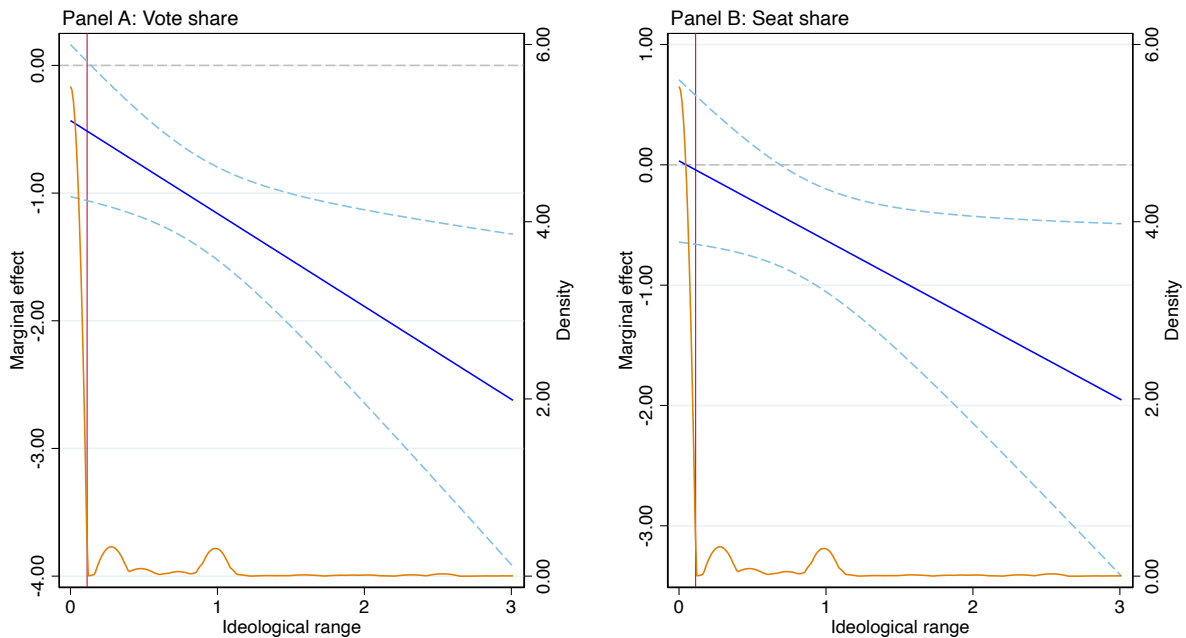
subsequent elections. Introducing these controls in our estimations does not change our conclusions; see Table C7.

We then turn into assessing the robustness of the municipality-level difference-in-differences analyses. In Table C8, we can see that the positive effect on the number of parties persists after controlling for the municipality-specific linear time trends (column 1). Seat shares also become less concentrated, and this effect is statistically significant (column 2). We lose the statistical significance of our point estimates in column 3 where we show the effect on the largest party's seat share, but the magnitude of the point estimate remains very stable. Finally, we do not see any clear effect on there being an absolute majority (column 4).



Notes: Vertical lines mark the average number of candidates per seat. Dashed lines are 95% confidence intervals. We also show the distribution of the moderator (lagged party seat share)

Figure C1. Interaction effects of pre-electoral coalition and party size.



Notes: Vertical lines mark the average number of candidates per seat. Dashed lines are 95% confidence intervals. We also show the distribution of the moderator (ideological distance)

Figure C2. Interaction effects of pre-electoral coalition and ideological distance.

Table C5. Party-level difference-in-differences results (sample of parties that coalesce at least once).

	Vote share		Seat share		Vote concentration	Board chair	Council chair
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PEC	-0.663*** [0.186]	0.139 [0.340]	-0.164 [0.223]	0.567 [0.389]	7.527*** [1.226]	0.006 [0.010]	-0.009 [0.011]
Seat share (t-1)	0.195*** [0.034]	0.197*** [0.034]	0.135*** [0.040]	0.137*** [0.040]	-0.461*** [0.099]	0.001 [0.003]	0.003 [0.002]
PEC × Ideological range		-0.989*** [0.334]		-0.900** [0.375]			
PEC × Seat share (t-1)					-0.232*** [0.038]	-0.002** [0.001]	0.003*** [0.001]
<i>N</i>	2189	2182	2189	2182	2189	2189	2189
Adjusted <i>R</i> ²	0.95	0.95	0.94	0.94	0.73	0.65	0.59
Mean of dependent variable	14.25	14.29	14.29	14.33	27.30	0.15	0.15

Notes: Vote and seat shares are measured in percentages. Chairmanship is an indicator variable that gets the value one if the party holds either board or council chairmanship (or both). The dependent variable in column (6) is Herfindahl index of within-party vote share concentration. Regressions control for the number of candidates relative to the council size, and year and party group fixed effects. Standard errors clustered at the party group level are reported in brackets. *, ** and *** denote statistical significance at 1%, 5% and 10%, respectively.

Table C6. Party-level difference-in-differences results (controlling for party-specific time trends).

	Vote share		Seat share		Vote concentration	Board chair	Council chair
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PEC	-0.365 [0.231]	0.076 [0.399]	0.192 [0.269]	0.554 [0.460]	5.877*** [1.856]	0.015 [0.014]	-0.004 [0.012]
Seat share (t-1)	-0.236*** [0.024]	-0.235*** [0.024]	-0.355*** [0.026]	-0.354*** [0.026]	-0.046 [0.057]	-0.005** [0.002]	-0.003* [0.002]
PEC × Ideological distance		-0.538 [0.407]		-0.442 [0.461]			
PEC × Seat share (t-1)					-0.155*** [0.055]	-0.004*** [0.002]	0.002 [0.001]
<i>N</i>	8081	8072	8081	8072	8081	8081	8081
Adjusted <i>R</i> ²	0.98	0.98	0.97	0.97	0.86	0.69	0.68
Mean of dependent variable	17.31	17.32	17.40	17.42	23.81	0.17	0.18

Notes: Vote and seat shares are measured in percentages. Chairmanship is an indicator variable that gets the value one if the party holds either board or council chairmanship (or both). The dependent variable in column (6) is Herfindahl index of within-party vote share concentration. Regressions control for the number of candidates relative to the council size, and year and party group fixed effects. Standard errors clustered at the party group level are reported in brackets. *, ** and *** denote statistical significance at 1%, 5% and 10%, respectively.

Table C7. Party-level difference-in-differences results (controlling for additional covariates).

	Vote share		Seat share		Vote concentration	Board chair	Council chair
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PEC	-0.317** [0.160]	0.113 [0.259]	0.225 [0.197]	0.603** [0.305]	6.435*** [1.129]	0.019* [0.010]	0.002 [0.011]
Seat share (t-1)	0.092*** [0.016]	0.093*** [0.016]	0.039** [0.018]	0.040** [0.018]	-0.195*** [0.037]	0.002 [0.001]	0.002 [0.001]
Candidates/Council seats	12.591*** [0.642]	12.585*** [0.643]	13.872*** [0.703]	13.868*** [0.704]	-27.452*** [1.620]	0.104** [0.042]	0.141*** [0.046]
Change in candidates/Council seats	1.391*** [0.407]	1.380*** [0.407]	0.987** [0.463]	0.978** [0.463]	-4.101*** [0.911]	0.039 [0.032]	0.015 [0.034]
PEC × Ideological range		-0.545** [0.265]		-0.477 [0.300]			
PEC × Seat share (t-1)					-0.190*** [0.036]	-0.003** [0.001]	0.002** [0.001]
<i>N</i>	7459	7450	7459	7450	7459	7459	7459
Adjusted <i>R</i> ²	0.97	0.97	0.97	0.97	0.79	0.67	0.63
Mean of dependent variable	18.29	18.31	18.46	18.48	21.34	0.19	0.19

Notes: Vote and seat shares are measured in percentages. Chairmanship is an indicator variable that gets the value one if the party holds either board or council chairmanship (or both). The dependent variable in column (6) is Herfindahl index of within-party vote share concentration. Regressions control for the number of candidates relative to the council size, and year and party group fixed effects. Standard errors clustered at the party group level are reported in brackets. *, ** and *** denote statistical significance at 1%, 5% and 10%, respectively.

Table C8. Municipality-level results controlling for municipality-specific time trends.

	Parties	Seat concentration	Max. seat share	Absolute majority
	(1)	(2)	(3)	(4)
PEC	0.201*** [0.067]	-127.274*** [47.040]	-0.782* [0.473]	-0.020 [0.026]
<i>N</i>	1859	1859	1859	1859
Adjusted <i>R</i> ²	0.31	0.38	0.38	0.25
Mean of dependent variable	4.87	3454.01	48.13	0.40

Notes: Coalition is an indicator variable that gets the value 1 if there is at least one electoral alliance in a municipality, an 0 otherwise. Herfindahl refers to a Herfindahl index of the seat shares of the parties that are represented in the local council. All regressions include year and municipality fixed effects. Standard errors clustered at the municipality level are reported in brackets. *, ** and *** denote statistical significance at 1%, 5% and 10%, respectively.

C.3 Placebo Density Test

We provide more detailed results for the placebo density test in Table C9. As in the main text, we conduct the test following Cattaneo, Jansson, and Ma (2020). We construct the placebo seat shares using the data from municipalities that had PECs. We use the D'Hondt rule and redistribute the seats as if there were no PECs. There appear to be no jumps at the cutoff, as there should not be. This gives further support for our claim that coalitions among smaller parties may indeed prevent the largest party from obtaining an absolute majority when the election is very close.

Table C9. Placebo density test results.

Panel A: Separate bandwidths				
	$\hat{h}_- (N_-)$	$\hat{h}_+ (N_+)$	T	p
$T_2(\hat{h}_1)$	2.752 (54)	2.801 (36)	-0.786	0.432
$T_3(\hat{h}_2)$	6.167 (111)	6.531 (81)	-1.342	0.180
$T_4(\hat{h}_3)$	10.739 (198)	10.891 (129)	-0.446	0.655
Panel B: Same bandwidth on both sides				
	$\hat{h}_- (N_-)$	$\hat{h}_+ (N_+)$	T	p
$T_2(\hat{h}_1)$	4.603 (148)	4.603 (150)	0.476	0.634
$T_3(\hat{h}_2)$	7.673 (247)	7.673 (231)	0.371	0.711
$T_4(\hat{h}_3)$	10.243 (334)	10.243 (281)	0.434	0.664

Notes: The density test is conducted using `rddensity` package in Stata. $T_p(h)$ denotes the manipulation test statistic using p th order density estimators with bandwidth choice $h = (h_-, h_+)$. We employ uniform weighting (rectangular kernels) and vary the degree of local polynomials used. Moreover, we use two alternative ways to compute the optimal bandwidths \hat{h}_p . In Panel A, we use different bandwidths on different sides of the cutoff (bandwidth selection procedure `comb`), and the same bandwidth on both sides of the cutoff in Panel B (bandwidth selection procedure `sum`). N_- (N_+) is the effective number of observations on the left-hand (right-hand) side of the cutoff.

C.4 Covariate Smoothness

In this section, we present RD estimates on different covariates to explore if there is something special about the 50% maximum seat share threshold. We estimate the following specification:

$$y_{m,t-1} = \alpha + \beta 1[\textit{Seat share margin}_{mt} > 0] + f(\textit{Seat share margin}_{mt}) + \varepsilon_{mt}. \quad (1)$$

Here, *Seat share margin_{mt}* is the distance between largest party's seat share and in municipality *m* at time *t*. The treatment of interest is an indicator variable for the largest party having an absolute majority. We run local linear regressions within MSE-optimal bandwidths, and allow for different slopes on different sides of the threshold. Besides the conventional estimation, we follow the robust bias-corrected approach proposed by Calonico, Cattaneo, and Titiunik (2014). Effectively, this means that we fit a second-order polynomial within the optimal bandwidth for the local linear specification. We run the covariate smoothness test for seven different pre-treatment covariates, $y_{m,t-1}$.

Table C10 shows the RDD estimates. In Panel A, we use data from municipal elections that do not have any PECs. There is no robust evidence that any of the covariates would systematically have jumps at the 50% seat share cutoff. Panel B shows regression results using data from municipalities that had at least one PEC. The point estimates are again convincing that there are no discontinuities in predetermined covariates. As we are interested in the difference in discontinuities, what is perhaps even more important in our setting is that there appear to be no massive differences between the estimates for municipalities with and without PECs. Finally, Panel C shows the RDD estimates using a placebo running variable: largest party's seat share that has been computed assuming that there are no PECs. The results from this placebo analysis are again good news for us. We do not detect any robust evidence of discontinuities at the threshold.

This analysis comes with the caveat that the largest party seat share does not satisfy the requirements of a proper regression discontinuity design; the running variable ought to be continuous. For instance, Meriläinen (2019) discusses this issue further.

Table C10. Covariate smoothness.

	Coalitions	Council parties	Herfindahl	Max. seat share	Absolute majority	Council size	Election parties
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: No PECs							
Conventional	-0.220 [0.206]	-0.416* [0.251]	125.223 [148.582]	1.168 [1.386]	0.305** [0.135]	-1.774 [2.716]	-0.894 [0.616]
Robust	-0.230 [0.591]	-0.186 [0.766]	29.715 [353.387]	2.257 [2.794]	0.652 [0.413]	-9.981* [5.310]	-3.350 [2.126]
<i>N</i>	223	372	415	480	281	297	269
Bandwidth	5.00	7.30	9.21	10.30	6.39	4.33	4.04
Panel B: PEC							
Conventional	-0.132 [0.151]	-0.057 [0.823]	33.444 [360.903]	-3.136 [4.324]	-0.100 [0.282]	-7.188 [4.550]	-0.894 [0.616]
Robust	-0.053 [0.343]	0.811 [2.130]	-266.435 [901.881]	-17.121 [16.863]	-0.006 [0.823]	-1.083 [2.711]	-3.350 [2.126]
<i>N</i>	162	121	96	82	97	138	269
Bandwidth	7.60	5.57	4.86	4.15	5.32	4.63	4.04
Panel C: Placebo							
Conventional	-0.153 [0.155]	-0.945* [0.505]	-37.714 [214.169]	0.385 [2.054]	0.005 [0.174]	-3.137 [3.610]	-0.714 [0.617]
Robust	-0.369 [0.324]	-1.412 [1.201]	-703.013 [618.728]	-2.398 [5.131]	-0.111 [0.441]	-0.332 [6.474]	-3.200 [2.113]
<i>N</i>	168	134	134	134	167	192	270
Bandwidth	7.82	6.06	6.78	6.45	7.18	6.23	4.18

Notes: The dependent variables in columns (1)-(6) are lagged. The table shows estimates from a local linear regression. We use a triangular kernel and MSE-optimal bandwidths. The optimal bandwidths have been estimated adjusting for clustering at the municipality level. For the bias-corrected specification, we use the same bandwidth for main and bias correction estimation. Standard errors clustered at the municipality are reported in brackets. *, ** and *** denote statistical significance at 1%, 5% and 10%, respectively.

D Lessons from Dyadic Data

This appendix discusses the lessons we can draw when we use dyadic data. We also describe these data and our variables in detail before proceeding to the analysis.

D.1 Dyadic Data and Variables

Using the party-level data, we construct all possible two-party combinations to study what kind of parties are more likely to coalesce with each other. Overall, there are almost 30,000 potential coalition pairs, and only around 1,100 become actual PECs. Focusing on two-party cases seems reasonable, as PECs are usually small, measured by the number of parties involved. Out of 794 PECs in our data set, 672 involve two parties, 96 three parties and 22 four or more parties. The largest electoral coalition we observe is formed by six parties.¹ Most typical alliances are formed between the Center Party and the Christian Democratic Party (235 instances), the National Coalition Party and the Christian Democratic Party (104 instances), and the Social Democrats and the Left Alliance (85 instances).

For each pair of parties we define *Coalition size* as the sum of parties' lagged seat shares. If a party did not run in $t - 1$, its size is coded as zero. Variable *Asymmetry* captures the asymmetry amongst coalition partners, i.e. the absolute value of the difference in party sizes divided by the sum of party sizes. We code this variable as zero if both parties had zero seats in the previous election. The resulting metric varies between zero and one, a higher value reflecting a more asymmetric coalition.

¹Parties that form coalitions with more than two parties are accounted for multiple times in our data. Analysing specifically larger coalitions would explode the number of potential coalitions and lead to unstable very rare events analysis. The drawback is that we do not learn whether larger coalitions are formed with different logic than two-partner coalitions.

The dummy variable *Majority* is equal to one if both parties would expect to obtain an absolute majority based on their past seat shares. This allows us to test the hypothesis that asymmetric coalitions may form if they are likely to obtain an absolute majority and a full control over policy-making (Ibenskas 2015). In order to capture the relevance of the critical 50% threshold, we also define a variable capturing how far the coalition is from such a threshold: *Distance from majority* is defined as $|50\% - \text{Coalition size}|$. This measure captures whether coalitions are close to achieving an absolute majority. Interacting it with *Majority* results in a piecewise linear fit that allows us to evaluate whether the propensity to coalesce peaks when the coalition is likely to reach an absolute majority of seats (while it does not need to overshoot that threshold). Finally, we measure the ideological (in)compatibility of two potential coalition partners by the difference in their ideologies.² We call this variable *Ideological range*.

D.2 Estimation Results

We start by asking whether expecting to reach a majority of seats (or being close to it) is associated with the probability of two parties forming an alliance. Table C11 presents findings from a number of regression models that we estimate using OLS.³ Column (1) first regresses an indicator variable for two parties forming a PEC—multiplied by 100 to allow interpreting the estimates as percentages—on the *Distance from majority* variable, an indicator for the coalition reaching an absolute majority of seats and an interaction of these two terms. The coefficient for reaching a majority of the seats (based on the previous election’s seat shares) is positive but not

²Comparing realized and non-realized coalitions reveals that coalitions are more common among ideologically close parties (see Table A1 for summary statistics). However, it seems that their expected size is smaller than the size of potential two-party coalitions that did not form. There appear to be no differences in terms of asymmetry. We will return to these comparisons below in a more sophisticated regression framework.

³We obtain similar results if we use probit and logit models (see Tables C12 and C13).

statistically significant. The positive and significant coefficient for *Distance from majority* and the negative and significant coefficient for its interaction with *Majority* shows that the propensity to coalesce peaks when the dyad can *just about* form a majority. This is natural as when the distance is large, it is likely that one party could reach an absolute majority of seats on its own—and thus would not need to coalesce with anyone. This specification demonstrates coalitions not wanting to maximize seat share but instead maximize the probability of obtaining an absolute majority of seats.

In column (2) we examine the role of the size of the expected coalition, size asymmetry, and their interaction. Given the negative coefficient of *Coalition size*, we can conclude that PECs are less likely to form between large parties. Similarly, as we predicted, similarly sized parties are more likely to coalesce. The interaction term tells us that only when the coalition size is large enough can we expect asymmetric coalitions (i.e. a large party coalescing with a small one). In column (3), we replace coalition size with the dummy variable indicating whether the two parties together can reach an absolute majority of the seats. Once again, size asymmetry is negatively correlated with the probability of two parties forming a PEC, two parties of a similar size are also less likely to coalesce if they expect to get a majority of the seats together, but this negative association is diluted by size asymmetry. In other words, two parties that expect to get an absolute majority of the council seats become more likely to join forces the more different their electoral support is.

Last, we investigate the role of ideology in PEC formation. We find strong support for the prediction that ideologically proximate parties are more likely to coalesce in column (4) where we regress an indicator for two parties belonging to the same PEC on their ideological distance.

D.3 Robustness Checks

Our main analysis of the dyadic data uses a linear probability model to estimate marginal effects. In Tables C12 and C13, we show that the qualitative conclusions remain unchanged even if we use non-linear probit and logit models.

Table C11. Dyad-level determinants of PEC formation.

	(1)	(2)	(3)	(4)
Distance from majority	0.036*** [0.011]			
Majority	0.314 [0.479]		-5.243*** [0.464]	
Distance from majority × Majority	-0.118*** [0.019]			
Coalition size		-0.129*** [0.011]		
Asymmetry		-3.686*** [0.669]	-1.209** [0.474]	
Asymmetry × Coalition size		0.147*** [0.016]		
Asymmetry × Majority			5.523*** [0.777]	
Ideological range				-3.320*** [0.150]
<i>N</i>	23499	23499	23499	28381
<i>R</i> ²	0.00	0.01	0.00	0.02

Notes: The dependent variable is an indicator for two parties belonging to a PEC, multiplied by 100. Standard errors clustered at the election level are reported in brackets. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Furthermore, the analysis in the main text does not include any additional covariates in the analyses that we conduct using the dyadic data. However, the conclusions from this investigation remain unchanged if we control for municipality and election year fixed effects. We show this in Table C14.

Column (1) first regresses an indicator variable for two parties forming a PEC on the difference between the dyad's expected seat share distance from majority, an indicator for the expected seat share being enough to give the parties more than half of the seats, and an interaction of these two terms. We see that when two parties do not expect to get a majority of the seats, a coalition is more likely to realize between them the smaller was the sum of their seat shares in the previous election. The coefficient of *Majority* is positive (although not statistically significant), indicating

that a coalition between two parties is more likely if their expected joint seat share is more than 50%. However, the interaction term had a negative regression coefficient—i.e. two parties are less likely to form a PEC the larger they are, if they expect to get a majority.

In column (2), we examine the role of expected coalitions size, size asymmetry, and their interaction. Given the negative coefficient of *Coalition size*, we can conclude that PECs are less likely to form between large parties of a similar size. Similarly, size asymmetry decreases the propensity of two parties coalescing. In column (3), we replace coalition size with an indicator variable for the two parties together acquiring an absolute majority. As before, size asymmetry is negatively correlated with the probability of two parties forming a PEC. Two parties of a similar size are also less likely to coalesce if they expect to get a majority of the seats together, but this negative association is diluted by size asymmetry. That is to say, two parties that expect to get more than half of the council seats become more likely to join their forces the larger is their size difference.

We investigate the role of ideology in PEC formation in column (4). We find strong support for the prediction that ideologically proximate parties are more likely to coalesce. The larger the ideological incompatibility between two parties, the less likely it becomes that they form a PEC.

Table C12. Dyad-level determinants of PEC formation (probit model).

	(1)	(2)	(3)	(4)
Distance from majority	0.005*** [0.001]			
Majority	0.118 [0.082]		-1.364*** [0.176]	
Distance from majority \times Majority	-0.030*** [0.005]			
Coalition size		-0.024*** [0.002]		
Asymmetry		-0.468*** [0.066]	-0.146*** [0.055]	
Asymmetry \times Coalition size		0.027*** [0.002]		
Asymmetry \times Majority			1.503*** [0.222]	
Ideological range				-0.617*** [0.034]
<i>N</i>	23499	23499	23499	28381
Pseudo- R^2	0.01	0.03	0.02	0.10

Notes: The dependent variable is an indicator for two parties belonging to a PEC. All specifications control for municipality and election year fixed effects. Standard errors clustered at the election level are reported in brackets. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Table C13. Dyad-level determinants of PEC formation (logit model).

	(1)	(2)	(3)	(4)
Distance from majority	0.010*** [0.003]			
Majority	0.297 [0.196]		-3.391*** [0.409]	
Distance from majority \times Majority	-0.074*** [0.014]			
Coalition size		-0.053*** [0.004]		
Asymmetry		-1.007*** [0.140]	-0.333*** [0.124]	
Asymmetry \times Coalition size		0.060*** [0.006]		
Asymmetry \times Majority			3.725*** [0.493]	
Ideological range				-1.421*** [0.077]
<i>N</i>	23499	23499	23499	28381
Pseudo- R^2	0.01	0.03	0.02	0.10

Notes: The dependent variable is an indicator for two parties belonging to a PEC. All specifications control for municipality and election year fixed effects. Standard errors clustered at the election level are reported in brackets. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Table C14. Dyad-level determinants of PEC formation (controlling for fixed effects).

	(1)	(2)	(3)	(4)
Distance from majority	0.036*** [0.011]			
Majority	0.255 [0.544]		-5.353*** [0.466]	
Distance from majority \times Majority	-0.174*** [0.029]			
Coalition size		-0.135*** [0.011]		
Asymmetry		-3.098*** [0.631]	-0.842** [0.429]	
Asymmetry \times Coalition size		0.135*** [0.018]		
Asymmetry \times Majority			4.639*** [0.990]	
Ideological range				-3.330*** [0.157]
<i>N</i>	23499	23499	23499	28379
<i>R</i> ²	0.08	0.08	0.08	0.10

Notes: The dependent variable is an indicator for two parties belonging to a PEC, multiplied by 100. All specifications control for municipality and election year fixed effects. Standard errors clustered at the election level are reported in brackets. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

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