SUPPLEMENTARY MATERIAL

GEOGRAPHICALLY TARGETED SPENDING IN MIXED-MEMBER MAJORITARIAN ELECTORAL SYSTEMS

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Geographically-Targeted Spending in Mixed-Member Majoritarian Electoral Systems

Supplementary Material

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A Mexico's Cap on Over-Representation, Threshold, and Rules About Publicly-Provided Campaign Funds

Here, we explain three pertinent features of Mexico's MMM system. First, the Mexican Constitution establishes two 'caps' to avoid over-representation: 1) no party can claim more than 300 Deputies, elected in either tier, even if it captures more than 52% of votes; and 2) no party's percentage of Deputies is allowed to exceed by more than 8% the percentage of votes the party obtained in an election. There is one exception to this, which we explain below, but before doing so, we note that in this latter calculation, the number of PR votes won by the party are used. This may be another reason why a majority-seeking party coordinating with a small party in Mexico may prefer to keep PR votes to itself: by doing so, it can avoid triggering this cap on over-representation.

The exception to this is parties that, by winning SSDs, obtain a percentage of seats that is larger than the percentage of votes received plus 10. Let us imagine that a party won 200 SSDs, but all by very tight margins, meaning that it obtained 30 per cent of all votes cast. In addition, the party receives 70 seats by PR. This means that the party has won 54% of seats in the COD (270 seats out of 500), but has only won 30% of the votes. This party is thus in violation of the second cap. To qualify for this exception, the party's percentage of seats won in the SSD tier (in this example, 40%) cannot be larger than the percentage of all votes obtained (in this example, 30%) plus 10 (meaning: 40%). The party in our example qualifies for the exception.

In the event any party does exceed its permitted number of seats, these seats are distributed among the remaining parties.

Second, Article 54 of the Mexican Constitution stipulates that a party must have registered candidates in at least two thirds of the 300 SSDs and obtained at least 3% of all valid votes to receive a PR seat.

Third, a 1996 reform established that of the campaign funds provided by the government, 70% would be distributed among political parties with a national registry according to their vote shares in the previous COD election, with the remaining 30% being equally distributed amongst all parties. In this calculation too, the number of votes the party wins in PR are used. This is another reason why a majority-seeking party in Mexico may prefer to maximize PR votes.

B How Seats in the PR Tier are Allocated in Mexico's COD Elections

The number of valid votes cast for a party list in each of Mexico's five PR constituencies is pooled at the national level first, and then divided by 200 to ascertain the number of votes needed for a party to obtain a single seat.[1] For example, if 50 million valid votes were cast in an election, a party would need 250,000 votes (50 million/200) to capture a seat. Then, the party that won the most votes is identified. Dividing the total number of valid votes cast for that party by this quotient yields the number of seats this party ought to receive, barring caps on over-representation, explained below, are not violated. For example, if Party A receives 20 million votes, this means it is entitled to 80 seats (20 million/250,000 votes). Then, the total number of votes Party A received in each of the five constituencies is divided by the same quotient. Thus, if Party A received 3 million votes in Constituency 1, then Constituency 1 would receive 12 of Party A's 80 seats (3 million/250,000 votes).

After allocating the total number of seats awarded to Party A and the distribution of those seats across the five constituencies, the allocation for the remaining parties is done simultaneously in the following manner. First, the number of votes cast for Party A (in this example, 20 million) is subtracted from the total number of valid votes cast (in this example, 50 million) and

[1]The total number of valid votes is the total number of votes minus votes cast for parties that did not reach the threshold, independent candidates, and non-registered candidates, as well as null votes.

the result is divided by the number of seats remaining to be allocated (in this example, 80 were awarded to Party A, leaving 120 of the 200 remaining). This quotient (30 million votes/120) determines the number of votes each of the remaining parties needs to have obtained to win a seat. Next, regional quotients are generated by dividing the total number of valid votes cast in each constituency minus the total number of valid votes cast for Party A in each constituency by the number of seats remaining to be allocated in each constituency. If 6 million valid votes were cast in Constituency 1 and 3 million of those were cast for Party A, enabling it to receive 12 of Party A's 80 seats, then the regional quotient for Constituency 1 is 6 million minus 3 million, divided by the 28 seats (the total number of seats available minus 12). This regional quotient (in this example, 107,143 votes) represents the number of votes each party needs to obtain a seat in each constituency (in this example, Constituency 1). To obtain the final distribution of seats, the total number of votes each party received in each constituency is divided by the constituency's regional quotient.[2]

C How PR Votes Cast for More Than One Coordinating Party are Divided Up

Here we explain how votes cast for a joint candidate under more than one coordinating party's label translate into PR votes for those parties. First, what does casting one's vote for a joint candidate under more than one coordinating party's label look like? If two coordinating parties present a joint candidate, this means the joint candidate appears twice on the ballot, under the names of both coordinating parties. As Montero explains, a voter can select the joint candidate under one party's label, the joint candidate under the other party's label, or the joint candidate under both party's labels.

When a voter casts her ballot in this manner, one vote is added to the joint candidate's tally in the SSD race. Then, one vote is divvied up equally among the number of chosen parties for the purposes of PR. For instance, let us say ten votes were cast for the PRI-PVEM joint-candidate in SSD A. Four were cast under the PRI label, three under the PVEM label, and three under both party's labels. First, the joint candidate receives 10 votes in the SSD race.

[2]Throughout the process, leftover seats are assigned by largest remainder.

Second, each coordinating party receives 100% of the votes cast under their label *only* (the PRI receives four and the PVEM, three). Third, votes cast under more than one of the coordinating parties' labels are divided equally among the selected parties (three votes are divided among two parties, totalling 1.5 votes for each party). When dividing the votes does not generate an integer number (as in this case), the residuals are summed (0.5 + 0.5) and assigned to the coordinating party that obtained the largest number of votes under its label only (in our example, the PRI, producing 2 votes for the PRI and 1 for the PVEM). Finally, the total number of PR votes for each coordinating party is given by adding the total number of votes each party got under its label only to the 'divided up votes' (the PRI receives 6 votes (4 + 2) and the PVEM receives 4 (3 + 1) votes).

D Descriptive Statistics

Table D.1: Descriptive Statistics for the Case of Japan

	Mean	Standard Deviation	Min	Max	Observations
Komeito $SSD_{m,t}$	0.017	0.130	0.000	1.000	10174
ΔKomeito PR $VS_{m,t}$	0.420	1.908	-20.155	16.019	6404
Negative (ΔLDP PR $VS_{m,t}$)	0.202	4.311	-40.627	40.670	9733
Log($Transfers_m, t$)	-3.396	0.744	-7.922	1.954	9818
Fiscal $Strength_m, t$	0.441	0.286	0.000	2.850	9764
Log($Population_m, t$)	9.783	1.418	5.142	15.966	10374
Log($Income_m, t$)	0.072	0.266	-1.064	1.647	9822
Dependent $Population_m, t$	0.381	0.054	0.000	0.629	9117
$Agriculture_m, t$	0.062	0.057	0.000	0.625	9116
Population $Density_m, t$	1108.222	2498.595	1.304	19315.560	10374

Table D.2: Descriptive Statistics for the Case of Mexico

	Mean	Standard Deviation	Min	Max	Observations
Log($Transfers_m, t$)	4.612	1.217	-2.055	9.433	2064
Negative (ΔPVEM or PVEM-PRI $VS_{m,t}$)	-1.991	5.321	-53.284	16.897	4864
ΔPRI $VS_{m,t}$	1.146	8.542	-69.193	34.696	4864
Log($Population_m, t$)	9.439	1.581	4.466	14.419	4913
Poverty $Index_m, t$	-0.000	0.997	-2.296	5.030	4913
Surface $Area_m, t$	796.408	2092.160	2.200	53237.801	4909
Population $Density_m, t$	289.348	1187.954	0.144	17206.451	4908
$Rural_m, t$	0.151	0.358	0.000	1.000	4918
State of $Emergency_m, t$	0.193	0.394	0.000	1.000	4915

E Supplementary Analyses for Hypothesis I

In Table E.1, we present the full specification of the main paper's Table 2. In Table E.2, we present Models 2 and 4 of Table E.1 (which use the fixed effect) without the lag. In Figure E.1, we present the Hainmueller, Mummolo, and Xu diagnostic.

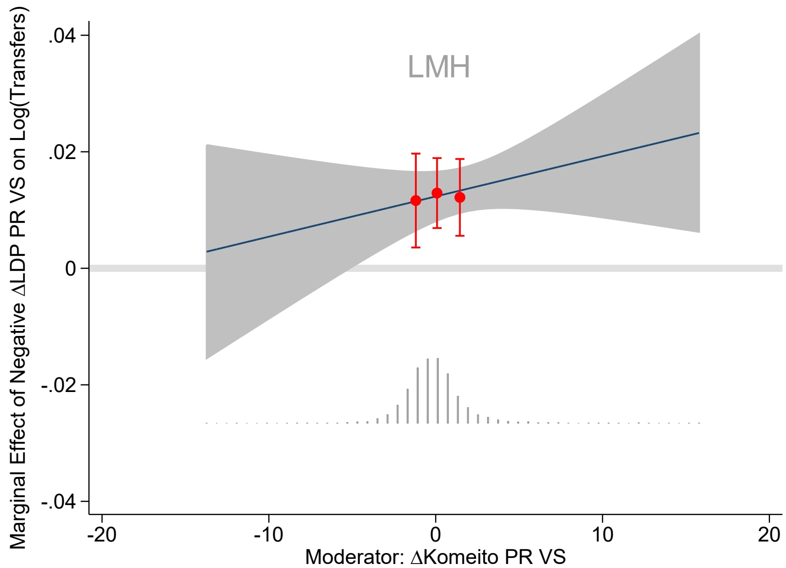

Figure E.1: Here, we present the Hainmueller, Mummolo, and Xu diagnostic for Model 4 in Table 2. Results show the estimated marginal effects using both the linear interaction model and the binning estimator. The conditional marginal-effect estimates of the binning estimator line up very closely with the linear interaction effect from the original model. The histogram at the bottom of the figure corroborates that there is sufficient common support across values of ΔKomeito PR $VS_{m,t}$.

Table E.1: In LDP SSDs, municipalities that increased PR votes for the Komeito while decreasing them for the LDP in the 2003, 2005, and 2012 HOR elections were rewarded with more money after elections. Municipalities that decreased PR votes for the LDP (without changes to Komeito PR vote share) were penalized with less money, while municipalities that increased PR votes for the Komeito (without changes to LDP PR vote share) were neither penalized nor rewarded (full specification).

	Dependent Variable: Log($\text{Transfers}_{m,t+1}$)			
	Model 1	Model 2	Model 3	Model 4
ΔKomeito PR $\text{VS}_{m,t}$* Negative (ΔLDP PR $\text{VS}_{m,t}$)	0.00249***	0.00211**	0.00249***	0.00210***
	[0.00093]	[0.00081]	[0.00093]	[0.00081]
ΔKomeito PR $\text{VS}_{m,t}$	-0.00518	-0.00018	-0.00518	-0.00111
	[0.00778]	[0.00851]	[0.00808]	[0.00859]
Negative (ΔLDP PR $\text{VS}_{m,t}$)	-0.00996**	-0.00913**	-0.00997**	-0.00717
	[0.00399]	[0.00434]	[0.00420]	[0.00497]
ΔLDP SSD $\text{VS}_{m,t}$			-0.00001	0.00162
			[0.00203]	[0.00210]
Log($\text{Transfers}_m, t$)	0.72027***	0.49787***	0.72027***	0.49762***
	[0.02646]	[0.03422]	[0.02647]	[0.03409]
Fiscal $\text{Strength}_m, t$	0.01344	-0.43850**	0.01344	-0.44286**
	[0.05553]	[0.17705]	[0.05565]	[0.17700]
Log($\text{Population}_m, t$)	-0.01181	-1.07479***	-0.01181	-1.09582***
	[0.01229]	[0.31366]	[0.01225]	[0.31636]
Log(Income_m, t)	0.16477**	-0.55025*	0.16478**	-0.55130*
	[0.07829]	[0.31466]	[0.07802]	[0.31517]
Dependent $\text{Population}_m, t$	1.26937***	-0.32327	1.26939***	-0.32766
	[0.47491]	[1.39813]	[0.47512]	[1.39629]
$\text{Agriculture}_m, t$	0.09327	-0.62286	0.09328	-0.64946
	[0.27014]	[1.80227]	[0.27057]	[1.80205]
Population $\text{Density}_m, t$	0.00001	0.00023	0.00001	0.00023
	[0.00001]	[0.00015]	[0.00001]	[0.00015]
Constant	-1.82202***	9.14976***	-1.82202***	9.36568***
	[0.29620]	[3.27514]	[0.29612]	[3.30196]
SSD-Year FE	Yes	Yes	Yes	Yes
Municipality FE		Yes		Yes
Observations	4,497	4,497	4,497	4,497
R-squared	0.80792	0.75881	0.80792	0.75888
Number of municipalities		2,293		2,293

Robust standard errors at the district level in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table E.2: These two models are identical to Model 2 and Model 4 in Table 1, but without the lagged dependent variable.

	Dependent Variable: Log(Transfers$_{m,t+1}$)	
	Model 1	Model 2
ΔKomeito PR VS$_{m,t}$* Negative (ΔLDP PR VS$_{m,t}$)	0.003*	0.003*
	[0.001]	[0.001]
ΔKomeito PR VS$_{m,t}$	0.004	0.002
	[0.009]	[0.009]
Negative (ΔLDP PR VS$_{m,t}$)	-0.011**	-0.008
	[0.005]	[0.007]
ΔLDP SSD VS$_{m,t}$		0.003
		[0.003]
Fiscal Strength$_m, t$	-0.504**	-0.511**
	[0.211]	[0.211]
Log(Population$_m, t$)	-0.455	-0.490
	[0.481]	[0.483]
Log(Income$_m, t$)	-1.521***	-1.522***
	[0.508]	[0.508]
Dependent Population$_m, t$	2.107	2.098
	[1.964]	[1.962]
Agriculture$_m, t$	0.711	0.667
	[2.358]	[2.352]
Population Density$_m, t$	0.000	0.000
	[0.000]	[0.000]
Constant	0.547	0.894
	[5.088]	[5.107]
SSD-Year FE	Yes	Yes
Observations	4,497	4,497
R-squared	0.673	0.673

Robust standard errors at the district level in brackets

*** p<0.01, ** p<0.05, * p<0.1

F Placebo Tests

In Table F.1 we present the placebo test explained in the main paper, where we redo Table 2 with Negative (ΔNon-LDP/Komeito PR $\text{VS}_{m,t}$) instead of Negative (ΔLDP PR $\text{VS}_{m,t}$).

Table F.1: In LDP SSDs, municipalities that increased PR votes for the Komeito while decreasing them for all non LDP or Komeito parties in the 2003, 2005, and 2012 HOR elections were not rewarded with more money after the election.

	Dependent Variable: Log($\text{Transfers}_{m,t+1}$)			
	Model 1	Model 2	Model 3	Model 4
ΔKomeito PR $\text{VS}_{m,t}$* Negative (ΔNon-LDP/Komeito PR $\text{VS}_{m,t}$)	-0.001	-0.001	-0.001	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]
ΔKomeito PR $\text{VS}_{m,t}$	-0.003	0.002	-0.003	0.002
	[0.007]	[0.009]	[0.007]	[0.009]
Negative (ΔNon-LDP/Komeito PR $\text{VS}_{m,t}$)	-0.001	0.002	-0.002	0.001
	[0.004]	[0.005]	[0.004]	[0.005]
ΔLDP SSD $\text{VS}_{m,t}$			0.003	0.003
			[0.002]	[0.002]
Log($\text{Transfers}_m, t$)	0.722***	0.499***	0.722***	0.498***
	[0.026]	[0.034]	[0.026]	[0.034]
Fiscal $\text{Strength}_m, t$	0.020	-0.450**	0.018	-0.454**
	[0.055]	[0.178]	[0.056]	[0.178]
Log($\text{Population}_m, t$)	-0.013	-1.277***	-0.013	-1.226***
	[0.012]	[0.306]	[0.012]	[0.305]
Log(Income_m, t)	0.190**	-0.485	0.182**	-0.506
	[0.078]	[0.319]	[0.077]	[0.319]
Dependent $\text{Population}_m, t$	1.279***	-0.594	1.271***	-0.437
	[0.469]	[1.410]	[0.470]	[1.402]
$\text{Agriculture}_m, t$	0.058	-0.696	0.063	-0.768
	[0.276]	[1.802]	[0.274]	[1.807]
Population $\text{Density}_m, t$	0.000	0.000*	0.000	0.000*
	[0.000]	[0.000]	[0.000]	[0.000]
Constant	-1.815***	11.169***	-1.806***	10.606***
	[0.294]	[3.226]	[0.296]	[3.214]
SSD-Year FE	Yes	Yes	Yes	Yes
Municipality FE		Yes		Yes
Observations	4,497	4,497	4,497	4,497
R-squared	0.807	0.758	0.807	0.758
Number of municipalities		2,293		2,293

Robust standard errors at the district level in brackets

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

G Supplementary Analyses for Hypothesis II

In Table G.1, we present the full specification of the main paper's Table 4. In Figure G.1, we present the Hainmueller, Mummolo, and Xu diagnostic.

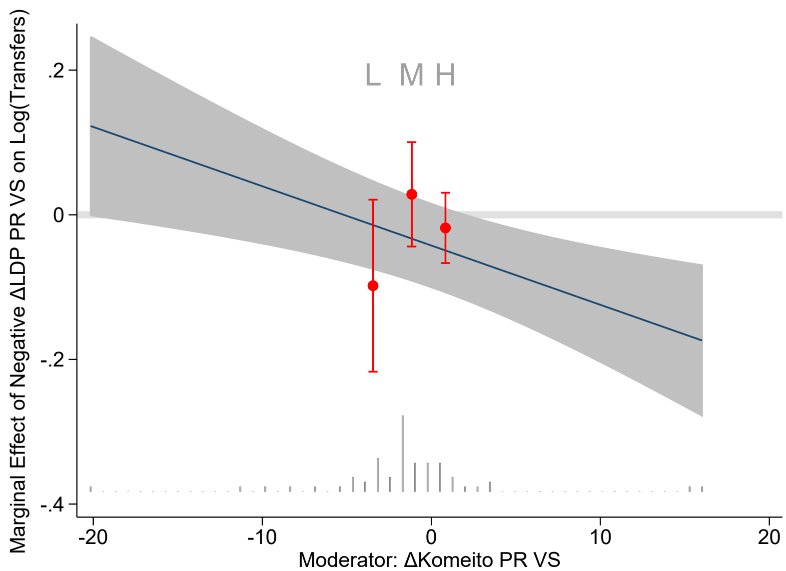

Figure G.1: Here, we present the Hainmueller, Mummolo, and Xu diagnostic for Model 1 in Table 4. Results show the estimated marginal effects using both the linear interaction model and the binning estimator. Because the confidence intervals of the binning estimators overlap with the linear interaction effect from the original model, we cannot reject the possibility that the conditional marginal effect estimates of the binning estimator are equal to those from the linear interaction effect in the original model. The histogram at the bottom of the figure corroborates that there is sufficient common support across values of ΔKomeito PR $\text{VS}_{m,t}$.

Table G.1: In Komeito SSDs, municipalities that increased PR votes for the Komeito while decreasing them for the LDP in the 2003, 2005, and 2012 HOR elections were penalized with less money after elections. Municipalities that decreased PR votes for the LDP (without changes to Komeito PR vote share) were also penalized, while municipalities that increased PR votes for the Komeito (without changes to LDP PR vote share) were neither penalized nor rewarded (full specification).

	Dependent Variable: Log(Transfers$_{m,t+1}$)
	Model 1
ΔKomeito PR VS$_{m,t}*$ Negative (ΔLDP PR VS$_{m,t}$)	-0.008***
	[0.001]
ΔKomeito PR VS$_{m,t}$	-0.007
	[0.010]
Negative (ΔLDP PR VS$_{m,t}$)	-0.057***
	[0.002]
Log(Transfers$_{m,t}$)	0.530***
	[0.053]
Fiscal Strength$_m, t$	-3.048**
	[0.925]
Log(Population$_m, t$)	0.208*
	[0.087]
Log(Income$_m, t$)	0.536*
	[0.212]
Dependent Population$_m, t$	0.277
	[0.660]
Agriculture$_m, t$	0.305
	[0.940]
Population Density$_m, t$	0.000***
	[0.000]
Constant	-2.663***
	[0.227]
Controls	Yes
SSD-Year FE	Yes
Observations	63
R-squared	0.659

Robust standard errors at the district level in brackets
*** p<0.01, ** p<0.05, * p<0.1

H Supplementary Analyses for Hypothesis III

In Table H.1, we present the main paper's full specification of Table 6. In Figure H.1, we present the Hainmueller, Mummolo, and Xu diagnostic.

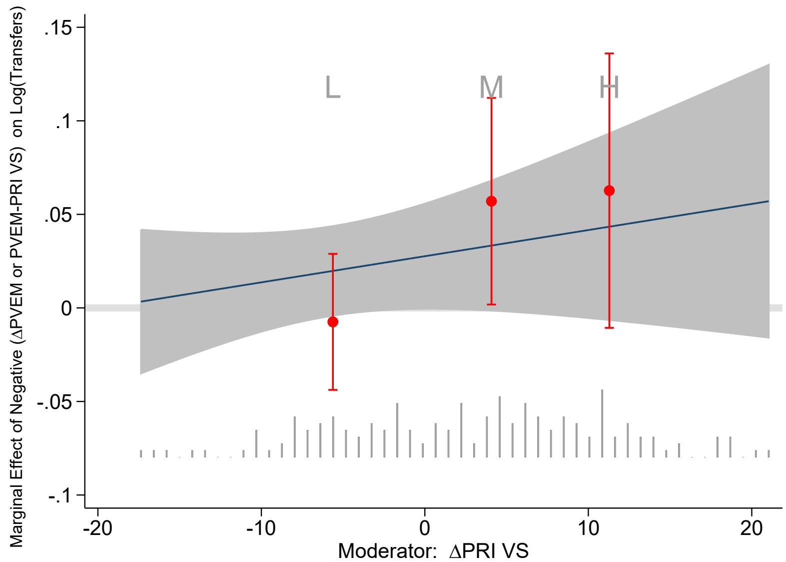

Figure H.1: Here, we present the Hainmueller, Mummolo, and Xu diagnostic for Model 1 in Table 6. Results show the estimated marginal effects using both the linear interaction model and the binning estimator. Because the confidence intervals of the binning estimators overlap with the linear interaction effect from the original model, we cannot reject the possibility that the conditional marginal-effect estimates of the binning estimator are equal to those from the linear interaction effect from the original model. The histogram at the bottom of the figure corroborates that there is sufficient common support across values of $\Delta\text{PRI}_{m,t}$.

Table H.1: In alliance SSDs with PVEM-affiliated candidates, municipalities that increased votes for this candidate under the PRI label only while decreasing them under the PVEM or both parties' labels were rewarded with more money after the 2012 and 2015 elections (Model 1). In alliance SSDs with PRI-affiliated candidates (Model 2) and non-alliance SSDs (Model 3), municipalities that increased votes for the PRI (only, in the case of Model 2) are rewarded(full specification).

	Dependent Variable: Log(Transfers$_{m,t+1}$)		
	Model 1	Model 2	Model 3
	Joint Candidate (PVEM)	Joint Candidate (PRI)	Non-Alliance District
ΔPRI VS$_{m,t}$* Negative (ΔPVEM or PVEM-PRI VS$_{m,t}$)	0.00214*	0.00000	
	[0.00117]	[0.00051]	
ΔPRI VS$_{m,t}$	0.01261	0.01169*	0.01760**
	[0.01849]	[0.00618]	[0.00755]
Negative (ΔPVEM or PVEM-PRI VS$_{m,t}$)	0.02680*	0.01310	
	[0.01370]	[0.00848]	
ΔPRI VS$_{m,t}$* Negative (ΔPVEM VS$_{m,t}$)			-0.00037
			[0.00214]
Negative (ΔPVEM VS$_{m,t}$)			0.01483
			[0.01942]
Log(Population$_m, t$)	-0.57112***	-0.59565***	-0.76725***
	[0.08555]	[0.03845]	[0.04072]
Population Density$_m, t$	0.00038	-0.00004	0.00013
	[0.00049]	[0.00011]	[0.00014]
Rural$_m, t$	0.70873***	0.26496	-0.02332
	[0.19987]	[0.16927]	[0.12453]
Poverty Index$_m, t$	-0.19277	-0.07279	-0.06650
	[0.13466]	[0.07298]	[0.08012]
Surface Area$_m, t$	-0.00000	0.00001	0.00001
	[0.00002]	[0.00001]	[0.00002]
State of Emergency$_m, t$	-0.05235	0.09994	0.16675
	[0.15587]	[0.10039]	[0.17202]
Constant	10.21101***	11.62302***	12.34533***
	[0.83591]	[0.41986]	[0.41195]
SSD-Year FE	Yes	Yes	Yes
Observations	170	1,135	635
R-squared	0.67101	0.62542	0.72780

Robust standard errors clustered at the district level in brackets

*** p<0.01, ** p<0.05, * p<0.1

I Construction of Independent Variables for 2012

As the main paper explains, coordinating parties were required to present joint lists in the 2006 election, meaning that only the number of votes cast for the PRI-PVEM *coalition* is observed in this election. The coalition would thus not have been able to distinguish how many votes, of this total, were cast for either partner. In 2012, then, how might a coalition go about verifying whether party supporters complied with instructions to split their votes? We posit that it is likely to have used the results of the 2009 election to calculate the ratio of votes contributed by each coordinating partner, and apply that ratio to the total number of votes received by the coalition in 2006.

More concretely, let us say that in municipality m, the PRI-PVEM coalition received 10 votes in 2006 and 15 in 2009[3], out of which 9 were cast under the PRI label and 6 under the PVEM label. Accordingly, the share of votes that the PRI contributed to the coalition's total in 2009 corresponds to 9 / (9 + 6) = 0.6 or 60%. Similarly, the share of votes that the PVEM contributed to the coalition's total in 2009 corresponds to 6 / (9 + 6) = 0.4 or 40%. To calculate the number of votes that the coalition might expect corresponded to each partner in the 2006 election, we apply these 2009 ratios to the total number of votes received by the PRI-PVEM coalition in 2006. By this calculation, of the 10 votes the coalition received in 2006, the PRI was responsible for 6 of these (10 * 0.6) and the PVEM 4 votes (10 * 0.4).

[3] We exclude votes cast under both party's labels to calculate these ratios.