Incumbency as a Source of Spillover Effects in Mixed Electoral Systems: Evidence from a Regression-Discontinuity Design

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Web Supplement

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This supplement contains the full results from all robustness checks we have performed and some additional methodological details on our simulation study of the 2002 Bundestag election.

1 Balance and Robustness Tests

As noted in the article, our causal estimates rest on the assumption of random assignment at the threshold. In this section, we test this assumption for several pre-treatment covariates. If treatment assignment is indeed randomized at the threshold, we expect pre-treatment variables to be balanced in the close neighborhood of the threshold. Take turnout at time $t-1$, for example. At the threshold, there should be no systematic differences in lagged turnout between districts that were barely won and districts that were barely lost by one party. The same should be true for interactions and squared terms.

Tables 1 and 2 provide evidence that supports the assumption of local random assignment. For both parties, we do not find any significant differences at the threshold for lagged SMD and PR vote shares, turnout, incumbent age and gender, squared vote shares, turnout, and age, and various linear combinations of these variables.

Our estimates should also be relatively insensitive to the inclusion of pre-treatment covariates. Just like in a randomized experiment, adding them to our models should increase the precision of our treatment effect estimates but not substantially affect their size. Tables 3 and 4 demonstrate that this is indeed the case. Our estimates are fairly robust across different specifications. Since the findings in both tables are substantively similar, they can be discussed at the same time.

For both major parties and all three measures of incumbency, the first column shows our baseline model in which treatment effects are estimated without the inclusion of any additional covariates. In the second column, we add all covariates to the specification. As expected, inclusion of this large set of covariates leaves the size of our treatment effect estimates largely unaffected but increases the precision with which they are estimated. Any changes we see in point estimates are well within the confidence bounds of our baseline model. This is true for both the CDU and the SPD. Taken together, the results of these robustness tests increase our confidence that local random assignment "worked" and that our causal estimates are not driven by omitted variable bias.

2 Simulation of Bundestag Seat Allocation

In order to assess the impact of spillover, we wrote a numerical simulation of the distribution of Bundestag seats in the absence of spillover.

First, we wrote a `R` function that takes as input the counts of valid SMD and PR votes for all parties in each district. The function calculates the resulting Bundestag seat distribution using the electoral rules codified in German election law including excess seats (*Überhangmandate*). According to German election law, a party only receives Bundestag seats if it reaches a 5 percent threshold or wins at least three district seats. If a party gets less than 5 percent of the PR vote and also wins less than three district seats, it will keep any district seats it wins but is not awarded any additional seats based on its PR vote share.

Second, we wrote another `R` function that simulates the absence of spillover effects. It takes as input the original vote counts for all parties in the SMD tier at $t-1$ in order to determine the incumbent party in each district. Then, the function takes PR vote counts in the election at time t and redistributes them, with the incumbent party losing votes according to our spillover effect estimates for the SPD and CDU/CSU. These votes are then re-allocated to all other parties in the same district having positive vote shares (so parties that received zero votes do not receive any additional votes).

We ran the simulations under two different assumptions. In the first scenario, incumbent losses are allocated proportionally to all other parties in a district based on their PR vote share. In the second scenario, incumbent losses are fully added to the other major party. This scenario captures our earlier finding that SPD incumbents mainly attract PR votes from the CDU and vice versa. In practice, these two scenarios yield very similar results, since in the proportional allocation scenario, the other major party also receives the bulk of the redistributed PR votes simply because of its larger baseline vote share. We only show the results from the proportional scenario. The other results are available upon request.

Reallocating PR votes in such a way gives us a new counterfactual matrix of PR vote counts, which for each district in the election at time t contains the PR vote counts that would have been observed in a counterfactual world without spillover due to incumbency. This matrix is then passed to the first function to determine how the absence of spillover would change the distribution of Bundestag seats.

To capture the uncertainty in our treatment effect estimates, we run our simulation 1000 times. Each iteration is based on a simulated set of treatment effect estimates drawn from their sampling distribution, taken here as a multivariate normal distribution with mean equal to the parameter estimates from our baseline models presented in Table 3 and a robust variance-covariance matrix from the same models. We should note that our simulation only incorporates spillover effects due to incumbency. Other sources of spillover such as the presence of district candidates are held constant.

Table 1: Random Assignment Checks for Imbalance in Pre-treatment Covariates: SPD, Party Incumbency

	Non-Incumbent	Incumbent	Difference	.90 CI LB	UB
SMD	43.9	44.21	-0.31	-0.95	0.32
	(0.32)	(0.29)	(0.39)		
SMD^2	1933.63	1958.85	-25.22	-78.87	28.43
	(28.87)	(24.33)	(32.62)		
PR	41.88	41.82	0.06	-0.69	0.81
	(0.38)	(0.33)	(0.46)		
PR^2	1762.52	1756.98	5.54	-55.45	66.53
	(32.09)	(25.6)	(37.08)		
$turnout$	84.8	85.14	-0.34	-1.60	0.92
	(0.65)	(0.56)	(0.77)		
$turnout^2$	7209.96	7272.15	-62.19	-273.22	148.83
	(109.39)	(93.31)	(128.29)		
age	52.07	53.77	-1.70	-4.07	0.67
	(1.15)	(0.83)	(1.44)		
age^2	2778.86	2943.41	-164.55	-414.1	84.99
	(122.09)	(86.03)	(151.71)		
$female$	0.15	0.13	0.02	-0.08	0.12
	(0.05)	(0.03)	(0.06)		
$female \times SMD$	6.33	5.72	0.61	-3.75	4.97
	(2.21)	(1.42)	(2.65)		
$female \times PR$	5.83	5.32	0.50	-3.58	4.59
	(2.07)	(1.35)	(2.48)		
$female \times turnout$	12.1	10.61	1.49	-6.79	9.77
	(4.11)	(2.89)	(5.03)		
$female \times age$	7.54	6.94	0.59	-4.59	5.78
	(2.55)	(1.84)	(3.15)		

Regression coefficients with heteroskedasticity and serial correlation consistent standard errors in parentheses. LB and UB mark the endpoints of 90% confidence intervals. All covariates are lagged, i.e., measured prior to treatment assignment.

Table 2: Random Assignment Checks for Imbalance in Pre-treatment Covariates: CDU, Party Incumbency

	Non-Incumbent	Incumbent	Difference	.90 CI LB	UB
SMD	44.12	43.92	0.20	-0.44	0.84
	(0.3)	(0.33)	(0.39)		
SMD^2	1954.22	1933.51	20.7	-35.51	76.91
	(26.65)	(27.22)	(34.17)		
PR	41.74	41.66	0.08	-0.71	0.87
	(0.33)	(0.41)	(0.48)		
PR^2	1754.81	1741.73	13.08	-53.76	79.91
	(28.4)	(32.74)	(40.63)		
$turnout$	85.19	84.81	0.38	-0.88	1.64
	(0.56)	(0.65)	(0.77)		
$turnout^2$	7279.54	7211.03	68.51	-142.51	279.52
	(92.86)	(109.22)	(128.29)		
age	54.03	53.14	0.89	-1.81	3.60
	(0.9)	(1.36)	(1.64)		
age^2	2994.72	2920.83	73.89	-219.08	366.86
	(99.21)	(146.17)	(178.11)		
$female$	0.06	0.05	0.01	-0.06	0.08
	(0.02)	(0.04)	(0.04)		
$female \times SMD$	2.67	2.22	0.45	-2.48	3.37
	(0.98)	(1.48)	(1.78)		
$female \times PR$	2.51	2.17	0.35	-2.45	3.15
	(0.92)	(1.43)	(1.70)		
$female \times turnout$	5.23	4.68	0.54	-5.27	6.36
	(1.78)	(3.04)	(3.54)		
$female \times age$	3.34	2.9	0.43	-3.39	4.26
	(1.14)	(2.02)	(2.33)		

Regression coefficients with heteroskedasticity and serial correlation consistent standard errors in parentheses. LB and UB mark the endpoints of 90% confidence intervals. All covariates are lagged, i.e., measured prior to treatment assignment.

Table 3: Robustness checks: SPD

	Effect on SMD Vote						Effect on PR Vote					
	Party Incumbency		Legislator Incumbency		No Shadow Incumbency		Party (Incumbency)		Legislator Incumbency		No Shadow Incumbency	
Incumbency	1.51	1.12	1.61	1.37	2.36	2.24	1.67	1.01	1.52	0.97	2.14	1.72
	(0.59)	(0.53)	(0.66)	(0.6)	(0.89)	(0.78)	(0.6)	(0.49)	(0.66)	(0.55)	(0.9)	(0.72)
SMD	.	0.17	.	0	.	0.3	.	-0.09	.	-0.09	.	0.11
	.	(0.34)	.	(0.37)	.	(0.39)	.	(0.34)	.	(0.35)	.	(0.39)
SMD^2	.	0.00	.	0.00	.	0.00	.	-0.01	.	-0.01	.	-0.01
	.	(0.00)	.	(0.00)	.	(0.01)	.	(0.00)	.	(0.00)	.	(0.01)
PR	.	0.41	.	0.44	.	0.04	.	0.51	.	0.33	.	0.03
	.	(0.37)	.	(0.41)	.	(0.44)	.	(0.36)	.	(0.37)	.	(0.41)
PR^2	.	0.00	.	0.00	.	0.01	.	0.01	.	0.01	.	0.02
	.	(0.00)	.	(0.01)	.	(0.01)	.	(0.00)	.	(0.00)	.	(0.01)
turnout	.	-0.16	.	-0.15	.	-0.1	.	-0.14	.	-0.13	.	-0.1
	.	(0.04)	.	(0.04)	.	(0.04)	.	(0.04)	.	(0.04)	.	(0.04)
age	.	-0.4	.	-0.37	.	-0.43	.	-0.33	.	-0.29	.	-0.33
	.	(0.1)	.	(0.12)	.	(0.12)	.	(0.10)	.	(0.11)	.	(0.11)
age^2	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00
	.	(0.00)	.	(0.00)	.	(0.00)	.	(0.00)	.	(0.00)	.	(0.00)
female	.	4	.	1.78	.	4.32	.	2.15	.	0.85	.	2.49
	.	(3.83)	.	(4.58)	.	(4.9)	.	(3.83)	.	(4.72)	.	(5)
$female \times SMD$	.	0.44	.	0.49	.	0.35	.	0.27	.	0.35	.	0.2
	.	(0.16)	.	(0.17)	.	(0.17)	.	(0.14)	.	(0.17)	.	(0.15)
$female \times PR$	.	-0.39	.	-0.45	.	-0.3	.	-0.2	.	-0.29	.	-0.14
	.	(0.16)	.	(0.17)	.	(0.18)	.	(0.14)	.	(0.17)	.	(0.15)
$female \times$	.	-0.1	.	-0.08	.	-0.1	.	-0.09	.	-0.06	.	-0.08
turnout	.	(0.04)	.	(0.05)	.	(0.05)	.	(0.05)	.	(0.05)	.	(0.05)
$female \times age$	.	0.04	.	0.05	.	0.03	.	0.04	.	0.03	.	0.03
	.	(0.03)	.	(0.03)	.	(0.03)	.	(0.03)	.	(0.03)	.	(0.03)

Regression coefficients with heteroskedasticity and serial correlation consistent standard errors in parentheses. LB and UB mark the endpoints of 90% confidence intervals. All covariates are lagged, i.e., measured prior to treatment assignment.

Table 4: Robustness checks: CDU

	Effect on SMD Vote						Effect on PR Vote					
	Party Incumbency		Legislator Incumbency		No Shadow Incumbency		Party (Incumbency)		Legislator Incumbency		No Shadow Incumbency	
Incumbency	1.88	1.89	1.88	1.7	1.99	1.81	1.36	1.45	1.33	1.25	1.4	1.26
	(0.66)	(0.58)	(0.74)	(0.66)	(0.85)	(0.72)	(0.69)	(0.51)	(0.75)	(0.56)	(0.85)	(0.65)
SMD	.	0.23	.	0.3	.	0.1	.	-0.11	.	0.02	.	-0.2
	.	(0.46)	.	(0.52)	.	(0.55)	.	(0.45)	.	(0.52)	.	(0.58)
SMD^2	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00
	.	(0.00)	.	(0.01)	.	(0.01)	.	(0.00)	.	(0.01)	.	(0.01)
PR	.	0.39	.	0.35	.	0.43	.	0.79	.	0.74	.	0.86
	.	(0.32)	.	(0.36)	.	(0.41)	.	(0.33)	.	(0.36)	.	(0.45)
PR^2	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00
	.	(0.00)	.	(0.00)	.	(0.00)	.	(0.00)	.	(0.00)	.	(0.00)
turnout	.	0.03	.	0.02	.	0.06	.	0.12	.	0.11	.	0.14
	.	(0.04)	.	(0.05)	.	(0.06)	.	(0.04)	.	(0.04)	.	(0.05)
age	.	0.16	.	0.22	.	0.22	.	0.05	.	0.19	.	0.14
	.	(0.13)	.	(0.14)	.	(0.17)	.	(0.09)	.	(0.12)	.	(0.15)
age^2	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00	.	0.00
	.	(0.00)	.	(0.00)	.	(0.00)	.	(0.00)	.	(0.00)	.	(0.00)
female	.	-12.54	.	-9.42	.	-11.01	.	-11.24	.	-7.11	.	-9.14
	.	(5.79)	.	(6.44)	.	(6.75)	.	(5.38)	.	(5.96)	.	(6.14)
$female \times SMD$	.	0.03	.	-0.01	.	-0.13	.	-0.03	.	-0.03	.	-0.14
	.	(0.15)	.	(0.19)	.	(0.18)	.	(0.14)	.	(0.17)	.	(0.19)
$female \times PR$	.	0	.	0.03	.	0.13	.	0.06	.	0.04	.	0.14
	.	(0.17)	.	(0.21)	.	(0.2)	.	(0.15)	.	(0.19)	.	(0.2)
$female \times$	.	0.12	.	0.1	.	0.14	.	0.11	.	0.09	.	0.12
turnout	.	(0.07)	.	(0.07)	.	(0.08)	.	(0.06)	.	(0.07)	.	(0.07)
$female \times age$	.	0.03	.	0.00	.	-0.02	.	0.01	.	-0.03	.	-0.03
	.	(0.04)	.	(0.05)	.	(0.06)	.	(0.04)	.	(0.04)	.	(0.04)

Regression coefficients with heteroskedasticity and serial correlation consistent standard errors in parentheses. LB and UB mark the endpoints of 90% confidence intervals. All covariates are lagged, i.e., measured prior to treatment assignment.