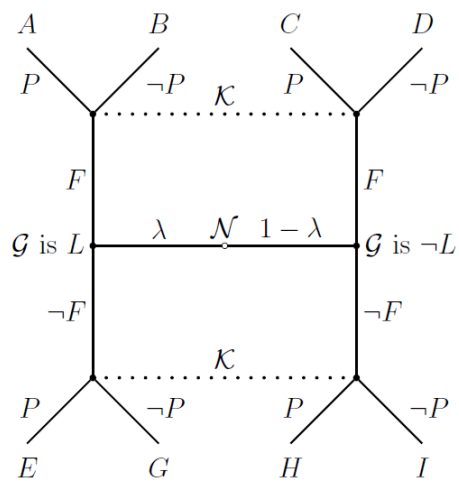
Appendices

A Appendix. Formal Model

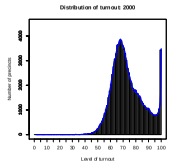
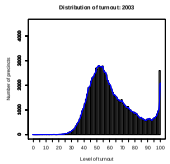
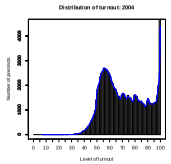
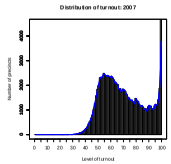
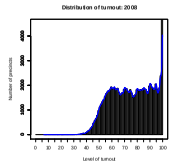
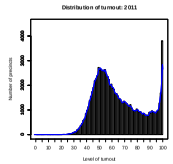
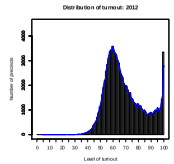
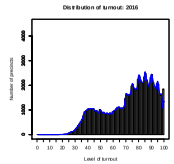
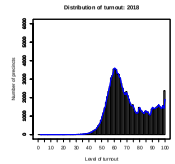
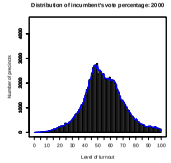
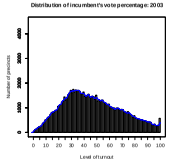
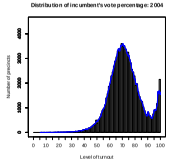
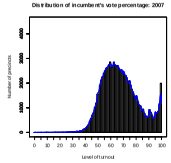
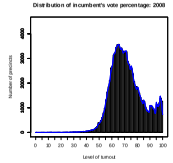
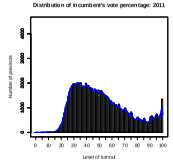
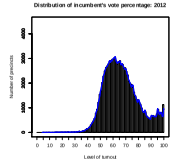
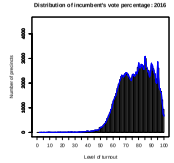
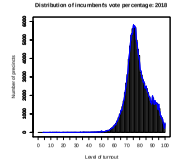
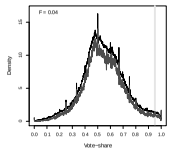
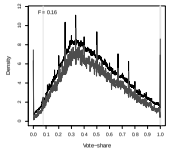
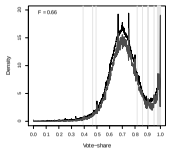
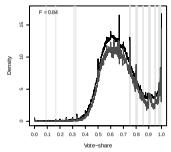
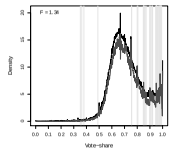
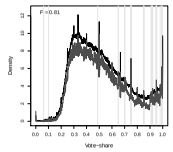
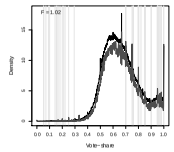
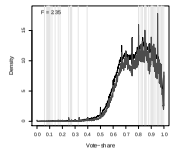
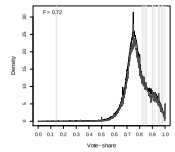
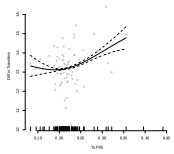
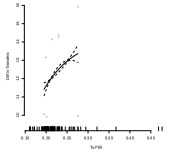
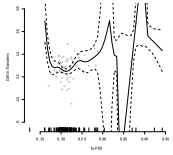
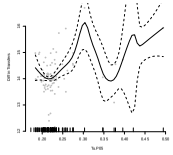
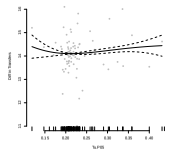
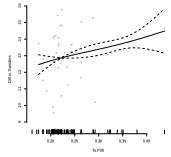
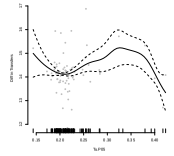
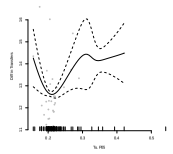
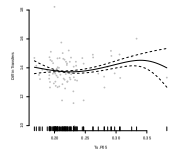
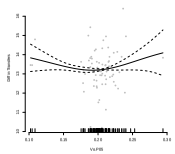
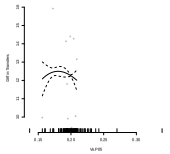
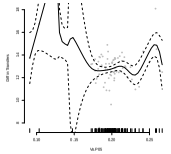
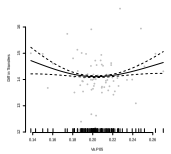
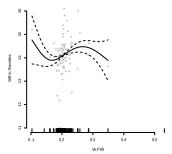
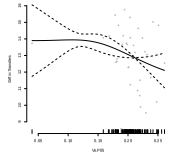
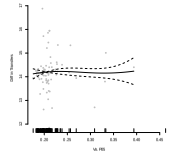
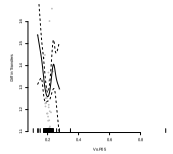
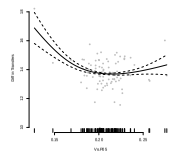
Figure A1: Game Diagram and Payoffs



symbol	$\mathcal{G}$	$\mathcal{K}$
A	$-w-p$	$v-p$
B	$-w+t$	$(b-1)t+v$
C	$-w-p$	$v-p+d$
D	$-w+(b+1)t$	$v-t$
E	$-p$	$-p$
G	t	$(b-1)t$
H	$-p$	$-p+d$
I	$(b+1)t$	$-t$

B Appendix. Descriptive Statistics of Signaling Strategies

Table B1: Descriptive Statistics of Signaling Strategies

Years	2000	2003	2004	2007	2008	2011	2012	2016	2018
Density (turnout)									
Density (vote)									
EFToolkit(Turnout)	0.221^s	0.219^s	0.236^s	0.228^s	0.232^s	0.219^s	0.22^s	0.226^s	0.218^s
	(0.218, 0.223)	(0.216, 0.222)	(0.233, 0.239)	(0.225, 0.231)	(0.229, 0.235)	(0.216, 0.221)	(0.218, 0.223)	(0.223, 0.229)	(0.215, 0.221)
EFToolkit(Votes)	0.202	0.207^s	0.207^s	0.21^s	0.204^s	0.209^s	0.209^s	0.214^s	0.205^s
	(0.199, 0.204)	(0.204, 0.209)	(0.204, 0.209)	(0.207, 0.213)	(0.202, 0.207)	(0.207, 0.212)	(0.207, 0.212)	(0.212, 0.217)	(0.202, 0.207)
Density (vote)									
Fraud (Rozenas)	0.035	0.161	0.657	0.842	1.336	0.81	1.018	2.351	0.72
Nonparam(Turnout)									
Nonparam(Vote)									

Notes: Fraud ([59]) – estimated percentage of polling stations with fraud. ^{s} – statistically significant at $p \leq 0.05$. For Nonparam(Vote)/Nonparam(turnout) *sm.regression: Nonparametric regression with one or two covariates* in **R** has been used.

Table B2: Signaling Strategies by Region and Year

	Signaling strategies related *Turnout P05*										Signaling strategies related to *Vote percentage P05*									
Region	2000	2003	2004	2007	2008	2011	2012	2016	2018	**Total**	2000	2003	2004	2007	2008	2011	2012	2016	2018	**Total**
'Evenkiyskiy AO	-	-	-							0	-	-	-							0
Aginskiy Buryatskiy AO	-	-	-	-						0	*	-	-	-						1
Altayskiy kray	-	-	-	-	-	-	-	*	-	1	-	-	-	-	-	-	-	-	-	0
Amurskaya oblast'	-	-	-	*	-	-	-	*	-	2	-	-	-	-	-	-	-	-	-	0
Arkhangel'skaya oblast'	*	*	*	*	*	-	*	-	*	7	-	-	-	-	-	-	*	-	*	2
Astrakhanskaya oblast'	-	-	-	*	-	-	-	*	-	2	-	-	-	-	-	-	-	-	-	0
Belgorodskaya oblast'	-	*	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	0
Bryanskaya oblast'	-	-	-	-	*	-	-	*	-	2	-	-	*	-	-	-	-	*	*	3
Chechenskaya Respublika		*	*	*	*	*	*	-	-	6		*	-	*	-	*	*	*	-	5
Chelyabinskaya oblast'	-	*	-	-	-	-	-	*	*	3	-	-	-	-	-	-	-	-	*	1
Chitinskaya oblast'	-	-	-	-						0	-	-	-	-						0
Chukotskiy avtonomnyy okrug	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	*	-	1
Chuvashskaya Respublika	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*	-	-	-	-	1
Gorod Moskva	*	*	*	-	*	-	-	-	*	5	-	-	-	-	-	-	-	-	-	0
Gorod Sankt-Peterburg	*	*	*	-	*	-	*	-	*	6	-	*	-	-	-	-	*	*	-	3
Gorod Sevastopol'								-	-	0								-	-	0
Irkutskaya oblast'	-	-	*	-	*	-	*	-	-	3	-	-	-	-	-	*	-	-	-	1
Ivanovskaya oblast'	-	-	-	-	-	-	-	*	-	1	*	-	-	-	-	-	-	-	-	1
Kabardino-Balkarskaya Respublika	-	-	*	*	*	*	-	-	*	5	-	-	-	*	*	*	-	*	*	5
Kaliningradskaya oblast'	*	*	-	-	-	-	-	*	-	3	*	-	*	-	-	-	-	-	-	2
Kaluzhskaya oblast'	-	*	-	-	*	-	-	-	-	2	-	-	-	-	-	-	-	-	-	0
Kamchatskaya oblast'	*	*	*							3	*	-	-							1
Kamchatskiy kray				*	*	*	*	-	*	5				-	-	-	-	-	-	0
Karachaevo-Cherkesskaya Respublika	-	-	*	*	-	-	-	-	-	2	-	-	-	-	-	*	-	*	-	2
Kemerovskaya oblast'	-	*	*	-	-	*	*		-	4	-	-	*	*	-	-	-		-	2
Khabarovskiy kray	*	-	-	-	*	-	*	-	*	4	-	-	-	-	-	-	-	*	-	1
Khanty-Mansiyskiy AO	-	-	-	-	-	-	-	*	-	1	-	-	-	-	-	-	-	-	-	0
Kirovskaya oblast'	-	-	-	-	*	-	-	-	-	1	-	-	-	-	-	-	-	-	-	0
Komi-Permyatskiy AO	-	-	-							0	-	-	-							0
Koryakskiy AO	-	-	-							0	-	*	-							1
Kostromskaya oblast'	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	0
Krasnodarskiy kray	*	-	-	-	*	-	-	*	*	4	-	-	-	-	*	-	-	*	-	2
Krasnoyarskiy kray	-	-	-	-	-	-	-	-	-	0	-	*	-	-	*	*	-	-	-	3
Kurganskaya oblast'	*	-	-	*	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	0
Kurskaya oblast'	-	-	*	-	-	-	-	-	*	2	*	-	-	-	-	-	-	-	-	1
Leningradskaya oblast'	-	-	*	-	-	-	-	*	-	2	-	-	-	-	-	-	-	-	-	0
Lipetskaya oblast'	-	-	-	-	-	-	-	-	*	1	-	-	-	-	-	-	-	-	-	0
Magadanskaya oblast'	*	*	-	*	*	*	-	-	*	6	-	-	-	-	-	-	*	-	-	1
Moskovskaya oblast'	-	-	*	-	-	-	-	*	-	2	-	*	-	-	-	*	-	*	-	3
Murmanskaya oblast'	*	*	*	*	*	*	*	-	*	8	-	-	-	-	-	-	-	-	-	0
Nenetskiy AO	-	*	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	0
Nizhegorodskaya oblast'	-	*	*	-	-	-	-	-	*	3	-	-	-	-	-	-	*	-	-	1
Novgorodskaya oblast'	*	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	0
Novosibirskaya oblast'	-	-	*	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	0
Omskaya oblast'	-	*	-	*	*	-	-	-	-	3	*	-	-	-	-	-	-	-	-	1
Orenburgskaya oblast'	-	-	-	*	-	-	-	*	*	3	-	-	-	-	-	-	-	-	-	0
Orlovskaya oblast'	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	0
Penzenskaya oblast'	*	*	*	-	-	*	-	*	-	5	-	-	-	-	-	-	-	-	-	0
Permskaya oblast'	-	-	-							0	-	-	-							0
Permskiy kray				-	*	*	-	-	-	2				-	-	-	-	-	-	0
Primorskiy kray	*	*	*	*	*	*	*	*	*	9	-	-	*	-	*	-	*	-	*	4
Pskovskaya oblast'	-	-	-	-	-	-	-	-	-	0	-	-	-	-	*	-	-	-	-	1
Respublika Adygeya	-	-	-	-	-	*	-	-	-	1	-	-	-	-	-	-	-	-	-	0
Respublika Altay	-	-	-	-	-	-	-	-	*	1	-	-	-	-	-	-	*	-	-	1
Respublika Bashkortostan	*	*	*	*	*	*	*		*	8	*	-	*	-	-	*	*		*	5
Respublika Buryatiya	-	-	*	*	-	*	-	-	-	3	-	*	-	-	-	-	-	-	-	1
Respublika Dagestan	*	*	*	*	*	-	*	*	*	8	*	*	*	*	*	*	*	*	*	9

Continued on next page

Table B2 Continued from previous page

	Signaling strategies related *Turnout P05*										Signaling strategies related to *Vote percentage P05*									
Region	2000	2003	2004	2007	2008	2011	2012	2016	2018	**Total**	2000	2003	2004	2007	2008	2011	2012	2016	2018	**Total**
Respublika Ingushetiya	*	-	-	*	-	*	*	-	*	5	*	-	-	*	*	-	*	-	*	5
Respublika Kalmykiya	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	0
Respublika Kareliya	-	*	-	*	*	*	*	-	*	6	-	-	-	-	-	*	*	-	-	2
Respublika Khakasiya	*		-	-	*	-	-	*	*	4	-		-	-	-	-	-	*	-	1
Respublika Komi	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	0
Respublika Krym								*	-	1								-	-	0
Respublika Mariy El	-	-	-	-	-	*	-	-	*	2	-	-	-	-	*	-	-	-	-	1
Respublika Mordoviya	-	*	*	*	*	*	-	*	-	6	-	-	-	*	*	*	-	-	-	3
Respublika Sakha		-	*	-	-	-	*	*	*	4		-	-	-	*	-	-	-	-	1
Respublika Severnaya Osetiya	-	*	*	-	-	-	-	-	*	3	-	-	*	-	-	*	*	-	-	3
Respublika Tatarstan	*	*	*	*	*	*	*	-	-	7	-	-	*	*	*	-	*	-	-	4
Respublika Tyva	*	-	-	-	-	-	*	*	-	3	-	-	*	-	-	-	-	-	-	1
Rostovskaya oblast'	-	-	*	*	*	*	*	*	-	6	-	-	*	*	-	-	-	*	-	3
Ryazanskaya oblast'	*	-	-	-	-	-	-	*	-	2	-	-	-	-	-	-	*	-	-	1
Sakhalinskaya oblast'	-	*	*	*	*	*	*	-	*	7	-	*	*	*	-	*	*	-	*	6
Samarskaya oblast'	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	0
Saratovskaya oblast'	*	-	*	*	*	*	-	*	*	7	-	-	-	-	*	*	-	-	*	3
Smolenskaya oblast'	-	-	-	-	*	-	-	-	-	1	-	-	*	*	-	-	-	-	-	2
Stavropol'skiy kray	-	*	-	*	-	*	-	*	-	4	-	-	-	-	-	-	-	*	-	1
Sverdlovskaya oblast'	*	-	-	-	-	-	-	-	*	2	*	-	-	-	-	-	-	-	-	1
Tambovskaya oblast'	*	-	-	*	-	-	-	-	-	2	-	-	-	-	-	-	*	-	-	1
Taymyrskiy AO	-	-	-							0	-	-	-							0
Tomskaya oblast'	-	-	-	-	-	-	-	-	-	0	-	-	*	-	-	-	-	-	-	1
Tul'skaya oblast'	-	*	-	-	*	-	-	*	-	3	-	-	-	-	-	-	-	*	-	1
Tverskaya oblast'	-	-	-	-	-	-	-	*	-	1	-	-	-	-	-	-	-	-	-	0
Tyumenskaya oblast'	-	-	*	*	*	*	*	*	*	7	-	*	-	*	*	*	-	*	*	6
Udmurtskaya Respublika	-	-	-	-	-	-	-	*	-	1	-	-	-	-	-	-	-	-	-	0
Ul'yanovskaya oblast'	-	-	*	*	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	0
Ust'-Ordynskiy Buryatskiy AO	-	-	-	-						0	-	*	-	-						1
Vladimirskaya oblast'	-	-	-	-	-	*	-	*	-	2	-	-	-	-	*	-	-	-	-	1
Volgogradskaya oblast'	-	-	-	-	*	-	-	*	-	2	-	-	-	-	-	-	-	*	-	1
Vologodskaya oblast'	-	*	-	*	-	-	-	*	*	4	-	-	-	*	-	-	-	-	-	1
Voronezhskaya oblast'	-	-	-	-	-	-	-	*	-	1	-	-	-	-	-	-	-	*	-	1
Yamalo-Nenetskiy AO	-		-	-	-	*	-	-	-	1	-		-	-	-	-	-	-	-	0
Yaroslavskaya oblast'	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	0
Yevreyskaya avtonomnaya oblast'	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	*	1
Zabaykal'skiy kray					-	-	-	-	-	0					-	-	-	-	-	0

End of table

Notes: All computations of *Turnout P05* and *Vote percentage P05* were obtained using the *EFToolkit* package.[60] "*" – statistically significant ($p \leq 0.05$) signaling pattern is detected in turnout or vote percentages, "-" – no statistically significant signaling is detected; " " – no data.

60. Kalinin and Mebane, "kkalininMI/EFToolkit: Election Forensics Toolkit."

C Appendix. Empirical Analysis

Table C1: Nonlinear Least Squares

	M2000	M2003	M2004	M2007	M2008	M2011	M2012	M2016	M2018
b_0	-1.174	13.611***	13.374***	7.274*	16.406***	-0.907	3.105***	5.437***	-8.687***
	(2.92)	(0.38)	(0.46)	(3.32)	(0.16)	(2)	(0.84)	(0.84)	(0.51)
c_1 Vote percentage	-0.016	-0.064	0.028	0.061	-0.044	0.024	0.007	0.023	-0.184
	(0.06)	(0.04)	(0.05)	(0.14)	(0.25)	(0.09)	(0.19)	(0.18)	(0.14)
c_2 Turnout	-0.036	-0.009	0.031	-0.239^{x}	-0.066	0.144	-0.183	-0.047	-0.067
	(0.11)	(0.05)	(0.04)	(0.12)	(0.2)	(0.12)	(0.19)	(0.11)	(0.1)
c_3 log Transfers$_{s-1}$	1.102***	0.175***	0.191***	0.579**	0.007	1.064***	0.785***	0.69***	1.52***
	(0.17)	(0.02)	(0.03)	(0.21)	(0.01)	(0.11)	(0.05)	(0.05)	(0.03)
c_4 VRP$_{s-1}$	-6.1e-07*	-1.5e-07	-1.1e-07	-5.0e-07***	2.9e-08	-2.7e-07*	-1.2e-07	7.308e-08	3.8e-07**
	(2.3e-07)	(1.4e-07)	(1.3e-07)	(1.3e-07)	(2.6e-07)	(1.0e-07)	(1.6e-07)	(1.154e-07)	(1.2e-07)
a_0	48.722	-46.555***	-55.782***	-27.204*	-64.621***	52.651***	78.368	-46.244***	68.161***
	(40.2)	(3.85)	(5.63)	(10.71)	(10.41)	(12.85)	(126.69)	(13.16)	(6.3)
a_1 log Transfers$_{s-1}$	-3.144	2.748*	3.318***	1.568*	3.781***	-3.31***	-4.76	2.878**	-4.102***
	(2.61)	(0.23)	(0.34)	(0.69)	(0.6)	(0.83)	(7.87)	(0.88)	(0.38)
a_2 log Days served	0.007	0.075**	-0.021	-0.041	0.13	0.009	1.16	-0.722^{x}	0.049
	(0.04)	(0.03)	(0.03)	(0.06)	(0.09)	(0.03)	(1.97)	(0.37)	(0.04)
f_1 Turnout P05	0.022	0.099	0.137*	0.488**	0.807**	-0.269*	0.18	0.27	0.064
	(0.08)	(0.06)	(0.06)	(0.15)	(0.25)	(0.12)	(0.12)	(0.29)	(0.09)
f_2 Vote percentage P05	-0.239	-0.096	0.032	-0.094	-0.005	0.057	-0.178**	-0.244	0.031
	(0.25)	(0.13)	(0.14)	(0.18)	(0.34)	(0.16)	(0.06)	(0.24)	(0.13)
σ	0.039	0.026	0.028	0.053	0.097	0.045	0.071	0.054	0.048
df	68	69	69	68	68	69	69	70	72
N	78	79	79	78	78	79	79	80	82

Notes: Dependent variable: Logged real transfers per capita. Region-level data built on precinct-level data. Standard errors in parentheses. Significance levels: $^{x}p \leq 0.1$, *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001.

Table C2: Nonlinear Least Squares

	M2000	M2003	M2004	M2007	M2008	M2011	M2012	M2016	M2018
b_0	-1.005***	-0.166^{x}	0.282^{x}	-0.019	0.121	-0.164	-0.99***	-1.017***	0.844***
	(0.22)	(0.09)	(0.16)	(0.14)	(0.13)	(0.15)	(0.03)	(0.07)	(0.17)
c_1 Vote percentage	0.002	-0.189^{x}	0.083	-0.003	-0.07	-0.048	0.039	0.139	-0.183
	(0.09)	(0.1)	(0.25)	(0.09)	(0.12)	(0.08)	(0.1)	(0.12)	(0.31)
c_2 Turnout	0.368*	0.098	0.081	-0.118	0.053	0.118	0.043	-0.081	0.16
	(0.18)	(0.12)	(0.2)	(0.08)	(0.09)	(0.1)	(0.1)	(0.07)	(0.23)
c_3 log Transfers$_{s-1}$	0.671**	0.716***	1.521***	0.339	-0.099	1.219***	0.778***	1.026***	1.128***
	(0.23)	(0.16)	(0.17)	(0.69)	(0.26)	(0.26)	(0.05)	(0.06)	(0.12)
c_4 VRP$_{s-1}$	-9.5e-07*	3.7e-07	1.8e-07	-4.5e-07	-6.3e-07***	-2.0e-07^{x}	-1.6e-07^{x}	2.630e-07*	9.277e-07***
	(4.0e-07)	(3.4e-07)	(5.7e-07)	(8.5e-08)	(1.4e-07)	(1.0e-07)	(8.5e-08)	(1.171e-07)	(2.420e-07)
a_0	4.461	-7.412^{x}	105.601	-1.544^{x}	-1.538**	-1.431	1.602	4.433	150.868
	(10.12)	(3.77)	(235.54)	(0.89)	(0.55)	(1.29)	(26.66)	(6.22)	(836.42)
a_1 log Transfers$_{s-1}$	3.324	7.989^{x}	-477.285	2.477	3.218**	-6.841	-2.49	18.197	-19.732
	(6.31)	(4.39)	(1110.46)	(2.22)	(0.96)	(4.71)	(60.13)	(34.59)	(92.7)
a_2 log days served	-0.264	0.096	5.819	0.015	0.004	0.065	1.099	-0.258	-25.138
	(0.99)	(0.12)	(15.14)	(0.02)	(0.02)	(0.12)	(2.54)	(0.91)	(141.61)
f_1 Turnout P05	0.177*	-0.004	0.133	0.124	0.01	-0.157	0.046	0.002	-1.108***
	(0.08)	(0.18)	(0.22)	(0.08)	(0.1)	(0.11)	(0.05)	(0.1)	(0.27)
f_2 Vote percentage P05	-0.294	0.622^{x}	-3.653***	-0.051	-0.115	0.059	-0.018	-0.196*	-3.257***
	(0.22)	(0.34)	(0.35)	(0.08)	(0.13)	(0.15)	(0.03)	(0.08)	(0.31)
σ	0.062	0.062	0.134	0.033	0.045	0.039	0.037	0.036	0.107
df	68	69	69	68	68	69	69	70	72
N	78	79	79	78	78	79	79	80	82

Notes: Dependent variable: Logged shares of transfers in the regional revenues. Region-level data built on precinct-level data. Standard errors in parentheses. Significance levels: $^{x}p \leq 0.1$, *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001.

Table C3: Robustness Test 1: Nonlinear Least Squares for Significance Indicator

	M2000	M2003	M2004	M2007	M2008	M2011	M2012	M2016	M2018
b0	9.408**	7.174***	12.786***	3.849***	16.396	-1.006***	2.845**	5.391***	1.47**
	(2.75)	(0.35)	(0.4)	(0.87)	(0.17)	(2.1)	(0.9)	(0.80)	(0.46)
c_1 Vote percentage	0.003	-0.126*	0.036	0.02	0.002	0.038	0.036	0.041	-0.186
	(0.05)	(0.06)	(0.05)	(0.15)	(0.26)	(0.08)	(0.19)	(0.18)	(0.20)
c_2 Turnout	0.012	0.054	0.014	-0.232^{x}	0.041	0.139	-0.329^{x}	-0.083	0.064
	(0.11)	(0.07)	(0.04)	(0.13)	(0.21)	(0.1)	(0.19)	(0.114)	(0.154)
c_3 log Transfers$_{s-1}$	0.44*	0.582***	0.23***	0.804***	0.013^{x}	1.066***	0.805***	0.694***	0.881***
	(0.17)	(0.02)	(0.02)	(0.05)	(0.01)	(0.12)	(0.06)	(0.050)	(0.030)
c_4 VRP$_{s-1}$	-6.14e-07**	4.96e-07**	-1.066e-07	-5.12e-07***	4.30e-07^{x}	-2.64e-07*	-1.29e-07	6.894e-08	9.06e-07***
	(2.11e-07)	(1.70e-07)	(1.347e-07)	(1.45e-07)	(2.56e-07)	(1.02e-07)	(1.55e-07)	(1.15e-07)	(2.02e-07)
a_0	-44.183**	-150.695*	-55.4***	-58.39	-82.593***	49.162***	61.244	-48.894***	-2588.145
	(15.27)	(69.73)	(6)	(44.99)	(13.09)	(10.27)	(68.07)	(12.836)	(5085.096)
a_1 log Transfers$_{s-1}$	2.629**	6.459*	3.297***	3.754	4.902***	-3.093***	-3.694***	3.064***	166.804
	(0.95)	(3.03)	(0.36)	(3.17)	(0.77)	(0.67)	(4.22)	(0.857)	(325.499)
a_2 log days served	0.003	4.903*	-0.033	-1.332	0.07	0.015	0.878	-0.797*	-10.532
	(0.05)	(2.33)	(0.04)	(1.59)	(0.11)	(0.03)	(1.08)	(0.3552)	(16.72)
f_1 Turn. P05Dum	0.007	0.007	0.015*	0.016	-0.044^{x}	-0.032**	0.022^{x}	0.022^{x}	-0.02^{x}
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.013)	(0.01)
f_2 Vote P05Dum	-0.037**	-0.037*	-1.1e-04	0.034	0.034	0.001	-0.011	-0.001	0.016
	(0.01)	(0.02)	(0.01)	(0.02)	(0.03)	(0.01)	(0.01)	(0.017)	(0.013)
σ	0.037	0.035	0.028	0.057	0.102	0.044	0.074	0.065	0.071
df	68	68	69	68	68	69	69	70	72
N	78	78	79	78	78	79	79	80	82

Notes: Dependent variable: Logged real transfers per capita. Region-level data built on precinct-level data. Standard errors in parentheses. Significance levels: $^{x}p \leq 0.1$, *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001.

Table C4: Robustness Test 1: Nonlinear Least Squares with Significance Indicator Variable

	M2000	M2003	M2004	M2007	M2008	M2011	M2012	M2016	M2018
b_0	-1.089***	-0.644**	-0.116	-0.044	0.203	-0.146	-0.959***	-1.099***	-0.798***
	(0.31)	(0.21)	(0.09)	(0.14)	(0.16)	(0.1)	(0.03)	(0.06)	(0.04)
c_1 Vote percentage	0.031	0.41	0.068	0.025	-0.119	-0.043	0.023	0.18	-0.228**
	(0.09)	(0.36)	(0.1)	(0.09)	(0.12)	(0.08)	(0.09)	(0.12)	(0.08)
c_2 Turnout	0.373*	-0.304	0.057	-0.118	0.03	0.129	0.021	-0.154*	0.027
	(0.19)	(0.45)	(0.08)	(0.08)	(0.09)	(0.09)	(0.09)	(0.08)	(0.06)
c_3 log Transfers$_{s-1}$	0.931^{x}	-0.045	-0.071	0.349	0.011	1.142***	0.793***	1.049***	0.996***
	(0.55)	(0.21)	(0.33)	(0.77)	(0.31)	(0.18)	(0.06)	(0.04)	(0.03)
c_4 VRP$_{s-1}$	-9.74e-07*	1.53e-06	-5.51e-07*	-4.38e-07***	-6.3e-07***	-2.19e-07*	-1.757e-07*	1.05e+00**	-7.961e-08
	(3.85e-07)	(1.17e-06)	(2.18e-07)	(8.833e-08)	(1.24e-07)	(9.62e-08)	(8.142e-08)	(3.84e-02)	(6.245e-08)
a_0	3.751	-165.809	-1.76***	-1.385^{x}	-1.95^{x}	-1.92	1.595	16.312	-10.326
	(9.92)	(300.85)	(0.41)	(0.78)	(1)	(1.38)	(11.26)	(20.92)	(25.89)
a_1 log Transfers$_{s-1}$	-1.993	4360.679	3.817*	2.363	3.033***	-8.095	-1.987	79.288	12.615
	(2.83)	(8089.48)	(1.3)	(2.74)	(0.73)	(5.67)	(25.55)	(179.80)	(27.53)
a_2 log days served	-0.112	-55.878	-0.002	0.014	0.006	0.109	0.882	-2.205	2.428
	(0.51)	(104.64)	(0.03)	(0.02)	(0.03)	(0.18)	(1.13)	(3.67)	(4.34)
f_1 Turnout P05Dum	0.016	-0.073*	0.006	0.003	-0.009	-0.02^{x}	0.012^{x}	0.0003	-0.007^{x}
	(0.01)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.004)
f_2 Vote percentage P05Dum	-0.005	0.13^{x}	-0.001	-0.001	0.024^{x}	0.001	-0.002	0.007	0.007
	(0.01)	(0.07)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
σ	0.063	0.239	0.052	0.033	0.043	0.039	0.036	0.037	0.028
df	68	68	69	68	68	69	69	70	72
N	78	78	79	78	78	79	79	80	82

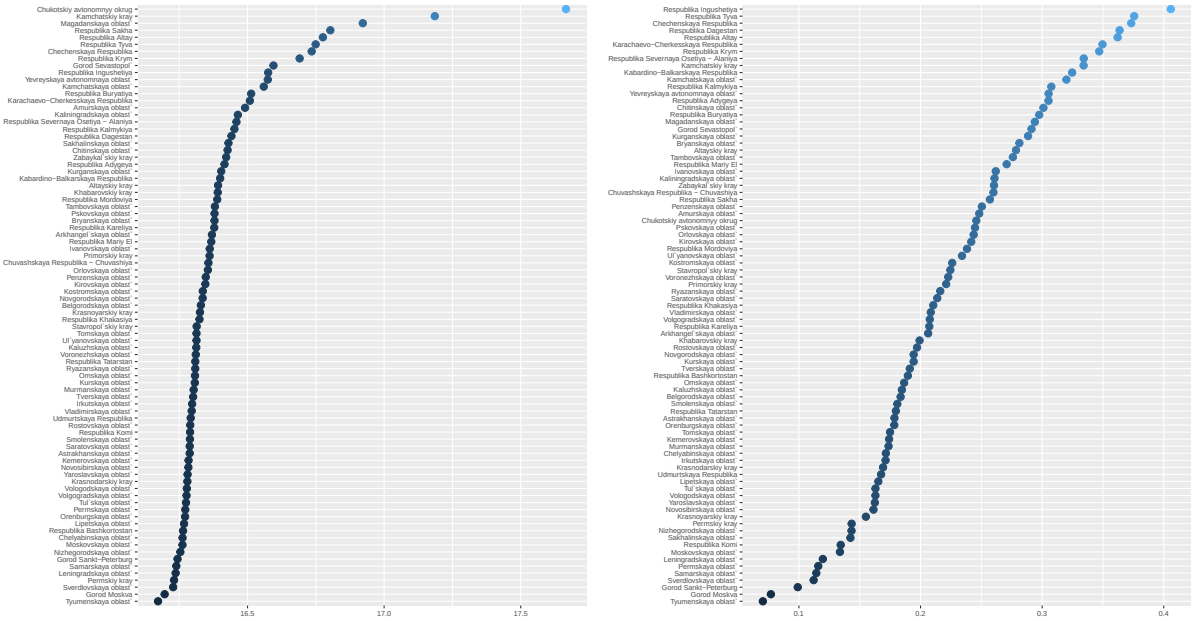
Notes: Dependent variable: Logged shares of transfers in the regional revenues. Region-level data built on precinct-level data. Standard errors in parentheses. Significance levels: $^{x}p \leq 0.1$, *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001.

Table C5: Robustness Test 2: Panel Data Analysis for Different Time Periods

	M1	M2	M3	M4	M5	M6
Transfers_{s-1}	0.013	0.134	0.01	0.358^{***}	0.835^{***}	0.466^{***}
	(0.009)	(0.105)	(0.008)	(0.047)	(0.018)	(0.043)
VRP_{s-1}	3.24e-07	7.89e-07	$-2.87\text{e-}08^{\star}$	$-2.79\text{e-}07^{***}$	-2.04e-07	3.95e-08
	(3.16e-07)	(9.83e-07)	(2.37e-07)	(1.34e-07)	(5.81e-08)	(1.41e-07)
Appointed	-0.016	-0.07^{x}	-0.021	-0.004	-0.008	0.004
	(0.017)	(0.039)	(0.017)	(0.013)	(0.012)	(0.011)
log Days served	-0.003	-0.01	-0.001	-0.001	-0.001	0.0004
	(0.003)	(0.007)	(0.003)	(0.002)	(0.002)	(0.002)
Vote percentage	0.141^{***}	0.356^{x}	0.073	0.095^{***}	0.059	0.038
	(0.021)	(0.187)	(0.064)	(0.021)	(0.039)	(0.035)
Turnout	-0.024	0.115	-0.051	0.206^{***}	0.008	-0.037
	(0.04)	(0.143)	(0.053)	(0.041)	(0.031)	(0.029)
Period (2007-2012)	0.204^{***}			0.144^{***}		
	(0.06)			(0.046)		
Period (2013-2018)	0.085			0.17^{***}		
	(0.056)			(0.054)		
Vote percentage P05	0.62^{x}	-0.507	0.612^{x}	0.416^{x}	0.157	$0.376^{\star}$
	(0.324)	(0.524)	(0.331)	(0.223)	(0.218)	(0.172)
Turnout P05	-0.103	0.347	-0.123	-0.127	0.11	0.079
	(0.103)	(0.307)	(0.125)	(0.133)	(0.082)	(0.089)
Vote percentage P05 X Period (2007-2012)	$-0.916^{\star}$	0.135	$-0.876^{\star}$	$-0.558^{\star}$	-0.131	-0.346^{x}
	(0.378)	(0.586)	(0.36)	(0.235)	(0.216)	(0.188)
Turnout P05 X Period (2007-2012)	$0.542^{\star\star}$	0.586	$0.609^{\star\star}$	0.035	-0.17^{x}	-0.163
	(0.204)	(0.562)	(0.2)	(0.151)	(0.092)	(0.126)
Vote percentage P05 X Period (2013-2018)	$-1.005^{\star\star}$	-1.105^{x}	-0.708^{x}	-1.014^{***}	$-0.577^{\star}$	$-0.587^{\star}$
	(0.36)	(0.625)	(0.394)	(0.254)	(0.278)	(0.24)
Turnout P05 X Period (2013-2018)	$0.815^{\star}$	$1.293^{\star}$	$0.799^{\star}$	0.091	-0.017	-0.105
	(0.409)	(0.514)	(0.365)	(0.209)	(0.15)	(0.144)
Region fixed effects	✓		✓	✓		✓
Time fixed effects		✓	✓		✓	✓
R^2	0.529	0.312	0.073	0.355	0.887	0.302
N	627	703	619	627	703	619

Notes: Region-level data built on precinct-level data. Dependent variable for *M1-M3* – logged real transfers per capita; for *M4-M6* – logged shares of transfers in the regional revenues. Clustered standard errors in parentheses. Significance levels: $^{x}p \leq 0.1$, $^{\star}\text{p} \leq 0.05$, $^{\star\star}\text{p} \leq 0.01$, $^{\star\star\star}\text{p} \leq 0.001$.

Figure C1: Region fixed effects



(a) (b)

Notes: Region fixed effects for Models M1 (dependent variable: logged real transfers per capita) and M4 (dependent variable: logged shares of transfers in the regional revenues).

Table C6: Robustness Test 3: Nonlinear Least Squares

	M2000	M2003	M2004	M2007	M2008	M2011	M2012	M2016	M2018
b_0	0.749	6.592***	11.488***	7.043***	15.091***	2.223***	4.64***	0.77	-2.437**
	(0.612)	(0.251)	(1.055)	(1.078)	(0.386)	(0.59)	(0.549)	(0.793)	(0.911)
c_1 Vote percentage	0.004	-0.03	0.059	0.035	0.577	-0.04	0.097	0.182	-0.058
	(0.054)	(0.049)	(0.054)	(0.127)	(0.549)	(0.097)	(0.2)	(0.179)	(0.178)
c_2 Turnout	-0.029	-0.056	0.033	-0.127	0.353	0.268*	-0.291	-0.14	-0.076
	(0.108)	(0.068)	(0.045)	(0.114)	(0.457)	(0.127)	(0.204)	(0.113)	(0.132)
c_3 log Transfers$_{s-1}$	0.99***	0.63***	0.312***	0.6***	0.057**	0.885***	0.752***	0.967***	1.17***
	(0.039)	(0.016)	(0.066)	(0.068)	(0.017)	(0.036)	(0.035)	(0.047)	(0.054)
c_4 VRP$_{s-1}$	-4.9e-07*	8.13e-08	-1.03e-07	-5.45e-07***	2.17e-06**	-2.14e-07^{x}	-9.87e-08	8.39e-08	1.11e-07
	(2.08e-07)	(1.48e-07)	(1.43e-07)	(1.20e-07)	(7.26e-07)	(1.09e-07)	(1.50e-07)	(1.18e-07)	(1.51e-07)
a_0	-535.608	-55.608	-77.777***	-36.782**	840.853	-237.051*	2450.298	164.692^{x}	154.958*
	(450.35)	(211.318)	(11.206)	(12.619)	(1926.798)	(108.877)	(11981.008)	(88.958)	(64.783)
a_1 log Transfers$_{s-1}$	33.637	14.659	4.647***	2.192**	-46.188	14.652*	-150.682	-9.797^{x}	-9.5*
	(28.308)	(26.214)	(0.671)	(0.815)	(105.278)	(6.715)	(736.885)	(5.275)	(4.026)
a_2 log Days served	-0.668	-21.049	-0.025	-0.269*	-14.147	-0.103	-1.801	-0.631	0.269
	(0.834)	(26.101)	(0.08)	(0.11)	(33.362)	(0.245)	(8.735)	(0.438)	(0.331)
f_1 Turnout P05	-0.311*	-0.01	1.296*	11.168*	-11.879**	-0.36*	0.283	1.305**	0.75**
	(0.148)	(0.093)	(0.596)	(5.438)	(4.303)	(0.144)	(1.695)	(0.426)	(0.26)
f_2 Vote percentage P05	0.041	-0.717***	1.622	-6.836*	13.054**	-0.243	-0.107	-0.545	0.674^{x}
	(0.225)	(0.159)	(1.01)	(3.424)	(4.878)	(0.182)	(1.757)	(0.381)	(0.355)
σ	0.038	0.032	0.03	0.049	0.221	0.049	0.077	0.056	0.062
df	68	69	69	68	68	69	69	70	72
N	78	79	79	78	78	79	79	80	82

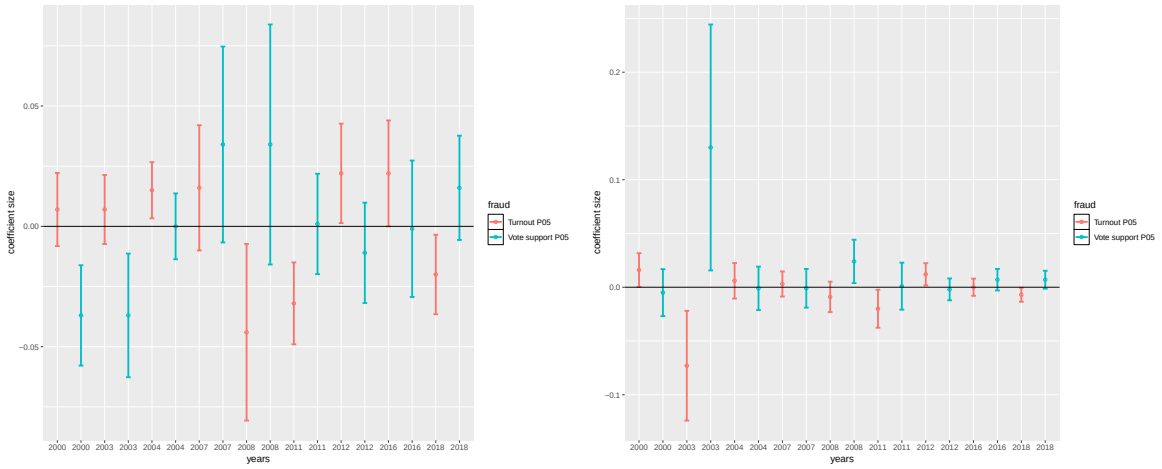
Notes: Region-level data built on precinct-level data. Dependent variable: Logged real transfers per capita. Standard errors in parentheses. Significance levels: $^{x}p \leq 0.1$, *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001.

Table C7: Robustness Test 3: Nonlinear Least Squares

	M2000	M2003	M2004	M2007	M2008	M2011	M2012	M2016	M2018
b_0	-0.09	-0.161^{x}	0.072	0.167***	0.396***	0.03	-0.053	-0.098*	0.184***
	(0.105)	(0.091)	(0.085)	(0.026)	(0.096)	(0.06)	(0.057)	(0.048)	(0.042)
c_1 Vote percentage	0.022	-0.023	0.047	0.003	-0.021	0.001	-0.007	0.147	-0.192*
	(0.091)	(0.105)	(0.107)	(0.078)	(0.122)	(0.075)	(0.095)	(0.108)	(0.079)
c_2 Turnout	0.361*	0.045	0.049	-0.105	0.043	0.078	0.016	-0.099	0.014
	(0.178)	(0.131)	(0.078)	(0.07)	(0.092)	(0.093)	(0.093)	(0.068)	(0.06)
c_3 log Transfers$_{s-1}$	0.712***	0.951***	0.713***	0.876***	0.383**	0.83***	1.044***	1.038***	0.988***
	(0.05)	(0.066)	(0.048)	(0.034)	(0.14)	(0.096)	(0.13)	(0.04)	(0.031)
c_4 VRP$_{s-1}$	-9.38e-07*	5.97e-07	-4.89e-07*	-4.19e-07	-6.174e-07***	-8.07e-08	-1.820e-07*	2.41e-07**	-1.06e-07
	(3.73e-07)	(4.49e-07)	(2.21e-07)	(8.21e-08)	(1.407e-07)	(1.01e-07)	(8.50e-08)	(7.62e-08)	(6.71e-08)
a_0	-91.62	-9.234	52.548	-71.071	3.439	13.412	5.331	149.049	97.873
	(123.446)	(47.068)	(190.229)	(116.358)	(3.156)	(11.639)	(3.782)	(837.212)	(425.335)
a_1 log Transfers$_{s-1}$	-121.031	104.525	-189.66	33.6	-7.755	-27.472	-22.2	-246.015	-249.145
	(169.279)	(560.16)	(1108.391)	(56.749)	(4.714)	(18.176)	(14.735)	(1359.479)	(1128.235)
a_2 log Days served	14.137	-0.05	6.927	6.762	-0.042	-0.157	0.061	-14.358	-10.555
	(19.112)	(4.259)	(66.371)	(11.528)	(0.2)	(0.886)	(0.213)	(80.643)	(44.9)
f_1 Turnout P05	1.504^{x}	-0.302	0.139	1.726	-0.044	-0.677**	-0.119	1.626***	0.501*
	(0.757)	(0.195)	(0.136)	(1.511)	(0.216)	(0.208)	(0.251)	(0.403)	(0.241)
f_2 Vote percentage P05	-1.883*	0.535	-0.392	-1.556	-0.72	0.425	0.652	-1.698***	-0.642*
	(0.846)	(0.381)	(0.236)	(1.298)	(0.501)	(0.27)	(0.451)	(0.438)	(0.281)
σ	0.062	0.07	0.053	0.031	0.045	0.039	0.036	0.034	0.028
df	68	69	69	68	68	69	69	70	72
N	78	79	79	78	78	79	79	80	82

Notes: Region-level data built on precinct-level data. Dependent variable: Logged shares of transfers in the regional revenues. Standard errors in parentheses. Significance levels: $^{x}p \leq 0.1$, *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001.

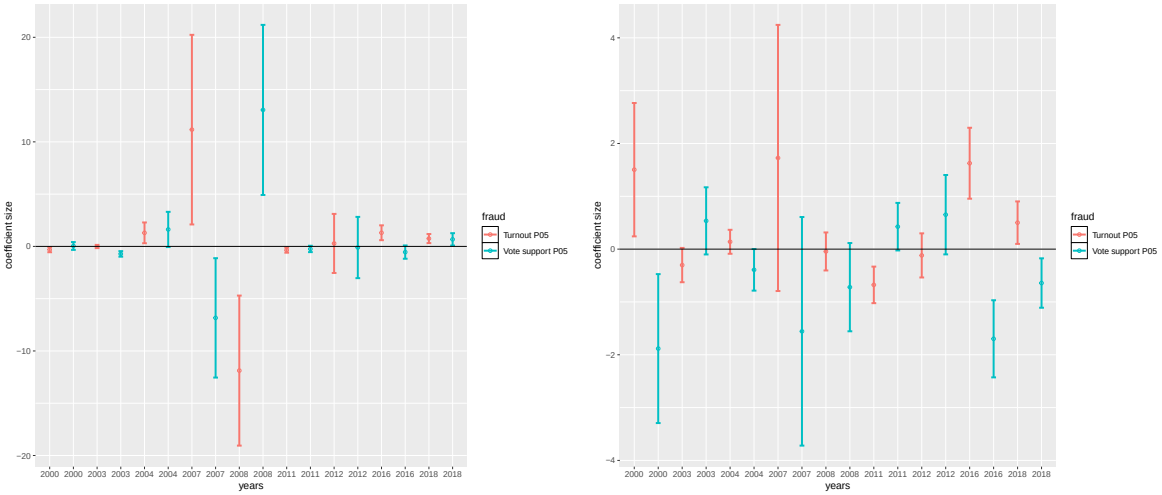
Figure C2: Robustness Test 1: Nonlinear Least Squares with Significance Indicator Variable



(a) (b)

Notes: (a) – Logged real transfers per capita; (b) – Logged shares of transfers in the regional revenues.

Figure C3: Robustness Test 3: Nonlinear Least Squares



(a) (b)

Notes: (a) – Logged real transfers per capita; (b) – Logged shares of transfers in the regional revenues.