Partisan Poll Watchers and Electoral Manipulation

Online Appendix

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Summary statistics

Table 1: Summary Statistics

Variable	Observations	Mean	Standard Deviation	Min	Max
PAN's vote share	267,984	0.305	0.169	0	1
PRI's vote share	267,984	0.391	0.163	0	1
PRD's vote share	267,984	0.219	0.178	0	1
Turnout	267,984	0.528	0.148	0.001	1
Null share	267,984	0.04	0.032	0	0.685
PAN's representatives	267,984	0.781	0.37	0	1
PRI's representatives	267,984	0.886	0.295	0	1
PRD's representatives	267,984	0.72	0.404	0	1
Registered PAN's representatives	241,154	0.968	0.163	0	1
Registered PRI's representatives	241,154	0.994	0.069	0	1
Registered PRD's representatives	241,154	0.927	0.245	0	1
Distance to closest largest city	267,669	66.323	79.867	0.016	699.954
Distance to PAN's district headquarter	267,669	24.406	78.964	0.011	1,199.36
Distance to PRI's district headquarter	267,669	22.645	51.709	0.014	699.995
Margin	267,984	0.149	0.111	0.001	0.618
PAN governor	267,984	0.236	0.425	0	1
PRI governor	267,984	0.584	0.493	0	1
Polling stations	267,984	1.936	1.108	1	44
Population	267,984	376,250	468,648.5	89.4	1823,658
Schooling	267,984	7.98	1.876	0.8	13.74
State election	267,984	0.472	0.5	0	1

The distribution of the share of polling stations in a precinct with representatives shown in Figure 1 indicates that parties either cover all polling stations or none, and that it is relatively less common to have representation only in some polling stations in the same precinct. This observation justifies our decision to discretize the choice of representation when studying the allocation of the representatives at the precinct level.

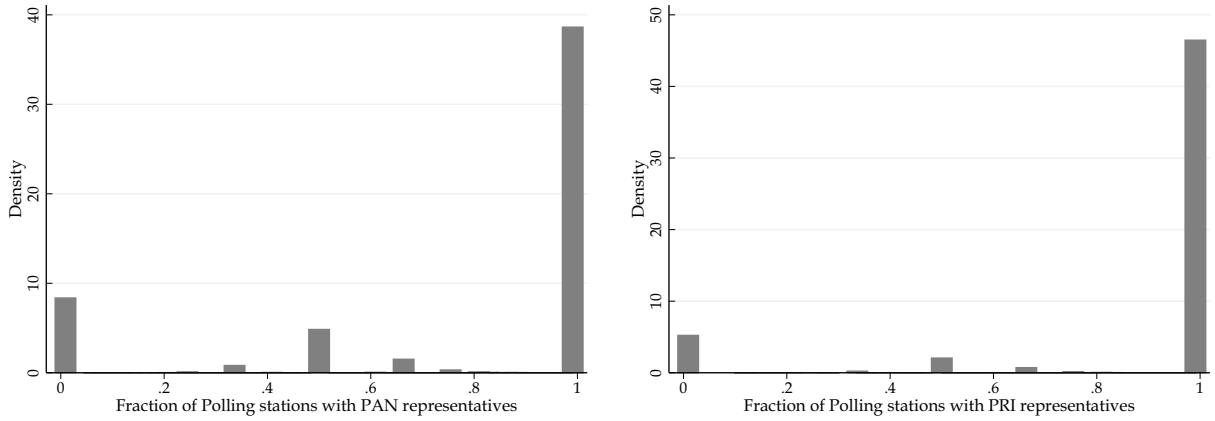

Figure 1: Parties' Representation in Precincts

Coalition definitions

The names of the parties included in coalitions during the period of analysis are: Convergencia (C), Movimiento Ciudadano (MC), Partido de Acción Nacional (PAN), Partido de Alianza Social (PA), Partido de la Sociedad Nacionalista (PSN), Partido Revolucionario Institucional (PRI), Partido del Trabajo (PT), and Partido Verde Ecologista (PVEM).

The names of the coalitions and the member parties are: Alianza por el Cambio (APC: PAN and PVEM), Alianza por Mexico (APM: PRD, C, PT, PA, and PSN), Alianza por Mexico (AM: PRI and PVEM), Compromiso Mexico (CM: PRI and PVEM), Movimiento Progresista (MP: PRD, PT, and MC), Por el Bien de Todos (PBT: PRD, PT, and C), and Primero Mexico (PM: PRI and PVEM).

The Primero Mexico coalition in 2006 applied only to the districts Chiapas: districts 1-12; Distrito Federal: districts 2, 6, and 16; Guanajuato: district 10; Guerrero: districts 4 and 9; Hidalgo: districts 3 and 5; Jalisco: districts 6, 7, and 9; Mexico: all districts but 9, 19, 20, 25, 29, 30, 31, and 36; Morelos: district 1; Puebla: district 11; Quintana Roo: districts 1 and 3; Tlaxcala: district 1; Yucatan: districts 1-5, and Zacatecas: district 3.

Table 2 includes the coalitions that include the PRI, the PAN, and the PRD in our analysis. Blanks appear when the party ran by itself.

Table 2: Coalitions

Year	PRI	PAN	PRD
2000	-	APC	APM
2003	-	-	-
2006	AM	-	PBT
2009	PM	-	-
2012	CM	-	MP

Polling station level results

Table 3 presents coefficients of a model that uses polling station level information. These models include polling station fixed effects, year effects, and the full set of controls included in the main regressions. The polling station fixed effects account for specific characteristics of groups of voters within the precinct. These could be known by party operatives driving mobilization strategies and can potentially affect party representatives' allocation choices.

It is important to note that given the rule capping the sizes of polling stations to 750 voters, it is possible that small changes in the number of registered voters in a precinct over time can induce large changes in the allocation of voters to polling stations. This could invalidate our identification assumption of having roughly invariant political preferences in a polling station. To account for this, a polling station whose voters came from the division of a larger polling station is treated as a new one in the empirical analysis.[1]

One important drawback of using the most disaggregated data is the risk of bias driven by spillover effects. To account for this, we add to the baseline specification the number of representatives of each party in the precinct where the polling station is located in that election. We also control for the number of registered representatives of each party in the precinct (along with the logged number of polling stations in the precinct as in all other regressions) and for indicators of whether there was a registered representative of each party in the polling station.

We still see that having a representative in a polling station is associated with a higher vote share for the party. It also reduces the vote share of the party's rival, although

[1]To illustrate, if a precinct has 750 registered voters in 2000, 740 voters in 2003, and 800 in 2006, all voters would vote in a polling station with the same identifier in 2000 and 2003. In 2006, the voters would be divided in two stations. We assign to both of these polling stations a different identifier from the one that the original polling station had. We repeat the process if the rule is applied later to any of the "new" polling stations.

Table 3: Party Representatives and Electoral Outcomes (Polling Station Level Results)

Dependent variable:	PAN's vote share	PRI's vote share	Turnout	Null share
	(1)	(2)	(3)	(4)
PAN's representatives	0.022***	-0.003	0.007*	-0.002**
	(0.003)	(0.003)	(0.004)	(0.001)
PRI's representatives	-0.010***	0.013***	0.002	-0.005***
	(0.003)	(0.003)	(0.003)	(0.001)
PAN's representatives ×	0.000	-0.015***	-0.006	0.003***
PRI's representatives	(0.004)	(0.004)	(0.004)	(0.001)
Others' representatives	-0.015***	-0.015***	-0.005***	0.001**
	(0.002)	(0.002)	(0.001)	(0.001)
PAN's representatives in precinct	0.016***	-0.013***	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.001)
PRI's representatives in precinct	0.001	-0.003	0.009***	-0.003***
	(0.002)	(0.002)	(0.003)	(0.001)
PAN's reps. in precinct ×	-0.002***	0.000	0.000	0.000
PRI's reps. in precinct	(0.000)	(0.001)	(0.001)	(0.000)
Others' reps. in precinct	-0.010***	-0.008***	-0.004***	-0.000
	(0.002)	(0.002)	(0.001)	(0.000)
Polling stations	188,159	188,159	188,161	188,159
Observations	474,882	474,882	474,920	474,884

All models include polling station and election year fixed effects. Additional controls are: logged number of polling stations in the precinct, margin of victory in the previous election, a dummy indicating whether the governor belongs to the same party, a dummy indicating whether there is a local election, logged population in the municipality where the precinct is located, and average number of years in school of a person in the municipality. All models also control for whether there were registered representatives of each party in the polling station and the fraction of polling stations with registered representatives of each party in the precinct. Standard errors clustered at the district level are in parentheses.

the coefficient on the PAN representative is not precisely estimated in the PRI vote share model. As before, third party representatives are also negatively related to the vote shares of the PAN and PRI, and the positive effect of the PRI representative on the PRI vote share is cancelled out by the presence of a PAN representative.

Interestingly, we see that having more third party representatives in other polling stations in the precinct is negatively related to the vote share of the PAN and the PRI. There is also some evidence of spillover effects for PAN representatives in the expected directions.

As for null vote share models, we find similar patterns found with the precinct level results. For turnout models, we see that, as before, party representatives of both major parties are positively related to turnout, but the coefficient is only precisely estimated for the PAN. The PRI representatives in the other polling stations in the precinct do have a positive and significant effect on turnout.

Autoregressive electoral outcomes models

Table 4 presents results of models that control for the lagged dependent variable, election year effects, and baseline controls, but that does not include precinct intercepts. We observe that the magnitude of the coefficients on representatives in their parties vote share models are in general slightly larger than what we obtained with the fixed effects models. Under the assumption that the previous votes share of a given party is positively correlated with the presence of its representatives, this pattern is expected. It can be shown that fitting an autoregressive model with no fixed effects when the true model includes fixed effects overestimates the true effect, while fitting a fixed effects model when the true model includes an autoregressive term underestimates it (Angrist and Pischke 2009).

An alternative would be to estimate a model that accounts for both fixed effects and lagged dependent variables. Consistent estimation of these models, however, requires assumptions that are not tenable for this particular application. In particular, the residuals in these vote share models exhibit high serial correlation that persists in different autoregressive

and moving average specifications when using the Arellano-Bond estimator. This invalidates assumptions needed for consistent estimation. Given the possibility of omitted variables in the simple AR1 specifications, we should be cautious about the interpretation of these results. Reassuringly, however, we see that the sign, statistical significance, and magnitude of the estimated coefficients of interest are similar to the ones found in the baseline results.

Table 4: Party Representatives and Electoral Outcomes (AR1 models)

Dependent variable:	PAN's vote share		PRI's vote share		Turnout	Null share
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged dep. Variable	0.609***	0.609***	0.494***	0.494***	0.525***	0.086***
	(0.016)	(0.016)	(0.015)	(0.015)	(0.015)	(0.027)
PAN's representatives	0.062***	0.070***	-0.002	0.016**	0.024***	-0.001
	(0.004)	(0.007)	(0.003)	(0.007)	(0.007)	(0.002)
PRI's representatives	-0.022***	-0.016***	0.018***	0.033***	0.026***	-0.011***
	(0.006)	(0.005)	(0.006)	(0.007)	(0.007)	(0.002)
PAN's representatives ×		-0.009		-0.022***	-0.015*	0.001
PRI's representatives		(0.007)		(0.007)	(0.008)	(0.002)
Others' representatives	-0.034***	-0.034***	-0.051***	-0.050***	-0.001	0.002
	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.001)
Observations	205,513	205,513	205,513	205,513	205,546	205,515

All models include election year dummies. Additional controls are: logged number of polling stations, margin of victory in the previous election, a dummy indicating whether the governor belongs to the same party, a dummy for whether there is a local election, logged population in the municipality where the precinct is located, and average number of years in school of a person in the municipality. Standard errors clustered at the district level are in parentheses.

Other figures and tables

Table 5: Party Representatives and Electoral Outcomes (District-Year Fixed Effects)

Dependent variable:	PAN's vote share		PRI's vote share		Turnout	Null share
	(1)	(2)	(3)	(4)	(5)	(6)
PAN's representatives	0.049***	0.040***	-0.018***	-0.017***	0.011***	-0.001*
	(0.003)	(0.003)	(0.002)	(0.004)	(0.003)	(0.001)
PRI's representatives	-0.009***	-0.016***	0.021***	0.022***	0.015***	-0.001***
	(0.002)	(0.002)	(0.003)	(0.004)	(0.002)	(0.000)
PAN's representatives ×		0.011***		-0.001	0.002	0.000
PRI's representatives		(0.003)		(0.004)	(0.003)	(0.001)
Others' representatives	-0.016***	-0.017***	-0.025***	-0.025***	0.008***	0.000
	(0.002)	(0.002)	(0.003)	(0.003)	(0.001)	(0.000)
Observations	267,984	267,984	267,984	267,984	268,006	267,986

All models include district-year fixed effects. Additional controls are: logged number of polling stations, margin of victory in the previous election, a dummy for whether the governor belongs to the same party, a dummy indicating whether there is a local election, logged population in the municipality where the precinct is located, and average number of years in school of a person in the municipality. Standard errors clustered at the district level are in parentheses.

Table 6: Party Representatives and Electoral Outcomes (PRD)

Dependent variable:	PRD's vote share		
	(1)	(2)	(3)
PRD's representatives	0.039***	0.043***	0.043***
	(0.003)	(0.004)	(0.012)
Other's representatives	-0.025***	-0.023***	-0.023***
	(0.006)	(0.006)	(0.006)
PRD's representatives ×			-0.001
Other's representatives			(0.012)
Precincts	64,655	64,379	64,379
Observations	268,146	242,671	242,671

All models include precinct fixed effects. Additional controls are: logged number of polling stations, margin of victory in the previous election, a dummy indicating whether the governor belongs to the same party, a dummy for whether there is a local election, logged population in the municipality where the precinct is located, and average number of years in school of a person in the municipality. Models 2 and 3 also control for the fraction of registered representatives of the PRD and other parties. Standard errors clustered at the district level are in parentheses.

Table 7: Party Representatives and High Vote Shares and Turnout

Party:	PAN	PRI
	(1)	(2)
PAN's representatives	0.000	-0.004**
	(0.002)	(0.002)
PRI's representatives	-0.003	-0.001
	(0.002)	(0.002)
PAN's representatives ×	0.003	0.004*
PRI's representatives	(0.002)	(0.002)
Others' representatives	-0.002**	-0.001
	(0.001)	(0.001)
Precincts	64,345	64,345
Observations	241,174	241,324

The dependent variable is the number of polling stations in the precinct in which turnout and vote share of the party was above 95th percentile in the district in that election. All models include precinct fixed effects. Additional controls are: logged number of polling stations, margin of victory in the previous election, a dummy indicating whether the governor belongs to the same party, a dummy for whether there is a local election, logged population in the municipality where the precinct is located, and average number of years in school of a person in the municipality. Standard errors clustered at the district level are in parentheses.

Model estimation

We start by generalizing the model to multiple precincts. Let $\mathbf{p}^s = (\mathbf{p}^s_{\text{PAN}}, \mathbf{p}^s_{\text{PRI}})$ be the equilibrium probabilities in electoral precinct s. Similarly, let $\mathbf{x}^s = (\mathbf{x}^s_{\text{PAN}}, \mathbf{x}^s_{\text{PRI}})$ represent the observed party and region characteristics of precinct s. We assume that the vector of structural parameters, θ, is the same across precincts, but that parties' actions are independent across precincts. Expression (3) in the main text needs to be satisfied in each precinct and so

$$\mathbf{p}^s = \Psi(\mathbf{p}^s, \mathbf{x}^s; \theta) \text{ for } s = 1, \ldots, S. \tag{1}$$

Given f, we can write the right hand side of expression (2) in the paper as

$$\psi^s_i(a^s_i = k, \mathbf{p}^s_{-i}, \mathbf{x}^s_i; \theta) = \frac{\exp(\mathbf{x}^{s\prime}_i \beta_{i,k} + p^s_{-i}(M)\alpha_{i,k,M} + p^s_{-i}(H)\alpha_{i,k,H})}{\sum_{k' \in \{L,M,H\}} \exp(\mathbf{x}^{s\prime}_i \beta_{i,k'} + p^s_{-i}(M)\alpha_{i,k',M} + p_{-i}(H)\alpha_{i,k',H})}. \tag{2}$$

Then the log-likelihood is

$$L(\theta \mid \mathbf{X}, \mathbf{P}) = \sum_{s=1}^{S} \sum_{i=1}^{2} \sum_{k \in \{L,M,H\}} \delta^s_i(k) \ln \left(\psi^s_i(a^s_i = k, \mathbf{p}^s_{-i}, \mathbf{x}^s_i; \theta) \right)$$

subject to (1), with

$$\delta^s_i(k) = \begin{cases} 1 & \text{if } a^s_i = k \\ 0 & \text{if } a^s_i \neq k, \end{cases}$$

$\mathbf{P} = (\mathbf{p}^s)_{s=1}^S$, and $\mathbf{X} = (\mathbf{x}^s)_{s=1}^S$.

There are several approaches to estimate the parameters in θ. One of them is the Nested Fixed Point Algorithm that requires solving the system (1) for each candidate θ before

evaluating the likelihood (2).[2] Such an approach requires either that the equilibrium of the game is unique or solving for all equilibria and specifying a selection mechanism among them. An alternative approach, which is the one we adopt here, involves a two-step estimation. In the first step, we estimate the beliefs of each party regarding their opponent's actions. We then use these estimates in the second step to maximize the likelihood, finding the parameters of interest that correspond to those beliefs. Consistency of the structural estimates requires that only one equilibrium is played in the data and that we obtain consistent estimates of action probabilities in the first stage. The first stage was estimated using a multinomial logit with a flexible specification that included squared terms and pairwise interactions of all state variables.

Identification

We will assume that the expected payoff of choosing the low level of representation in a precinct is zero. That is, $g_{i,L}(a_{-i}, \mathbf{x}_i) = 0$. This is similar to the normalization used in multinomial models. We are also required to impose an exclusion restriction to identify the deterministic part of the payoff functions. Note that, in equilibrium, $\mathbf{x}_i^s$ determines the beliefs of i about her opponent taking a given action. At the same time, $\mathbf{x}_i^s$ directly affects the payoff of i through the term $\mathbf{x}_i^s \beta_{i,k}$. An identification strategy to address this issue is to include in $\mathbf{x}_i^s$ at least one continuous variable that affects the payoff of i, but that does not directly affect the payoff of the other party once other covariates are controlled for.[3] We choose the distance from the precinct centroid to the closest headquarter of each party in the district to satisfy this requirement.

[2]This is the static game equivalent of the methodology introduced in Rust (1993).

[3]For a general discussion about identification of parameters in empirical static models of strategic interactions see Bajari et al. (2010).

2S-LS Estimator, intended allocation, and model diagnostics

Instead of maximizing the pseudo-likelihood function, one can find the parameters, θ, that minimize the distance between the equilibrium probabilities and the best response functions (Pesendorfer and Schmidt-Dengler 2008). As is the case with the maximum likelihood approach, one needs to have a consistent estimate of the parties' beliefs, $\hat{\mathbf{P}}$. We again use a multinomial logit with a flexible specification (all explanatory variables are included with linear and quadratic terms in addition to all possible pairwise interactions) to obtain such estimates. The estimated parameters are

$$\theta^{2S-LS} = \arg\min_{\theta} \|\hat{\mathbf{P}} - \Psi(\hat{\mathbf{P}}, \mathbf{X}; \theta)\|^2.$$

Table 8 shows the results.

Table 8: Representative Allocation Model Estimates (Least Squares)

Dependent variable:	PRI's choice		PAN's choice	
	Medium	High	Medium	High
Strategic allocation:				
Rival's high representation	0.923	1.999**	5.262***	2.178***
	(0.788)	(0.792)	(1.516)	(0.677)
Rival's medium representation	5.266***	2.819**	5.63**	-2.644**
	(1.162)	(1.163)	(1.809)	(1.035)
Electoral environment:				
ln(Polling stations)	0.079	-0.075	1.375***	0.343**
	(0.28)	(0.271)	(0.135)	(0.128)
L. Margin	-0.66	-1.825	-0.699	-0.766
	(2.805)	(2.732)	(0.651)	(0.67)
L. Other's representatives	0.066	0.084	-0.121**	-0.159**
	(0.13)	(0.123)	(0.049)	(0.057)
L. Precinct's difference PAN-PRI	-0.961	-0.319	0.604	0.342
	(1.071)	(1.048)	(0.457)	(0.418)
L. Turnout	-1.636	-3.266**	1.797***	2.417***
	(1.2)	(1.257)	(0.343)	(0.33)
State election	-2.406	-2.867	-0.787***	-1.555***
	(5.864)	(5.859)	(0.169)	(0.18)
Other controls				
Governor	0.53	1.943***	1.088***	2.124***
	(0.331)	(0.342)	(0.174)	(0.213)
ln(Distance to city)	-0.203	-0.134	0.135**	0.12**
	(0.158)	(0.163)	(0.058)	(0.06)
ln(Distance to party's headquarter)	-0.158	-0.284**	-0.071**	-0.022
	(0.109)	(0.116)	(0.034)	(0.042)
ln(Population)	-0.091	-0.01	-0.151*	-0.235**
	(0.165)	(0.173)	(0.091)	(0.1)
Schooling	-0.318	-0.491*	0.259***	0.249***
	(0.21)	(0.224)	(0.074)	(0.078)

This table presents least squares estimated structural parameters of the representative allocation model. Lags are denoted by 'L.' Bootstrapped standard errors clustered at the district level are in parentheses.

Table 9: Representative Allocation Model Estimates (Registered Representatives)

Dependent Variable:	PRI's choice		PAN's choice	
	Medium	High	Medium	High
Strategic allocation:				
Rival's high representation	0.746	3.863***	10.361***	-2.601**
	(1.511)	(0.85)	(3.192)	(0.832)
Rival's medium representation	-1.174	-5.87**	33.79***	24.72***
	(3.203)	(2.178)	(5.683)	(3.57)
Electoral environment:				
ln(Polling Stations)	2.158***	0.914***	1.534***	0.426***
	(0.146)	(0.105)	(0.061)	(0.044)
L. Margin	0.034	-4.973***	-1.626***	-1.629***
	(0.535)	(0.369)	(0.29)	(0.192)
L. Other's representatives	0.036	-0.015	-0.158**	-0.254***
	(0.099)	(0.057)	(0.056)	(0.039)
L. Precinct's difference PAN-PRI	-1.517***	0.239	-0.143	0.847***
	(0.404)	(0.231)	(0.191)	(0.121)
L. Turnout	-0.336	-6.852***	-1.053***	1.727***
	(0.483)	(0.336)	(0.192)	(0.129)
State election	-2.276***	-3.488***	-0.616***	-2.612***
	(0.402)	(0.349)	(0.082)	(0.055)
Other controls:				
Governor	0.27	3.606***	1.265***	2.9***
	(0.297)	(0.195)	(0.141)	(0.117)
ln(Distance city)	-0.179**	-0.102**	0.119***	0.148***
	(0.073)	(0.044)	(0.03)	(0.021)
ln(Distance to party's headquarter)	-0.601***	-0.934***	-0.164***	-0.071***
	(0.057)	(0.038)	(0.022)	(0.014)
ln(Population)	-0.283***	-0.028	0.052*	0.081***
	(0.066)	(0.042)	(0.03)	(0.02)
Schooling	-0.053	-0.401***	0.17***	0.211***
	(0.052)	(0.034)	(0.026)	(0.018)

This table presents maximum likelihood estimates of the parameters of the representatives allocation model. The estimations use data on registration of representatives. Lags are denoted by 'L.' Standard errors are in parentheses.

The scatter plot at the top of Figure 2 gives estimated probabilities for the maximum likelihood model. The one at the bottom gives the least squares estimated probabilities. The solid lines represent predicted best response probabilities from linear regression models. Both graphs show that the majority of probabilities from the first stage are close to their best responses and the estimated regression coefficient is almost one for both models. This indicates that our two-step estimates are not incompatible with equilibrium restrictions even though such restrictions are not imposed at the estimation stage.

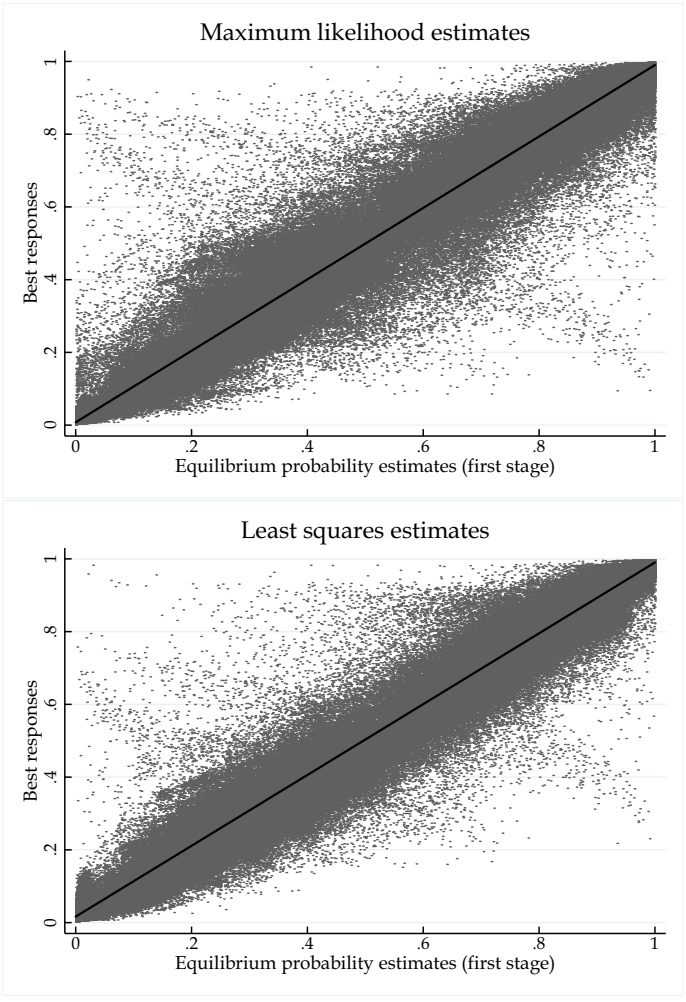

Figure 2: Best Responses and First Stage Equilibrium Action Probabilities

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