APPENDIX

DETERMINING THE IMPACT OF STRATEGIC VOTING ON ELECTION RESULTS

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1. STUDIES USED FOR PARTY PREFERENCE ESTIMATION

1.1. *Data sources*

Data from eleven studies with information on respondent's party preference were gathered. Table 1 reports them in detail.

TABLE 1: Overview of the data sources gathered.

Study name	UKDA study number	Used for preference estimation of		Net no. of cases used
		1997	2001	
BSA 1996*	3921	x		2,373
BSA 1998	4131	x		1,327
BSA 2000	4486		x	1,380
BSA 2001	4615		x	1,855
BSA 2002	4838		x	1,327
GES 1997**, Cross-Section	3887	x		1,883
GES 2001, Cross-Section	4619		x	1,189
GES 2001, Campaign Panel	4621		x	3,254
GES 1992-1997 Panel	3888	x		975
GES 1997-2001 Panel	4028		x	1,316

* BSA stands for British Social Attitudes Survey.

** GES stands for General Election Study.

1.2. *Summary statistics*

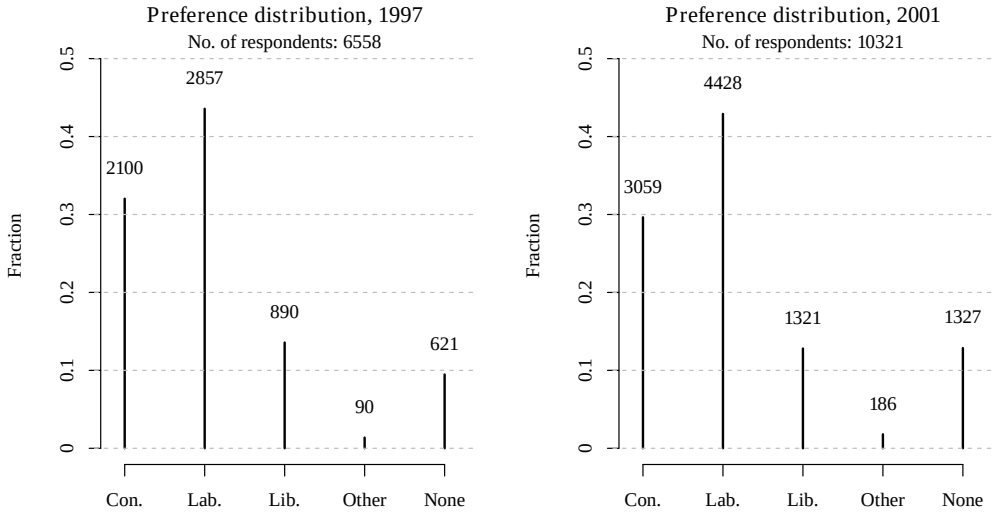
TABLE 2: Summary statistics of the survey data utilized: numbers of respondents, N, percentage of districts covered, J, average numbers of respondents per district, $\bar{N}_j$, their standard deviations, minimum and maximum values.

	N	J	$\bar{N}_j$	$s.d.(N_j)$	$\min(N_j)$	$\max(N_j)$
1997	6,558	79.9	15.5	11.8	1	81
2001	10,321	91.7	21.3	13.6	1	76
Pooled	16,879	97.5	32.8	20.1	1	126

Scheme for generating the party preference variable

if party identification item available like
"Generally speaking, do you think of yourself as Conservative, Labour, Liberal Democrat, (Nationalist/Plaid Cymru) or what?"
then
  use it (if respondent has DK and NA, move to next step);
else if party closeness item available like
"Do you generally think of yourself as a little closer to one of the parties than the others?"
then
  use it (if respondent has DK and NA, move to next step);
else if preferred party item available like
"Which party did you really prefer?"
then
  use it (if respondent has DK and NA, move to next step);
else if party thermometer item available like
"Please choose a phrase from this card to say how you feel about the Conservative Party (the Labour Party / the Liberal Democrats)?"
then
  use it (code as preference for the mostly preferred party (i.e. the party with the highest score). If two parties are scored equally and are preferred over all other parties, the respondent is coded as preferring both parties.);
else
  set party identification variable to missing.

FIGURE 1: Distributions of party preferences, 1997 and 2001. Results based on survey data listed above.



3. VALIDATION RESULTS: ESTIMATING PARTY VOTE SHARES FOR THE 1997 AND 2001 GENERAL ELECTIONS

TABLE 3: Validation results: mean absolute errors (MAEs), mean widths of 90% Bayesian credible intervals, and the intervals' coverage probabilities.

	MAE (direct)	MAE (model-based)	Mean width of 90%-CI	Coverage probabilities
Conservative 1997	0.145	0.052	0.198	0.8568
Labour 1997	0.169	0.0795	0.269	0.803
Lib. Democrat 1997	0.113	0.055	0.191	0.871
Conservative 2001	0.125	0.063	0.186	0.765
Labour 2001	0.131	0.079	0.207	0.710
Lib. Democrat 2001	0.094	0.049	0.168	0.854

FIGURE 2: Distributions of party preferences over studies, 1997 and 2001. Results based on survey data listed above.

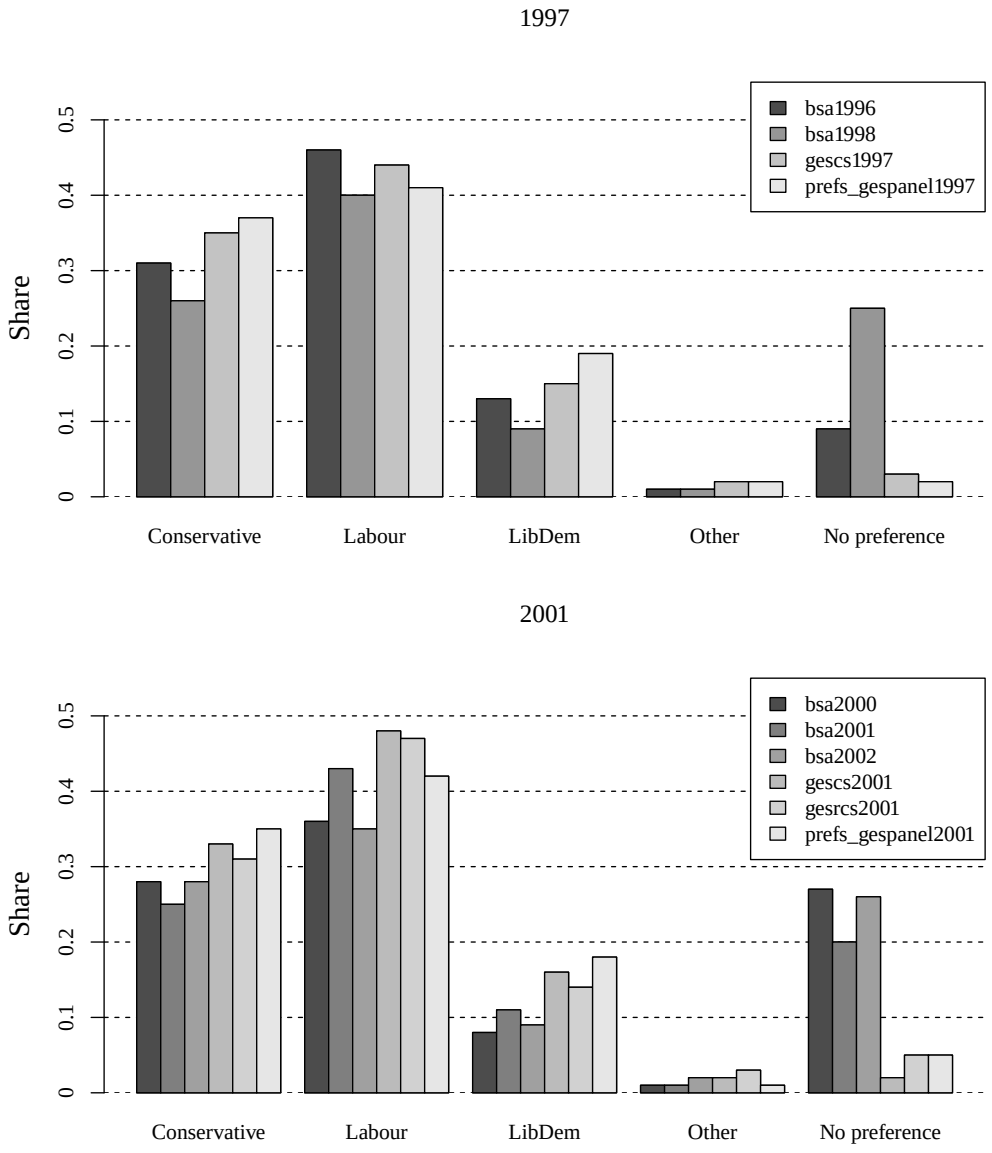


FIGURE 3: Moran's plots: (true) district-level party vote shares versus their spatial lags, i.e., the average party vote shares in the districts' neighborhoods. Official results from the United Kingdom general elections 1997 and 2001 (english districts only).

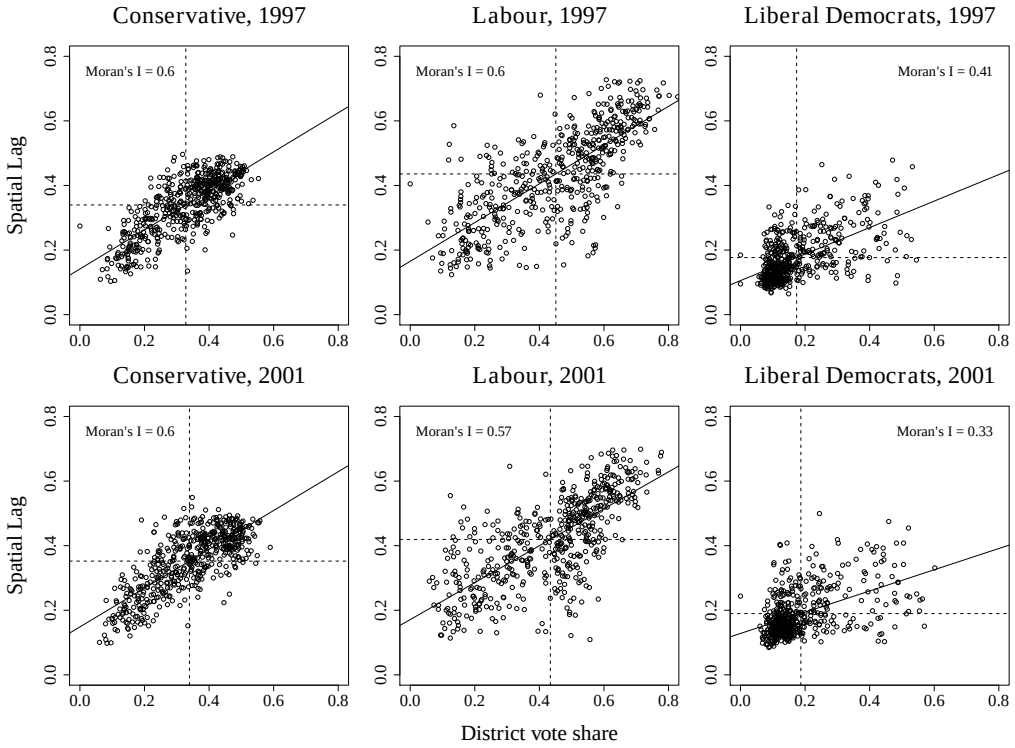


FIGURE 4: Distributions of voting behavior over studies, 1997 and 2001. Results based on survey data listed above.

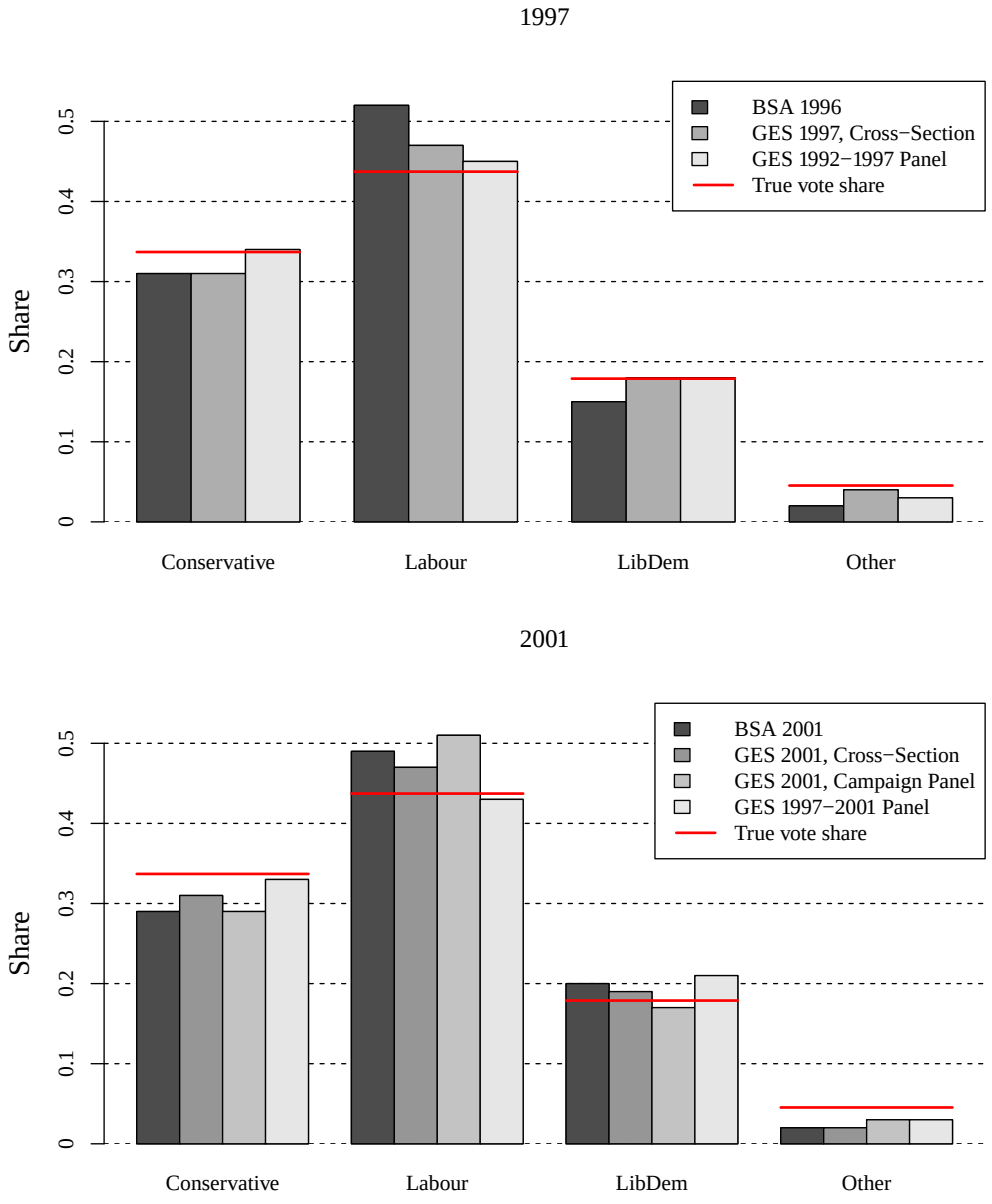


FIGURE 5: True versus estimated district-level party vote shares (direct estimator) at the UK general elections 1997 and 2001 (England only). The dashed vertical and horizontal lines indicate the true and the estimated mean values.

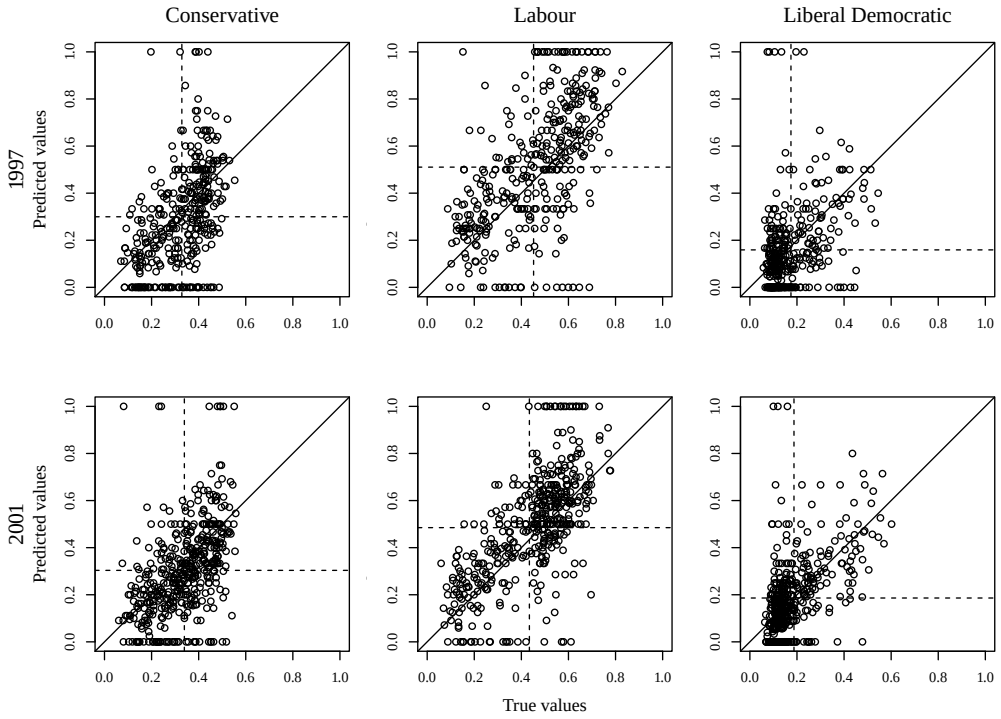


FIGURE 6: True versus estimated district-level party vote shares (model-based estimator) at the UK general elections 1997 and 2001 (England only). The dashed vertical and horizontal lines indicate the true and the estimated mean values.

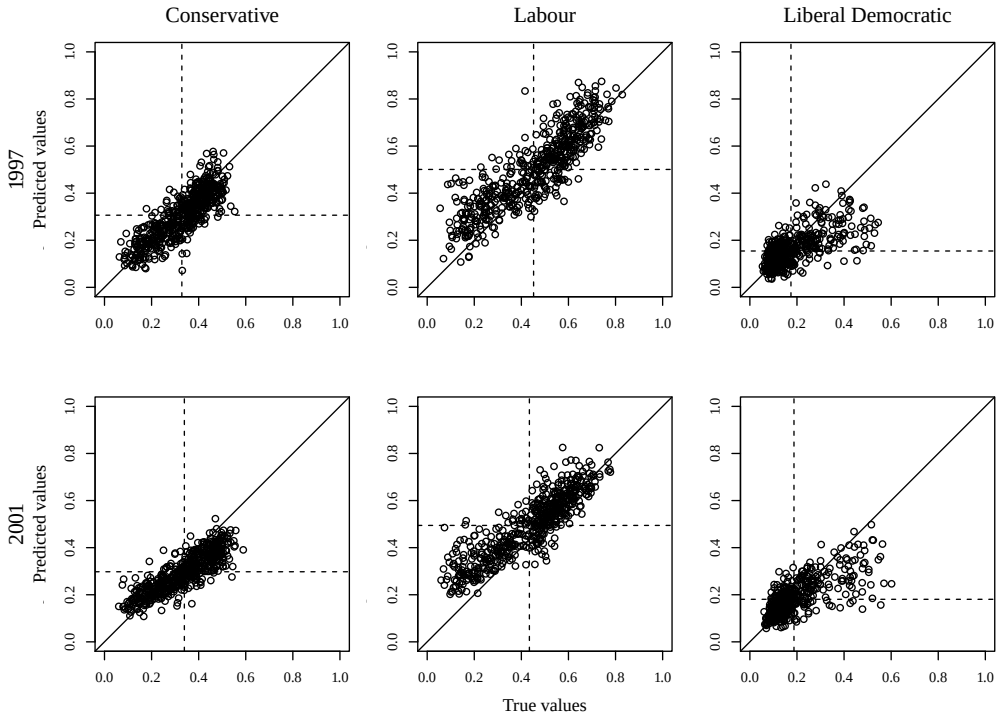


FIGURE 7: True and estimated district-level party vote shares, 1997 versus 2001 results. The dashed vertical and horizontal lines indicate the true and the estimated mean values.

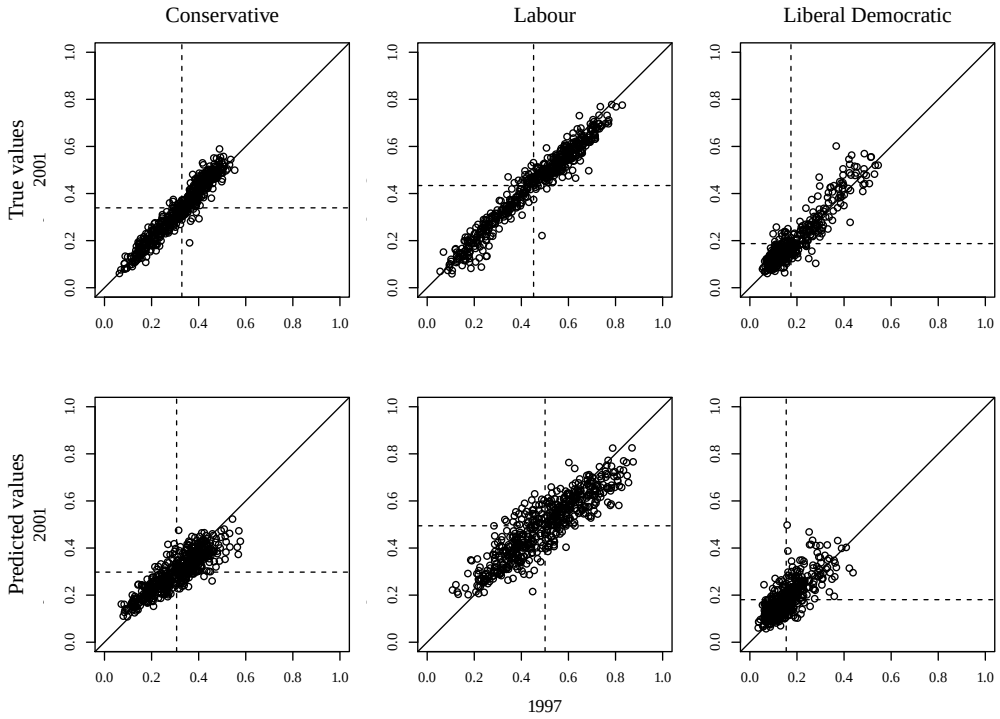
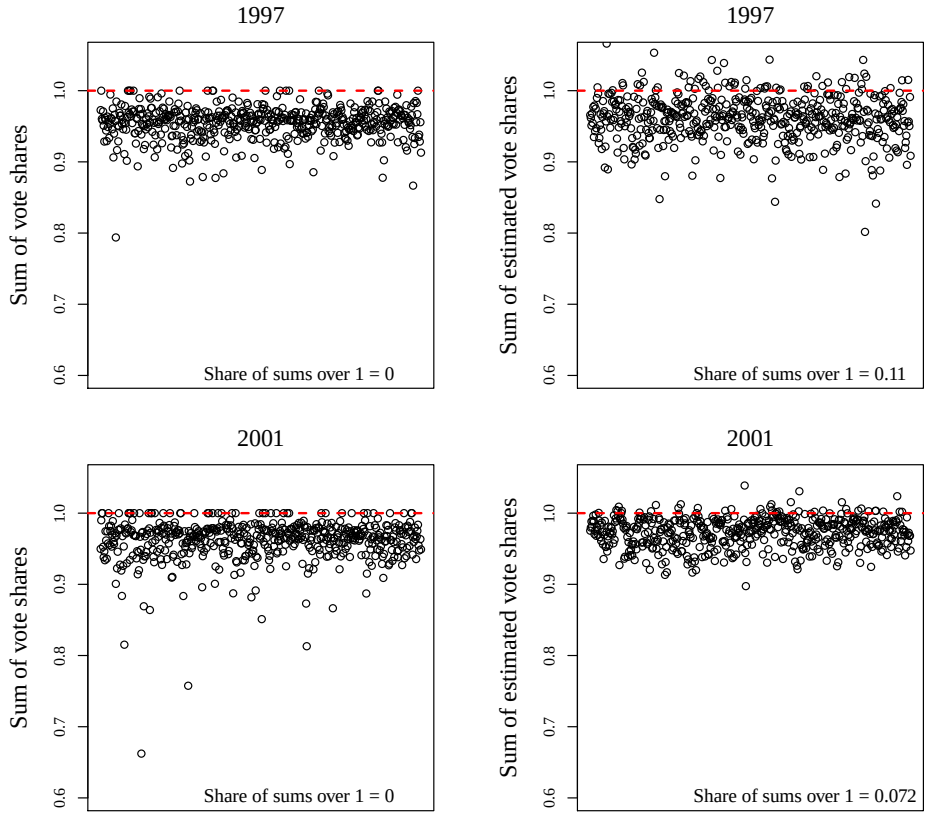


FIGURE 8: Sums of both official and estimated vote shares per district at the UK general elections 1997 and 2001 (England only). Vote shares of the Conservative Party, the Labour Party, and the Liberal Democrats were used. The dashed red line indicates the logical border of 1.



4. WINBUGS EXAMPLE CODE

```
model
{

## Conservative preference model
for(i in 1:ns)
{
    for(j in 1:n[i])
    {
        y.conser[cumn[i]+j] ~ dbern(p.conser[cumn[i]+j])
        logit(p.conser[cumn[i]+j]) <- beta.conser[s[i]] + v.conser[s[i]]
    }
    u.conser[s[i]] ~ dnorm(0, tauu.conser)
    }

    for(i in 1:N)
    {
        beta.conser[i] <- b.region.conser[region[i]]
        + b.loginvdistsize.conser*loginvdistsize[i]
        + b.pension.conser*pension[i]
        + b.migrant.conser*migrant[i]
        + b.worker.conser*working[i]
        + u.conser[i]
    }

    for(i in 1:N.region)
    {
        b.region.conser[i] ~ dnorm(0, tauregion.conser)
    }

    for(i in 1:N)
    {
        mu.conser[i] <-
        exp(beta.conser[i] + v.conser[i]) / (1 + exp(beta.conser[i] + v.conser[i]))
    }

v.conser[1:N] ~ car.normal(nb[], weight[], num[], tauv.conser)

b.loginvdistsize.conser ~ dnorm(0,.001)
b.pension.conser ~ dnorm(0,.001)
b.migrant.conser ~ dnorm(0,.001)
b.worker.conser ~ dnorm(0,.001)-2)
sigmau.conser ~ dunif(0,2)
tauv.conser <- pow(sigmav.conser, -2)
tauu.conser <- pow(sigmau.conser, -2)
sigmav.conser ~ dunif(0,2)
tauregion.conser <- pow(sigmaregion.conser, -2)
sigmaregion.conser ~ dunif(0,2)

## Labour preference model
for(i in 1:ns)
{
    for(j in 1:n[i])
    {
        y.labour[cumn[i]+j] ~ dbern(p.labour[cumn[i]+j])
        logit(p.labour[cumn[i]+j]) <- beta.labour[s[i]] + v.labour[s[i]]
    }
    u.labour[s[i]] ~ dnorm(0, tauu.labour)
    }
```

```
    for(i in 1:N)
    {
        beta.labour[i] <- b.region.labour[region[i]]
        + b.loginvdistsize.labour*loginvdistsize[i]
        + b.pension.labour*pension[i]
        + b.migrant.labour*migrant[i]
        + b.worker.labour*working[i]
        + u.labour[i]
    }

    for(i in 1:N.region)
    {
        b.region.labour[i] ~ dnorm(0, tauregion.labour)
    }

    for(i in 1:N)
    {
        mu.labour[i] <-
        exp(beta.labour[i] + v.labour[i]) / (1 + exp(beta.labour[i] + v.labour[i]))
    }

v.labour[1:N] ~ car.normal(nb[], weight[], num[], tauv.labour)

b.loginvdistsize.labour ~ dnorm(0,.001)
b.pension.labour ~ dnorm(0,.001)
b.migrant.labour ~ dnorm(0,.001)
b.worker.labour ~ dnorm(0,.001)-2)
sigmau.labour ~ dunif(0,2)
tauv.labour <- pow(sigmav.labour, -2)
tauu.labour <- pow(sigmau.labour, -2)
sigmav.labour ~ dunif(0,2)
tauregion.labour <- pow(sigmaregion.labour, -2)
sigmaregion.labour ~ dunif(0,2)

## Libdem preference model
for(i in 1:ns)
{
    for(j in 1:n[i])
    {
        y.libdem[cumn[i]+j] ~ dbern(p.libdem[cumn[i]+j])
        logit(p.libdem[cumn[i]+j]) <- beta.libdem[s[i]] + v.libdem[s[i]]
    }
    u.libdem[s[i]] ~ dnorm(0, tauu.libdem)
    }

    for(i in 1:N)
    {
        beta.libdem[i] <- b.region.libdem[region[i]]
        + b.loginvdistsize.libdem*loginvdistsize[i]
        + b.pension.libdem*pension[i]
        + b.migrant.libdem*migrant[i]
        + b.worker.libdem*working[i]
        + u.libdem[i]
    }

    for(i in 1:N.region)
    {
        b.region.libdem[i] ~ dnorm(0, tauregion.libdem)
    }

    for(i in 1:N)
    {
```

```
        mu.libdem[i] <-
        exp(beta.libdem[i] + v.libdem[i]) / (1 + exp(beta.libdem[i] + v.libdem[i]))
    }

v.libdem[1:N] ~ car.normal(nb[], weight[], num[], tauv.libdem)

b.loginvdistsize.libdem ~ dnorm(0,.001)
b.pension.libdem ~ dnorm(0,.001)
b.migrant.libdem ~ dnorm(0,.001)
b.worker.libdem ~ dnorm(0,.001)-2)
sigmau.libdem ~ dunif(0,2)
tauv.libdem <- pow(sigmav.libdem, -2)
tauu.libdem <- pow(sigmau.libdem, -2)
sigmav.libdem ~ dunif(0,2)
tauregion.libdem <- pow(sigmaregion.libdem, -2)
sigmaregion.libdem ~ dunif(0,2)


## Prohibit cross-model inference from strategic voting estimation model to preference estimation model
for (i in 1:N) {
mu.conser.cut[i] <- cut(mu.conser[i])
mu.labour.cut[i] <- cut(mu.labour[i])
mu.libdem.cut[i] <- cut(mu.libdem[i])
}

## Compute independent variable "share of preference for independents"
for (i in 1:N) {
mu.independ.cut[i] <- 1 - (mu.conser.cut[i] + mu.labour.cut[i] + mu.libdem.cut[i])
}

## Strategic voting model

for (i in 1:N) {
for (j in 1:P) {
y[i,j] ~ dnorm(mu[i,j],tau[j])
}

# conservative vote share
mu[i,1] <-    b0.conser
+ mu.conser.cut[i]
+ b.incentive.cola*-incentive.cola[i] + b.incentive.coli*-incentive.coli[i]
+ b.incumbent.conser*incumbent.conser[i] + b.turnout.conser*turnout[i]
+ b.independ.conser*mu.independ.cut[i]
# labour vote share
mu[i,2] <-    b0.labour
+ mu.labour.cut[i]
+ b.incentive.cola*incentive.cola[i] + b.incentive.lali*-incentive.lali[i]
+ b.incumbent.labour*incumbent.labour[i] + b.turnout.labour*turnout[i]
+ b.independ.labour*mu.independ.cut[i]
# libdem vote share
mu[i,3] <-    b0.libdem
+ mu.libdem.cut[i]
+ b.incentive.coli*incentive.coli[i] + b.incentive.lali*incentive.lali[i]
+ b.incumbent.libdem*incumbent.libdem[i] + b.turnout.libdem*turnout[i]
+ b.independ.libdem*mu.independ.cut[i]

} # end of model

## priors
b0.conser ~ dnorm(0,.001)
b0.labour ~ dnorm(0,.001)
b0.libdem ~ dnorm(0,.001)
```

```
b.incentive.cola ~ dnorm(0,.001)
b.incentive.coli ~ dnorm(0,.001)
b.incentive.lali ~ dnorm(0,.001)
b.incumbent.conser ~ dnorm(0,.001)
b.incumbent.labour ~ dnorm(0,.001)
b.incumbent.libdem ~ dnorm(0,.001)
b.turnout.conser ~ dnorm(0,.001)
b.turnout.labour ~ dnorm(0,.001)
b.turnout.libdem ~ dnorm(0,.001)
b.independ.conser ~ dnorm(0,.001)
b.independ.labour ~ dnorm(0,.001)
b.independ.libdem ~ dnorm(0,.001)
for (j in 1:P) {
sigma[j] ~ dunif(0,100)
tau[j] <- pow(sigma[j],-2)
}


} # end of overall model
```