Appendix for "Gubernatorial coattails in Mexican congressional elections"

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Abstract

This is the on-line appendix for the article published in *The Journal of Politics* (vol. vv, num. n, issue and year, pp. bb–ee). It reports information left out of the article due to space limitations, elaborates methodological issues raised in the anonymous review process, and points to code and data to replicate the analysis.

Contents

1 Descriptive statistics

		1979--2009					1997--2009				
Continuous variables		Obs	Mean	StdDev	Min	Max	Obs	Mean	StdDev	Min	Max
Deputy share	PAN	352	.228	.133	.009	.584	160	.309	.118	.043	.584
	PRI	352	.545	.195	.069	.970	160	.382	.099	.069	.636
	PRD	352	.112	.115	.002	.493	160	.178	.124	.018	.493
President share	PAN	160	.262	.145	.012	.610	64	.376	.117	.036	.610
	PRI	160	.499	.208	.050	.925	64	.309	.110	.050	.652
	PRD	160	.119	.120	.002	.556	64	.194	.127	.022	.556
Governor share, all	PAN	173	.214	.171	0	.605	77	.318	.178	.011	.605
	PRI	173	.614	.217	.133	1	77	.423	.240	.134	.613
	PRD	173	.105	.133	0	.521	77	.180	.126	.008	.521
Gov. sh., concurrent	PAN	49	.270	.178	0	.605	26	.396	.123	.031	.605
	PRI	49	.579	.240	.134	1	26	.387	.101	.134	.567
	PRD	49	.085	.126	0	.481	26	.134	.142	.008	.481
Economy	PAN	352	-.023	.036	-.260	.073	160	-.012	.033	-.087	.073
	PRI	352	.020	.038	-.073	.260	160	.005	.034	-.073	.087
	PRD	352	-.027	.033	-.260	.057	160	-.019	.029	-.087	.057

		--- 1979--2009 ---				--- 1997--2009 ---			
Dichotomous variables		0	(%)	1	(%)	0	(%)	1	(%)
PresOnlyConcurs		202	(57)	150	(43)	103	(64)	57	(36)
GovOnlyConcurs		313	(89)	39	(11)	141	(88)	19	(12)
Gov&PresConcur		342	(97)	10	(3)	153	(96)	7	(4)
Neither (dropped)		199	(57)	153	(43)	83	(52)	77	(48)
IncumbentGov	PAN	312	(89)	40	(11)	123	(77)	37	(23)
	PRI	62	(18)	290	(82)	59	(37)	101	(63)
	PRD	332	(94)	20	(6)	140	(88)	20	(22)
IncumbentPres	PAN	256	(73)	96	(27)	64	(40)	96	(60)
	PRI	96	(27)	256	(73)	96	(60)	64	(40)
	PRD	352	(100)	0	(0)	160	(100)	0	(0)
PartyCoalesced	PAN	320	(91)	32	(9)	128	(80)	32	(20)
	PRI	297	(84)	55	(16)	105	(66)	55	(34)
	PRD	288	(82)	64	(18)	96	(60)	64	(40)

2 Data availability and replication code

Five downloadable files are posted along this appendix in the web:

1. `replicationCode.r`,
2. `dipfed.out`,
3. `triennia.out`,
4. `annual.out`, and
5. `dfprallgob.out`.

The first has code reproducing analysis in the article and this appendix in R (`http://cran.r-project.org/`). The rest are data files. To re-analyze the data, create a working directory in your hard disk, save all five files in it, and follow directions in the top of the `replicationCode.r` file.

3 Apportioning coalition members' vote

This section discusses how the article deals with the (recent) problem of coalitions, one source of measurement error. Electoral alliances between two or more parties have gained popularity since they were legalized at the end of the 1990s. They are now widespread. All major parties have entered such coalitions in races at all levels, and they seem to be doing so with increasing frequency—sometimes, though still rarely, even among themselves. Of three presidential races since 1994, PAN coalesced in one, PRI in one, and PRD in all. Of 160 federal deputy races at the state level (coalitions can be national or state by state) since 1997, PAN coalesced in 32 (1 in 5), PRI in 55 (1 in 3), and PRD in 64 (2 in 5). Regarding gubernatorial races, only 26 concurrent with federal deputies since 1997 are of concern: PAN coalesced in 3 of those (1 in 10); PRI in 9 (1 in 3); and PRD in 7 (1 in 4).

Depending on election laws, which have varied over time and across states, there are two general ways parties engage in such arrangements. (1) Each party retains its slot on the ballot, and a candidate's name appears as many times as there are parties cross-endorsing. Or (2) parties supporting a common candidate share a common slot on the ballot, so that the candidate's name appears only once. The difference is subtle, but important for analysis: while it is possible to know the exact share of the joint vote that each party contributed to the whole in cross-endorsements, it remains unknown where coalition parties' votes are reported jointly at all levels of aggregation. For type 2 coalitions—and the bulk of coalitions observed are type 2—we are therefore forced to approximate each party's vote.

This is done by assuming that parties coalescing in a given year preserve the relative weight they had in the legislative election when they last competed separately. To illustrate, two parties coalescing in 2000—the PAN and the Greens (PVEM)—running separately received 442,255 and 44,884 votes, respectively, in the 1997 federal deputies election in the state of Veracruz. Had they coalesced that year, PAN would have contributed nearly 91% of the combined vote. This percentage was used to impute that, out of 892,279 federal deputy votes the coalition received in the state in 2000, PAN's contribution was 810,006. This method was used for type 2 coalitions in congressional, presidential, and gubernatorial elections in the analysis.[1] To control for measurement errors associated with this imperfect, but necessary procedure, a control was included in the regressions whenever a party coalesced and an imputation was performed.

Imputation relied on past federal deputies' votes to break coalitions for president and federal deputies, and on past votes for state deputies to break coalitions for governor. In the case of executive races, the previous vote for the same office was avoided because that involved a six-year lag, instead of three-year, playing against the plausibility of the constant relative party weight assumption.

[1] I am grateful to Federico Estévez for suggesting this method.

Where parties coalesced two or more legislative elections in a row—common mostly between the PRI and Green party since 2001—the procedure required exceptions. Where available, recent municipal (*Ayuntamiento*) races where the partners ran separately were used to break down coalition aggregates in order to avoid relying on distant lags. Some cases, however, offered no better alternative than relying on distant lags.

Listed below are type 2 federal-level coalitions and the imputation method used.

President and Federal Deputies 2000:

(1) PAN-PVEM alliance in all states, apportioned with federal deputies $t-3$.

(2) PRD-PT-Convergencia-PSN-PAS alliance in all states, apportioned with federal deputies $t-3$.

Federal Deputies 2003:

(3) PRI-PVEM alliance in eleven states, apportioned with federal deputies $t-6$.

President and Federal Deputies 2006:

(4) PRI-PVEM alliance in all states, eleven apportioned with federal deputies $t-9$, twenty-one with federal deputies $t-3$.

(5) PRD-PT-Convergencia alliance in all states, apportioned with federal deputies $t-3$.

Federal Deputies 2009:

(6) PRI-PVEM alliance in twelve states (all but three different from 2003), three apportioned with federal deputies $t-12$, nine with federal deputies $t-6$.

Of 26 gubernatorial races concurrent with a federal election, the PRI went solo in 17; it joined the PVEM in 3, the PVEM and one or more other parties in 4, and a party other than the PVEM twice. I next list type 2 gubernatorial coalitions in races concurrent with a federal election for which parties' relative weights in the previous state legislative race (celebrated at most 3 years before) could *not* be used for imputation. Each entry reports the imputation method used.

(1) Colima 2009: PRI-PANAL alliance, votes apportioned with state deputies $t-6$.

(2) Guanajuato 2006: PRD-PT alliance, votes apportioned with Ayuntamiento $t-3$.

(3) Jalisco 2006: PRD-PT alliance, votes apportioned with Ayuntamiento $t-3$.

(4) Morelos 2006: PRD-PT-Convergencia alliance, votes apportioned with Ayuntamiento $t-3$.

(5) Nuevo León 2009: PRI-PVEM alliance, votes apportioned with state deputies $t-9$.

(6) Querétaro 2009: PRI-PANAL alliance, votes apportioned with concurrent Ayuntamiento.

An alternative method of apportioning type 2 coalition votes relies on information from the pre-election deals. Parties joining a coalition still nominate separate lists to compete for the Proportional Representation seats. They must therefore agree, before the election takes place, how the aggregate vote will be distributed among partners in order to allocate PR seats to each. This is established in ex-ante formal agreements signed by the national leaders of member parties. While this formality makes it appealing as a proxy, I still preferred the use of the previous vote breakdown in the last election because it comes from the electorate and not from the elite. Another option is to give all coalition votes to the major party (as Valdés 2009 does, with results much the same as mine). It would be important to re-analyze the data using different imputation methods so as to verify the robustness of results.

4 MCMC estimates of model 1

As stated in footnote 13 of the article, Figure i shows that MCMC estimates of model 1 are very similar to OLS estimates reported in the article (Table 2). To get MCMC estimates, three chains were updated 5 thousand times each, preserving every tenth iteration from the second half. This generated a sample of $3 \times 250 = 750$ posterior simulations to derive the results discussed in this section. Gelman and Hill's (2007) $\hat{R} \approx 1$, suggesting that the chains had converged towards a steady state. BUGS (Spiegelhalter, Thomas, Best and Lunn 2007) used for MCMC estimation.

The attractiveness of the simulation approach is manifest: circles in Figure i show coefficients' point estimates (the median of the posterior sample), lines show estimate precision (intervals containing 50 and 95 percent of the posterior distribution). The graphical approach reveals that incumbency has practically no effect (regardless of significance levels); that a puzzle remains with economic performance in that only the PRI in recent years has been affected, but for the worse as the economy gets better (but see section 9). More to the point of the article, gubernatorial coattail estimates are large and relatively precise for the PAN and the PRD; they are somewhat less precise for the PRI, but sizeable. The figure also reveals the model's difficulty to isolate the effect of one coattails from the other. The sign of regressors for governor and president elections jointly concurrent with the congressional are always a matter of chance.

5 Controlling concurrence regimes

One anonymous referee expressed concern about my failure to include the component parts of the conditional variables. The relation between the concurrence regime and the gubernatorial/presidential votes is not a standard multiplicative interaction, as I hope to show in this section.

(a) The concurrence regime of the federal deputy election in a given state is indicated by four dummies: $GovOnlyConcurs$, $PresOnlyConcurs$, $Gov\&PresConcur$, and $NonConcurrent$. Because they are mutually-exclusive and exhaustive (as per Table 1 in the article), the last is dropped from the right side to avoid the dummy trap.

(b) $Gvote$ and $Pvote$ are the votes won by a given party in a *concurrent* gubernatorial or a *concurrent* presidential race, respectively. Whether or not these votes are observed depends on the concurrence regime—hence my calling them "conditional" variables. This can be seen by defining alternative dummies $Gconc = 1$ and $Pconc = 1$ indicating deputy races concurrent with a gubernatorial and a presidential, respectively. The dummies discussed in (a) are special cases of these new dummies, as the following table lists:

	$Pconc = 1$	$Pconc = 0$
$Gconc = 1$	$Gov\&PresConcur = 1$ $Gvote$ and $Pvote$ observed	$GovOnlyConcurs = 1$ $Gvote$ observed
$Gconc = 0$	$PresOnlyConcurs = 1$ $Pvote$ observed	$NonConcurrent = 1$ neither observed.

The table also lists concurrent votes that are observable in four regimes. My regressions include all available information: $Gvote|GovOnlyConcurs$, $Gvote|Gov\&PresConcur$, $Pvote|$-

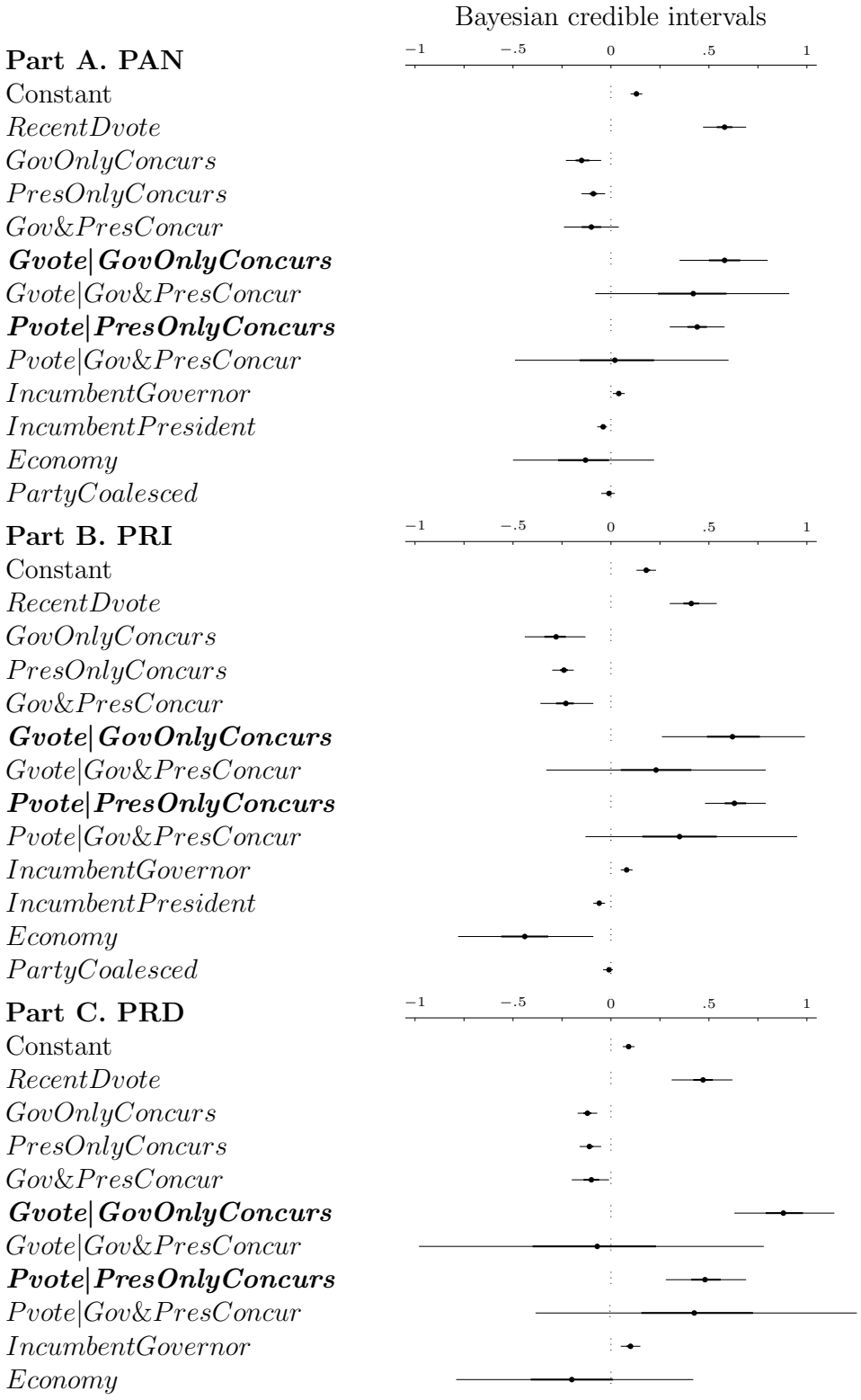


Figure i: *Magnitude and confidence of coefficients on vote share for 1997–2009 period. Bayesian replica of model 4 in Table 2 to generate simulations, MCMC method of estimation. Charts report the median, 50% interval, and 95% interval of posterior coefficient distributions.*

$PresOnlyConcurs$, and $Gvote|Gov\&PresConcur$, so there are no more constitutive terms to include in the right side, as stated in the article's footnote 7.

(c) The specification that the referee may have had in mind interacts dummies $Gconc$ and $Pconc$ with $Gvote$ and $Pvote$ multiplicatively. Following Brambor, Clark and Golder (2006), this would produce the following equation:

$$\begin{aligned} Dvote = {} & b_1 + b_2 Gconc + b_3 Pconc + b_4 Gvote + b_5 Pvote \\ & + b_6 GconcPconc + b_7 GconcGvote + b_8 GconcPvote \\ & + b_9 PconcGvote + b_{10} PconcPvote + b_{11} GvotePvote \\ & + b_{12} GconcPconcGvote + b_{13} GconcPconcPvote \\ & + b_{14} PconcGvotePvote + b_{15} GconcPconcPvoteGvote \\ & + ... + \text{error}. \end{aligned}$$

While it includes all constituent terms, plus their two-, three-, and four-way multiplications, the equation cannot be operationalized because it requires counterfactual data. For instance, which value should variable $Pvote$ adopt in a midterm? Forcing $Pvote = 0$ to remove missing values is unacceptable, for this makes the absence of a concurrent presidential race observationally equivalent to a bad (extremely bad) performance in the presidential race. Data to estimate this equation would be available if attention were restricted to deputy elections concurrent with both executive races (but then $Pconc$ and $Gconc$ then become perfectly collinear).

6 Estimating concurrence regimes separately

This section reports regression estimates for each concurrence regime separately mentioned in footnote 12 of the article—much like Ferejohn and Calvert (1984) do when they drop midterm elections. The full 1979–2009 period was used to maximize observations in the least-populated regimes. While the process sacrifices estimator efficiency and loses the advantages offered by Mexico's staggered election calendar, estimates are in line to those reported in the article's pooled model. Gubernatorial coattails are in the .8–.91 range for all parties and significant; presidential are in the .82–.87 range and significant. Joint concurrence makes it harder to separate the effects (they are positive, but insignificant).

```
##################### PAN #####################
> ## PRES CONC ONLY
Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)     0.011788   0.004071   2.895 0.004382 **
RecentDvote     0.102071   0.030367   3.361 0.000995 ***
Pvote           0.864208   0.024845  34.783  < 2e-16 ***
IncumbGovernor  0.021568   0.009007   2.395 0.017939 *
IncumbPresident -0.023026   0.005300  -4.345 2.63e-05 ***
Economy         -0.027469   0.067075  -0.410 0.682767
PartyCoalesced  -0.030332   0.005213  -5.819 3.74e-08 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.02006 on 143 degrees of freedom
Multiple R-squared: 0.9762,     Adjusted R-squared: 0.9752
F-statistic: 978.9 on 6 and 143 DF,  p-value: < 2.2e-16

> ## GOV  CONC ONLY
Coefficients: (1 not defined because of singularities)
                Estimate Std. Error t value Pr(>|t|)
(Intercept)     0.021971   0.014668   1.498    0.144
RecentDvote     0.152951   0.095555   1.601    0.119
Gvote           0.804803   0.058618  13.730 3.38e-15 ***
IncumbGovernor  -0.008570   0.019982  -0.429    0.671
IncumbPresident -0.005564   0.017523  -0.317    0.753
Economy         -0.356648   0.216446  -1.648    0.109
PartyCoalesced         NA         NA      NA       NA
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.02913 on 33 degrees of freedom
Multiple R-squared: 0.966,      Adjusted R-squared: 0.9608
F-statistic: 187.4 on 5 and 33 DF,  p-value: < 2.2e-16

> ## GOV & PRES CONC
Coefficients:
                 Estimate Std. Error t value Pr(>|t|)
(Intercept)      0.003725   0.007119   0.523   0.6530
RecentDvote     -0.057836   0.193037  -0.300   0.7927
Pvote            0.762431   0.193744   3.935   0.0589 .
Gvote            0.159819   0.085165   1.877   0.2014
IncumbGovernor   0.022255   0.017543   1.269   0.3323
IncumbPresident  0.016651   0.022144   0.752   0.5305
Economy         -0.014387   0.169034  -0.085   0.9399
PartyCoalesced  -0.002862   0.014212  -0.201   0.8590
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.008828 on 2 degrees of freedom
Multiple R-squared: 0.9996,     Adjusted R-squared: 0.998
F-statistic: 636.8 on 7 and 2 DF,  p-value: 0.001569

> ## NON-CONCURRENT
Coefficients: (1 not defined because of singularities)
               Estimate Std. Error t value Pr(>|t|)
(Intercept)     0.06652    0.01024   6.497 1.18e-09 ***
RecentDvote     0.82674    0.05449  15.173  < 2e-16 ***
IncumbGovernor  0.04496    0.01734   2.593 0.010483 *
IncumbPresident -0.04225    0.01248  -3.386 0.000910 ***
Economy          0.53797    0.13606   3.954 0.000119 ***
PartyCoalesced        NA         NA      NA       NA
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.05669 on 148 degrees of freedom
Multiple R-squared: 0.7923,     Adjusted R-squared: 0.7867
F-statistic: 141.1 on 4 and 148 DF,  p-value: < 2.2e-16
```

```
##################### PRI #####################
> ## PRES CONC ONLY
Coefficients: (1 not defined because of singularities)
                Estimate Std. Error t value Pr(>|t|)
(Intercept)     0.041391   0.010610   3.901 0.000146 ***
RecentDvote     0.109318   0.032958   3.317 0.001152 **
Pvote           0.828742   0.029265  28.318  < 2e-16 ***
IncumbGovernor  0.017966   0.011109   1.617 0.108016
IncumbPresident -0.034766   0.008196  -4.242 3.95e-05 ***
Economy         0.055325   0.101603   0.545 0.586923
PartyCoalesced         NA         NA      NA       NA
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.02809 on 144 degrees of freedom
Multiple R-squared: 0.976,      Adjusted R-squared: 0.9752
F-statistic:  1171 on 5 and 144 DF,  p-value: < 2.2e-16

> ## GOV  CONC ONLY
Coefficients:
               Estimate Std. Error t value Pr(>|t|)
(Intercept)    -0.02880    0.03080  -0.935  0.35669
RecentDvote     0.22167    0.12784   1.734  0.09257 .
Gvote           0.78382    0.08332   9.407  9.9e-11 ***
IncumbGovernor  0.01724    0.02456   0.702  0.48777
IncumbPresident -0.01695    0.03368  -0.503  0.61823
Economy         -0.78687    0.28677  -2.744  0.00987 **
PartyCoalesced  -0.01495    0.02446  -0.611  0.54519
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.03794 on 32 degrees of freedom
Multiple R-squared: 0.9698,     Adjusted R-squared: 0.9641
F-statistic:   171 on 6 and 32 DF,  p-value: < 2.2e-16

> ## GOV & PRES CONC
Coefficients: (1 not defined because of singularities)
                Estimate Std. Error t value Pr(>|t|)
(Intercept)    -0.013055   0.016591  -0.787   0.4888
RecentDvote     0.044124   0.079265   0.557   0.6166
Pvote           0.625662   0.109064   5.737   0.0105 *
Gvote           0.305048   0.118268   2.579   0.0818 .
IncumbGovernor  0.043683   0.035080   1.245   0.3014
IncumbPresident -0.007717   0.018772  -0.411   0.7086
Economy         -0.437908   0.252659  -1.733   0.1815
PartyCoalesced         NA         NA      NA       NA
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.01248 on 3 degrees of freedom
Multiple R-squared: 0.9994,     Adjusted R-squared: 0.9982
F-statistic: 822.2 on 6 and 3 DF,  p-value: 6.55e-05

> ## NON-CONCURRENT
Coefficients:
               Estimate Std. Error t value Pr(>|t|)
(Intercept)    -0.01829    0.02360  -0.775 0.439666
RecentDvote     0.90071    0.04786  18.819  < 2e-16 ***
IncumbGovernor  0.07329    0.01773   4.133 5.98e-05 ***
IncumbPresident -0.07561    0.01959  -3.860 0.000169 ***
Economy         0.48950    0.17064   2.869 0.004730 **
PartyCoalesced  0.02179    0.02048   1.064 0.289084
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.06907 on 147 degrees of freedom
Multiple R-squared: 0.8787,     Adjusted R-squared: 0.8746
F-statistic: 213.1 on 5 and 147 DF,  p-value: < 2.2e-16
```

```
##################### PRD #####################
> ## PRES CONC ONLY
Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)     0.011318   0.003670   3.084  0.00245 **
RecentDvote     0.120986   0.052472   2.306  0.02255 *
Pvote           0.833392   0.032204  25.879  < 2e-16 ***
IncumbGovernor  0.034552   0.011463   3.014  0.00305 **
Economy         0.018300   0.081151   0.226  0.82190
PartyCoalesced -0.014678   0.006491  -2.261  0.02523 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.02329 on 144 degrees of freedom
Multiple R-squared: 0.9532,     Adjusted R-squared: 0.9516
F-statistic: 586.3 on 5 and 144 DF,  p-value: < 2.2e-16

> ## GOV  CONC ONLY
Coefficients: (2 not defined because of singularities)
                Estimate Std. Error t value Pr(>|t|)
(Intercept)     0.004475   0.005589   0.801    0.429
RecentDvote     0.062694   0.058154   1.078    0.288
Gvote           0.917137   0.031158  29.435   <2e-16 ***
IncumbGovernor         NA         NA      NA       NA
Economy        -0.132563   0.121058  -1.095    0.281
PartyCoalesced         NA         NA      NA       NA
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.01826 on 35 degrees of freedom
Multiple R-squared: 0.9685,     Adjusted R-squared: 0.9658
F-statistic: 359.1 on 3 and 35 DF,  p-value: < 2.2e-16

> ## GOV & PRES CONC
Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)    -0.003964   0.023370  -0.170    0.876
RecentDvote     0.027136   0.205246   0.132    0.903
Pvote           0.420641   0.205341   2.049    0.133
Gvote           0.485621   0.217168   2.236    0.111
IncumbGovernor  0.049877   0.062267   0.801    0.482
Economy        -0.479213   0.509602  -0.940    0.416
PartyCoalesced -0.010095   0.031542  -0.320    0.770

Residual standard error: 0.02699 on 3 degrees of freedom
Multiple R-squared:  0.99,      Adjusted R-squared: 0.9701
F-statistic: 49.65 on 6 and 3 DF,  p-value: 0.004304

> ## NON-CONCURRENT
Coefficients: (1 not defined because of singularities)
               Estimate Std. Error t value Pr(>|t|)
(Intercept)     0.05385    0.01164   4.625 8.08e-06 ***
RecentDvote     0.67697    0.08131   8.326 4.99e-14 ***
IncumbGovernor  0.10346    0.03070   3.370 0.000956 ***
Economy         0.08568    0.19804   0.433 0.665910
PartyCoalesced       NA         NA      NA       NA
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.08153 on 149 degrees of freedom
Multiple R-squared: 0.5532,     Adjusted R-squared: 0.5442
F-statistic: 61.49 on 3 and 149 DF,  p-value: < 2.2e-16
```

7 Causality in the model: a schematic representation

One referee expressed concern about a threat of unaccounted multi-collinearity in the specification. I rely on a simplified model to represent causality and thus show that this danger is not serious:

$$Dvote_t = \beta_1 + \beta_2 Dvote_{t-1} + \beta_3 PresConcurs_t + \beta_4 Pvote_t|PresConcurs_t. \quad (1)$$

Equation (1) replaces *RecentDvote* (three-year average) with a lagged dependent variable and is a presidential-coattails-only model, but otherwise has the essential features of the model in the article. Consider three consecutive deputy elections in $t-2$, $t-1$, and t. The first and last concur with a presidential, the second is a midterm. A schematic representation of short- and long-term forces involved in the coattails perspective is the following:

Long-term forces		Short-term forces	Election
$Dvote_{t-2}$	$\longleftarrow$	$Pvote_{t-2}$	presidential
$\downarrow$			
$Dvote_{t-1}$		(0)	midterm
$\downarrow$			
$Dvote_t$	$\longleftarrow$	$Pvote_t$	presidential

The lagged deputy vote encapsulates long-term forces (the normal vote), reverting a unit's vote to its mean. Vertical arrows represent this influence. In concurrent elections, short-term forces (presidential coattails) augment or depress the unit's deputy vote. Horizontal arrows represent this other source of influence. By definition short-term forces vanish in the midterm, so that $Pvote_{t-2}$ exerts no influence on $Dvote_{t-1}$—and there are no diagonal arrows in the diagram.

In line with the diagram, variable $Pvote|PresConcurs$ in the model takes a value of zero in non-concurrent elections to indicate the absence of a presidential coattail—and, by virtue of β_3, allows a constant shift to differentiate this for a very poor showing in a presidential race (i.e. zero votes). The extension of this discussion to gubernatorial coattails is trivial. The next section uses this diagram to simulate and analyze fake data.

8 Model specification estimates coattails without bias

I develop an exercise in Monte-Carlo simulation for the presidential-coattails model only (presented in the previous section), thus avoiding two concurrence regimes. This simplified version suffices to demostrate the specification's capacity to estimate coattails without bias. The process starts by generating a set of 400 deputy and presidential vote shares to begin the analysis in period $t-2$. The starting $Pvote_{t-2}$ is distributed evenly in the [0,1] range for convenience; while $Dvote_{t-2} = Pvote_{t-2} +$ shock, where shock is normally-distributed with mean 0 and a .1 standard deviation. This implies that there is a one-to-one correspondence of deputy and presidential votes in (with random noise) in year $t-2$.

Next, sets of 400 independent and identically distributed (iid) error terms using a normal distribution with mean zero and standard deviation of .04 are generated. Each set is used once and discarded. Presidential shares for year t are generated with $Pvote_t = Pvote_{t-2} +$ error (thereby leaving shares for $t-2$ in the same level as in t, with random error). But deputy shares for $t-1$ and t are generated with functions representing the lines of causality established in the previous section's diagram. So for non-concurrent year $t-1$

$$Dvote_{t-1} = .5 + .5Dvote_{t-2} + \text{error};$$

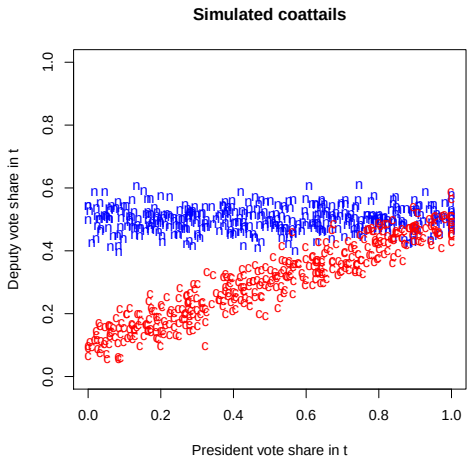
and for concurrent year t

$$Dvote_t = .1 + .5Dvote_{t-1} + .4Pvote_t + \text{error}.$$

By construction, the autoregressive coefficient is .5 for both elections, the presidential coattail in year t is .4, and the constant is at .5 and .1 in years $t-1$ and t, respectively. For control, a second set of deputy shares with null coattails in t was also generated:

$$Dvote_{null,t} = .5 + .5Dvote_{t-1} + \text{error}.$$

The following chart plots the **c**oattail and **n**ull-coattail (control) fake data sets for year t, red cs and blue ns distinguishing them.



The ideal scenario in multiple linear regression is reached when the systematic variance in the dependent variable is fully explained by the regressors in the right side of the equation, and all that remains unexplained is an iid error term. By construction, fake data meet this ideal. Regressing year t's null-coattail data on a constant and an autoregressive term (model A), and year t's presidential coattail data on a constant, the autoregressive term, and $Pvote$ (model B) recovers estimates in line with the data-generating process.

	(A) $Dvote_{t,null}$		(B) $Dvote_{t,coat}$	
Variable	$\hat{\beta}$	p	$\hat{\beta}$	p
Constant	.497	.000	.095	.000
$Dvote_{t-1}$	.505	.000	.518	.000
$Pvote_t$			.386	.000
R^2	.926		.956	

The challenge is to pool the non-concurrent data and the concurrent coattail data together and verify that the proposed specification can recover the effects without bias. The pooled version drops subscripts to avoid confusion with the data-generation discussion, renaming variable $Dvote_{t-1}$ to $DvoteLag$. Since half the observations in the pooled dataset (those with $PresConcurs = 0$) lack an observation of $Pvote$, variable $Pvote|PresConcurs$, as defined in the previous section, is used instead—as the article does. The non-concurrent and null-coattail data are also pooled for reference.

Model D shows that the specification used for model B retrieves biased coattail estimates: the constant term is overestimated by about 300%, the coattail effect underestimated by about 120%, making it negative and significant. The same specification shows no problems in the absence of a coattail effect, as shown by model C. But model F shows that the simple addition of the $PresConcurs$ dummy in the right side—as done in the article, allowing a constant shift whenever elections concur—retrieves unbiased coattail estimates. The estimated coattail at .391 is not far from the true coefficient (.4); neither is the constant $.498 - .397 = .101$ (the true is .1). The method in fact also performs without bias in the absence of a coattail effect, as shown by model E—the coefficient for $Pvote|PresConcurs$ is insignificant.

					Article's specification			
	(C) $Dvote_{t,null}$		(D) $Dvote_{t,coat}$		(E) $Dvote_{t,null}$		(F) $Dvote_{t,coat}$	
Variable	$\hat{\beta}$	p	$\hat{\beta}$	p	$\hat{\beta}$	p	$\hat{\beta}$	p
Constant	.497	.000	.418	.000	.497	.000	.498	.000
$DvoteLag$	.507	.000	.505	.000	.507	.000	.506	.000
$Pvote\|PresConcurs$	−.003	.535	−.081	.000	.001	.995	.391	.000
$PresConcurs$					−.003	.520	−.397	.000
R^2	.922		.462		.926		.952	
Data	pooled		pooled		pooled		pooled	

The proposed specification recovers the true coefficients.

The code to replicate this exercise in R appears next.

```
## Simulation-based analysis showing coattail estimation method works
## Note that results will not be identical to those reported due to random data simulation
##
## STARTS THE SERIES AT t-2
shock <- rnorm(400, 0, .1)
Pt2 <- (1:400)/400                ## generates continuous sequence of 400 Pvotes for t-2
Dt2 <- Pt2 + shock                ## generates set of 400 Dvotes fot t-2 (pure coattails with larger error)
Dt2[Dt2<0] <- 0; Dt2[Dt2>1] <- 1   ## avoids out of range obs
#plot(c(0,1),c(0,1), type="n")
#points(Pt2,Dt2)
##
## GENERATES PVOTE FOR t (t-1 non-concurrent)
error <- rnorm(400, 0, .04)        ## new error
Pt <- Pt2 + error                  ## Pvote in t
Pt[Pt<0] <- 0; Pt[Pt>1] <- 1
##
## GENERATES DVOTE FOR t-1 AND t WITH NULL COATTAIL
error <- rnorm(400, 0, .04)        ## new error
Dt1null <- .5 + .5*Dt2 + error     ##
error <- rnorm(400, 0, .04)        ## new error
Dtnull  <- .5 + .5*Dt1null + error ##
##
## GENERATES DVOTE FOR t-1 AND t WITH COATTAIL WHEN CONCURRENT
Dt1 <- Dt1null                     ## midterm
error <- rnorm(400, 0, .04)        ## new error
Dt  <- .1 + .5*Dt1 + .4*Pt  + error##
##
## Pool t-1 and t together, t-1 not concurrent, t concurrent
presConcurs <- c( rep(0,400), rep(1,400) )
Pvote <- c(rep(0,400),Pt)
Dvote <- c(Dt1,Dt)
Dvote_lag <- c(Dt2,Dt1)
Dvote_null <- c(Dt1null,Dtnull)
Dvote_null_lag <- c(Dt2,Dt1null)
##
## GRAPH COATTAIL EFFECT NET OF AUTOREGRESSIVE TERM
Dt_null_net <- Dtnull - .5*Dt1null
Dt_net  <- Dt  - .5*Dt1
plot(c(0,1), c(0,1), type="n", xlab="President vote share in t", ylab="Deputy vote share in t", main="Simulated coattails")
points(Pt, Dt_null_net, pch="n", col="blue")
points(Pt, Dt_net, pch="c", col="red")
##
## Model estimations
## Autoreg model, null coattail data, both years
reg1 <- lm(Dvote_null ~ Dvote_null_lag)
summary(reg1)
## Coattail model, .4 coattail data, concurrent year only
reg2 <- lm(Dvote[presConcurs==1] ~ Dvote_lag[presConcurs==1] + Pvote[presConcurs==1])
summary(reg2)
## Coattail model, null coattail, both years
reg3 <- lm(Dvote_null ~ Dvote_null_lag + Pvote)
summary(reg3)
## Coattail model, .4 coattail data, both years, no intercept change
reg4 <- lm(Dvote ~ Dvote_lag + Pvote)
summary(reg4)
## Coattail model, null coattail data, both years, with intercept change
reg5 <- lm(Dvote_null ~ Dvote_null_lag + Pvote + presConcurs)
summary(reg5)
## Coattail model, .4 coattail data, both years, with intercept change
reg6 <- lm(Dvote ~ Dvote_lag + Pvote + presConcurs)
summary(reg6)
```

9 Attribution of economic performance

Two referees requested interacting incumbency dummies for the president and governor with the economy in order to verify whether it is national or sub-national executives who get the credit or blame for the state's economy. I defend my specification of economic effects in this section. Table i reports re-estimates of models 1 and 2 interacting incumbency dummies and the state of the economy, as suggested. Following Brambor, Clark and Golder (2006), this called for the inclusion of seven regressors instead of three in the article—constituent variables $IncumbentGovernor$, $IncumbentPresident$, and GSP, plus all two- and three-way interactions. Recall that *Economy* in the article is the three-year average rate of growth of the gross state product multiplied by +1 when the party in question governs the state and by –1 when it does not. GSP is the same without multiplications. Coattail estimates in the alternate specifications remain fundamentally unchanged and the multiplicative interactions produce mixed, yet mostly null results.

The table below summarizes the total effect of a unit increase of economic growth (all else constant) in parties' deputy vote shares, contingent on incumbency status, by adding up interacted coefficients accordingly:

	PAN		PRI		PRD	
Incumbency regime	1979–2009	1997–2009	1979–2009	1997–2009	1979–2009	1997–2009
governor only	−2.371	−1.545	−.106	−.300	1.787	2.344
president only	−.408	.108	1.780	.948	—	—
both	−.221	.328	.702	.109	—	—
neither	−.156	.705	−.131	.029	.196	.721

There is some evidence that the credit/blame for growth/stagnation of the state economy was geared towards PRI presidents but towards PRD governors, although a look at the regressions themselves in Table i shows that neither coefficient achieves significance at the .10 level. Some interaction coefficients are significant and sizeable for the PAN in the regression, but it is noteworthy that the largest effects mostly cancel each other out: one point of economic growth bought as much as 2.6 extra deputy vote points in PAN-governed states after 2000, when it also controlled the presidency, but it generally ate nearly 2.4 points wherever it had a governor (leaving the effect, all things considered, at +.328 in 1997–2009).

Because the model in the article is already quite intricate, and this refinement adds four extra regressors without settling the question of attribution, I claim that the original specification of *Economy* works satisfactorily. I briefly discuss elements of Table i in the article's footnote 8.

10 Innocuous multi-collinearity

Multi-collinearity can raise estimation problems. Two highly collinear variables in the right side of a regression render the ceteris paribus condition hard to sustain, making it hard/impossible to separate their marginal effects. Their β coefficients cannot be interpreted as the effect of a unit change in the regressor on the dependent variable when all else is constant because the other variable tends to get a parallel unit change. As a consequence of multi-collinearity, small changes in the data tend to produce wide swings in parameter estimates (Greene 2003:57–58).

	1997–2009				1979–2009			
	Model 1		alternate		Model 2		alternate	
Variable	$\hat{\beta}$	p	$\hat{\beta}$	p	$\hat{\beta}$	p	$\hat{\beta}$	p
Part A. PAN								
Constant	.135	.000	.121	.000	.084	.000	.085	.000
RecentDvote	.586	.000	.565	.000	.671	.000	.650	.000
GovOnlyConcurs	−.151	.005	−.135	.009	−.057	.002	−.055	.002
PresOnlyConcurs	−.097	.054	−.102	.020	−.058	.011	−.063	.004
Gov&PresConcur	−.106	.102	−.106	.034	−.063	.033	−.064	.022
Gvote|GovOnlyConcurs	.584	.000	.557	.000	.405	.000	.407	.000
Gvote|Gov&PresConcur	.444	.043	.410	.017	.500	.002	.486	.003
Pvote|PresOnlyConcurs	.446	.002	.460	.000	.421	.000	.463	.000
Pvote|Gov&PresConcur	.018	.956	.045	.853	−.096	.638	−.061	.744
IncumbentGovernor	.045	.021	.160	.000	.020	.155	.155	.001
IncumbentPresident	−.047	.004	−.024	.206	−.025	.120	−.017	.316
Economy	−.145	.465			.204	.141		
GSP			.584	.062			−.241	.134
GSP × *IncumbentGovernor*			−2.410	.001			−2.370	.007
GSP × *IncumbentPresident*			−.573	.171			−.235	.580
IncPresident × *IncGovernor*			−.130	.001			−.134	.005
GSP × *IncPresident* × *IncGovernor*			2.600	.002			2.536	.012
PartyCoalesced	.016	.416	−.015	.409	−.001	.990	.002	.913
R^2	.82		.83		.84		.85	
Part B. PRI								
Constant	.187	.000	.173	.000	.092	.050	.061	.145
RecentDvote	.418	.000	.451	.000	.746	.000	.756	.000
GovOnlyConcurs	−.288	.001	−.279	.001	−.190	.000	−.189	.000
PresOnlyConcurs	−.249	.000	−.233	.000	−.224	.000	−.230	.000
Gov&PresConcur	−.235	.052	−.216	.074	−.232	.001	−.249	.000
Gvote|GovOnlyConcurs	.620	.002	.597	.002	.291	.000	.288	.000
Gvote|Gov&PresConcur	.231	.478	.306	.337	.378	.270	.500	.117
Pvote|PresOnlyConcurs	.640	.000	.577	.000	.315	.000	.321	.004
Pvote|Gov&PresConcur	.362	.329	.174	.609	−.050	.876	−.156	.599
IncumbentGovernor	.086	.000	.089	.000	.027	.168	.073	.000
IncumbentPresident	−.063	.006	−.061	.110	−.033	.350	−.063	.307
Economy	−.438	.005			.402	.090		
GSP			−.144	.618			−.192	.729
GSP × *IncumbentGovernor*			−.418	.260			−.048	.925
GSP × *IncumbentPresident*			.980	.176			1.974	.111
IncPresident × *IncGovernor*			−.023	.547			−.002	.969
GSP × *IncPresident* × *IncGovernor*			−.487	.555			−1.101	.354
PartyCoalesced	−.018	.132	−.011	.380	.006	.801	.018	.434
R^2	.74		.77		.88		.89	
Part C. PRD								
Constant	.098	.005	.081	.035	.058	.005	.053	.012
RecentDvote	.475	.019	.579	.008	.608	.000	.658	.000
GovOnlyConcurs	−.125	.000	−.121	.000	−.070	.000	−.068	.000
PresOnlyConcurs	−.111	.039	−.122	.021	−.045	.123	−.041	.149
Gov&PresConcur	−.104	.043	−.117	.044	−.031	.424	−.028	.475
Gvote|GovOnlyConcurs	.878	.000	.870	.000	.785	.000	.778	.000
Gvote|Gov&PresConcur	−.051	.901	−.282	.454	.233	.474	.089	.779
Pvote|PresOnlyConcurs	.488	.006	.438	.085	.577	.001	.551	.001
Pvote|Gov&PresConcur	.408	.298	.551	.108	.242	.443	.339	.265
IncumbentGovernor	.102	.009	.051	.247	.084	.009	.043	.253
Economy	−.202	.608			−.059	.829		
GSP			.640	.147			.143	.614
GSP × *IncumbentGovernor*			1.572	.122			1.548	.106
PartyCoalesced					−.058	.092	−.066	.058
R^2	.67		.68		.73		.74	

Table i: *Comparing Economy specifications of models 1 and 2.*

When they concur, variables *Gvote* and *Pvote* share the same origin and indeed are highly collinear. When executive races take place simultaneously with a deputy election their correlation coefficient is .86 on average across parties in the two periods periods:

	1979–2009	1997–2009
PAN	.95	.83
PRI	.97	.58
PRD	.93	.89.

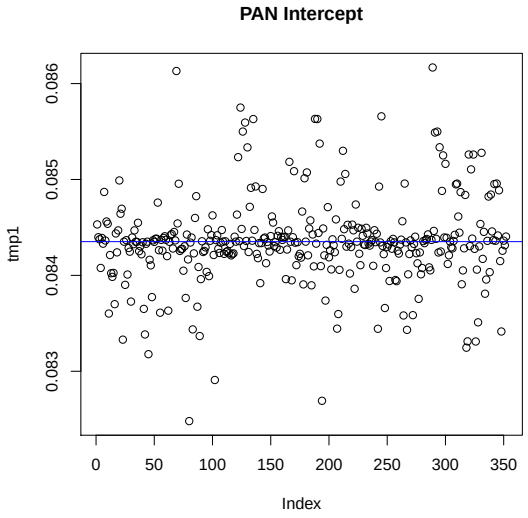
That said, it must be kept in mind that both executive races concurred with ten of 352 state deputy elections only since 1979, leaving little potential for their collinearity to affect the estimation.

I performed sensitivity analysis to model 2 (multi-collinearity is most acute in 1979–2009) to verify that this is, in fact, the case. The procedure confirms that high multi-collinearity is mostly innocuous for coefficient estimates. I proceeded by repeatedly estimating the regression dropping one observation each pass, thus obtaining a total of $N = 352$ regressions for each party. Coefficient estimates from each pass are then compared to those reported in the article. Large swings in more than a handful of passes, especially if affecting several/all regression coefficients at once, would be symptomatic of troublesome multi-collinearity.

Plots below report variation in coefficient estimates. The x-axis in each indexes 352 passes, the y-axis is the coefficient estimate corresponding to each pass. Horizontal blue lines mark the estimate reported in the ms, black and red lines indicate relative changes of ± 5 and ± 10 percent with respect to the blue line, respectively. Swings exceeding ± 10 percent will be considered large.

Coefficient estimates for *PartyCoalesced* in the PAN and PRI equations, or *Economy* in the PRD's exemplify acute sensitivity, as seen by the large proportion of passes effecting changes far exceeding 10 percent in absolute value. Yet the important thing to note is that these variables are quite exceptional in their degree of sensitivity: removing observations has little effect in the remainder regression coefficients, bringing confidence that the results are not driven by multi-collinearity. Nearly all swings in key variables $Gvote|GovOnlyConcurs$ and $Pvote|PresOnlyConcurs$ are below ± 5 percent, and none is remotely close to the ± 10 percent threshold.

For the three parties, between half and a dozen observations removed generated swings remarkably away from the red lines for variables $Gov\&PresConcur$, $Gvote|Gov\&PresConcur$, and $Pvote|Gov\&PresConcur$. The largest swing by far corresponds to dropping the Morelos 2000 observation. The PAN ran solo for governor that year and won by a landslide; it coalesced in the concurrent federal races, winning them by much smaller margins—further shrunk by the imputation method (see section 3), hence the gap. I therefore see no sign of alarm because swings do not spill over to other estimates. Noting that, party by party, swings in $Gvote|Gov\&PresConcur$ and $Pvote|Gov\&PresConcur$ tend to involve the same observations in opposite ways even suggests these variables' insignificance is less attributable to multi-collinearity than to difficult separability when two executive election concur, as discussed in the text.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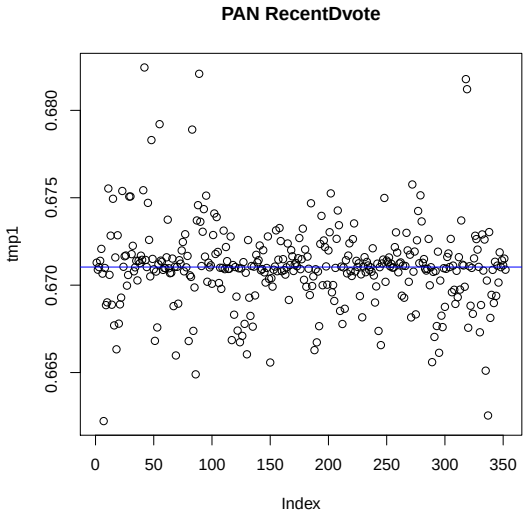
Index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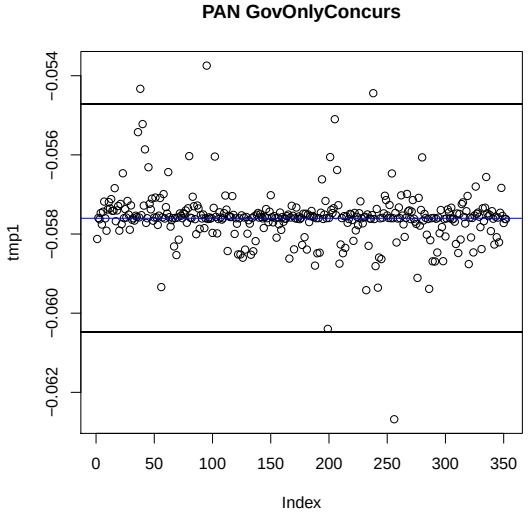
Index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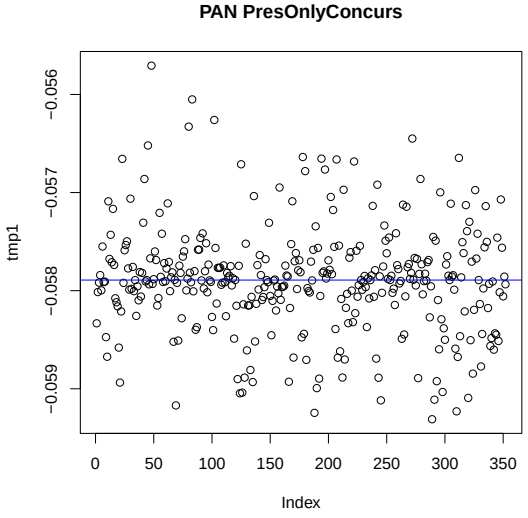
tmp1
Index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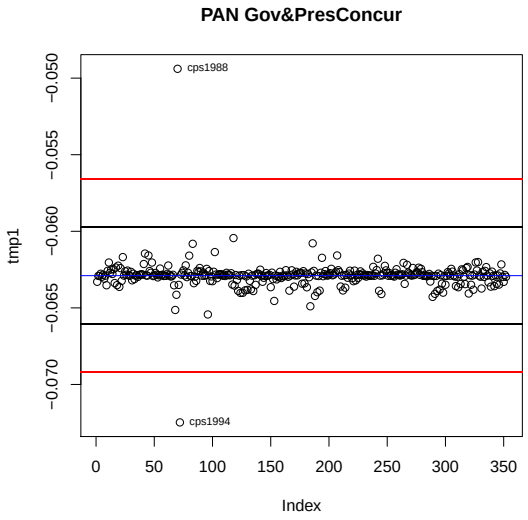
Index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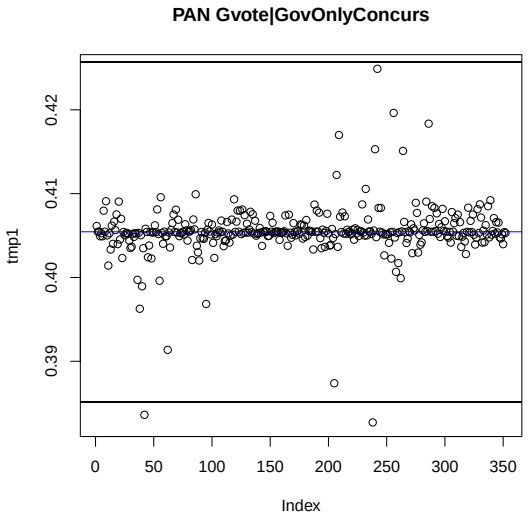
cps1988
cps1994
tmp1
Index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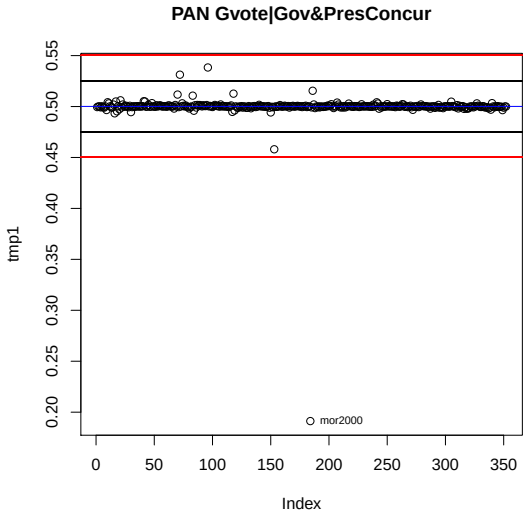
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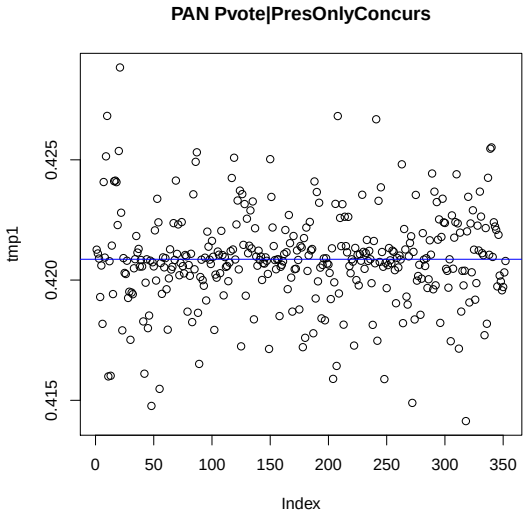
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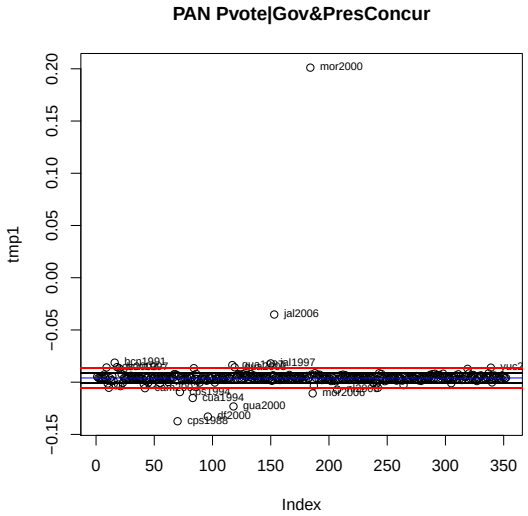
tmp1
Index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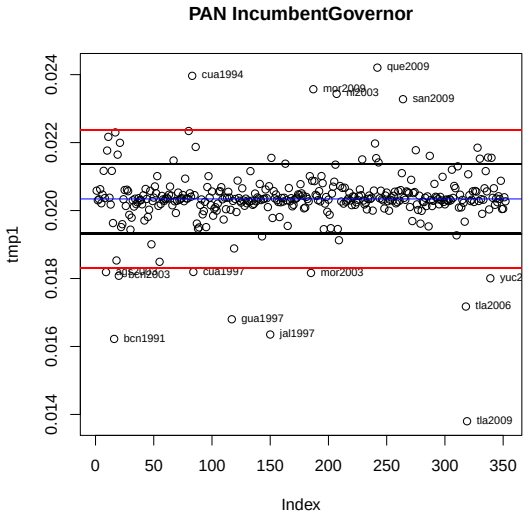
gua2000
cps1988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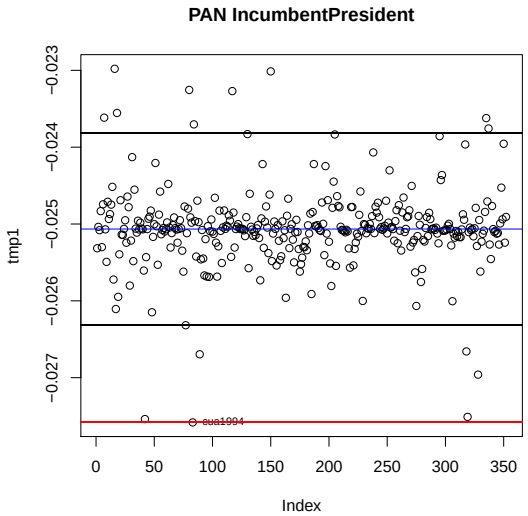
san2009
cua1997
mor2003
yuc2
tla2006
gua1997
jal1997
bcn1991
tla2009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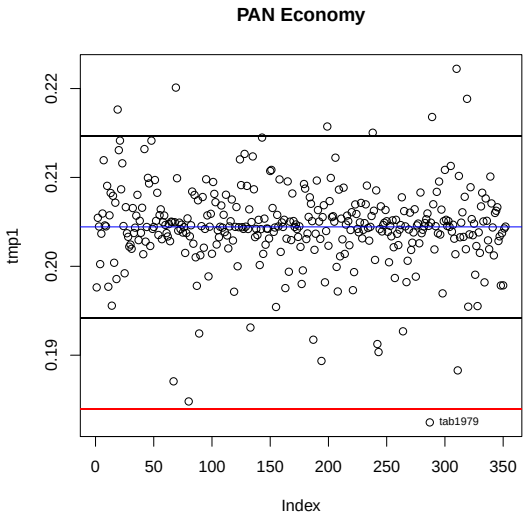
cua1994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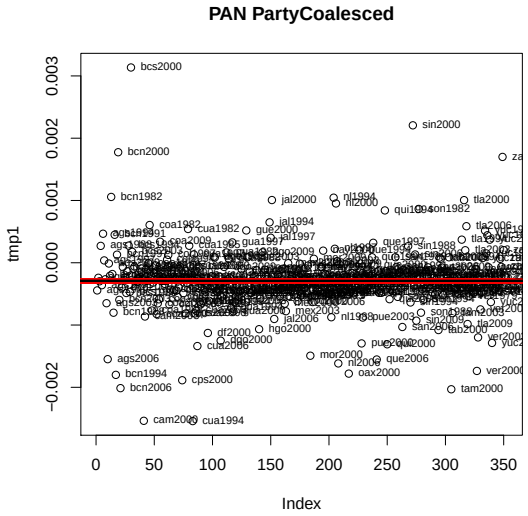
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bcn2000
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coa1982
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ags2006
bcn1994
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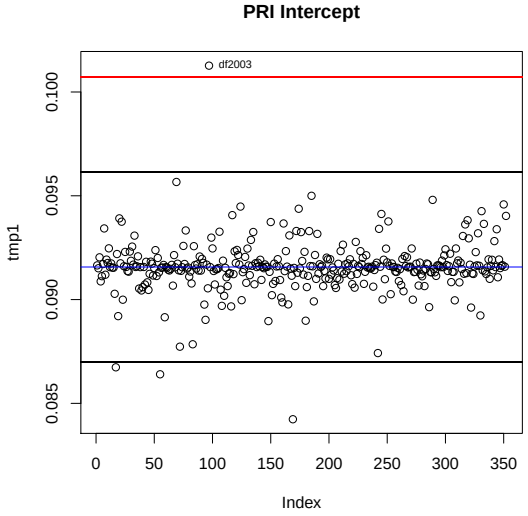
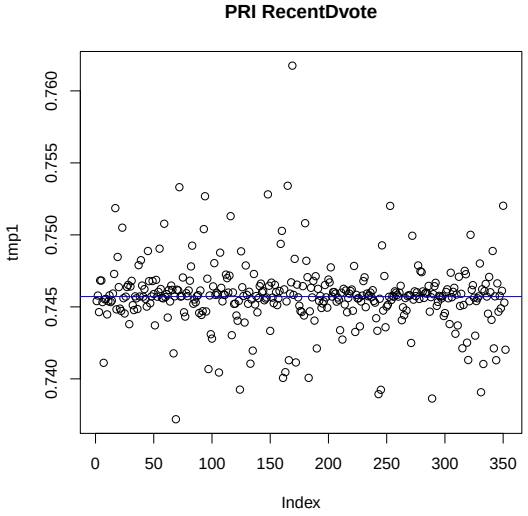
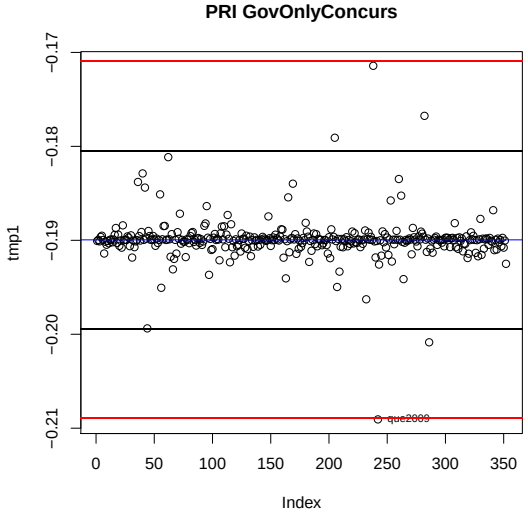
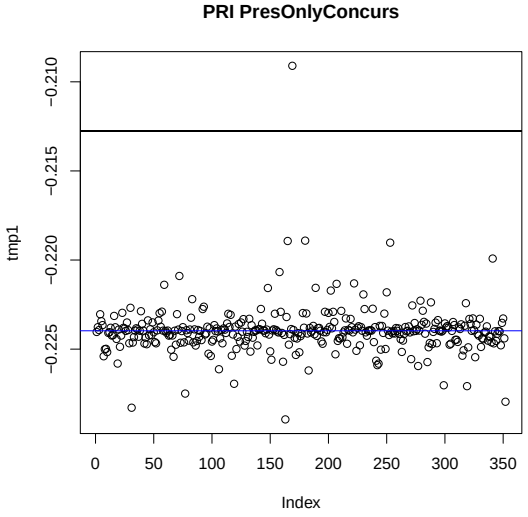
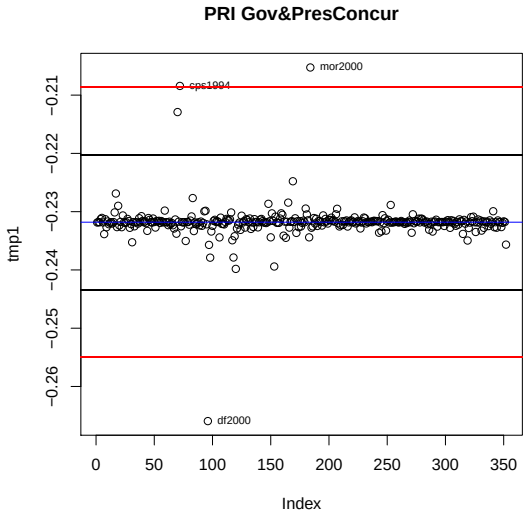
cps2000
cam2009
cua1994
df2000
hgo2000
cua2006
mor2000
que2006
oax2000
tam2000
ver2000

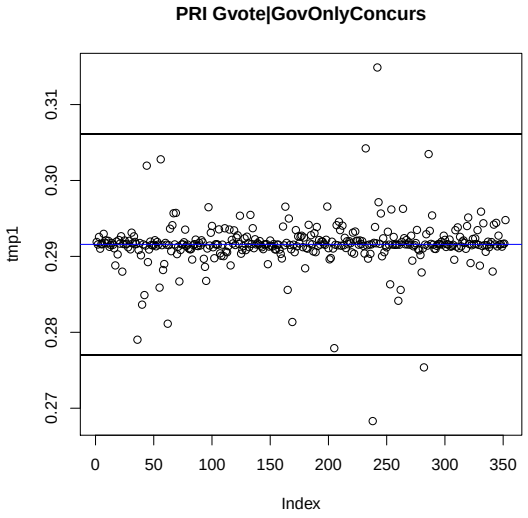

PRI Intercept
tmp1
Index
df2003

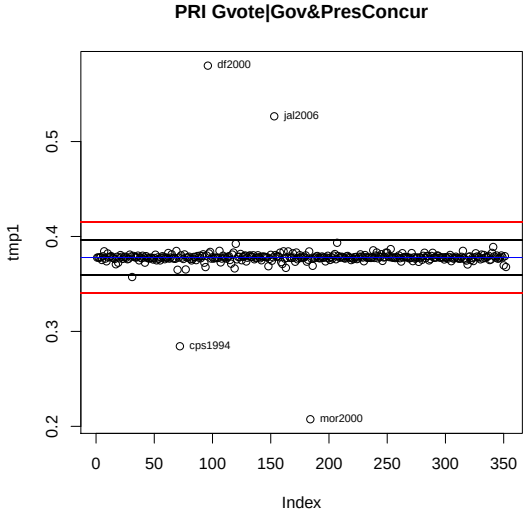

PRI RecentDvote
tmp1
Index

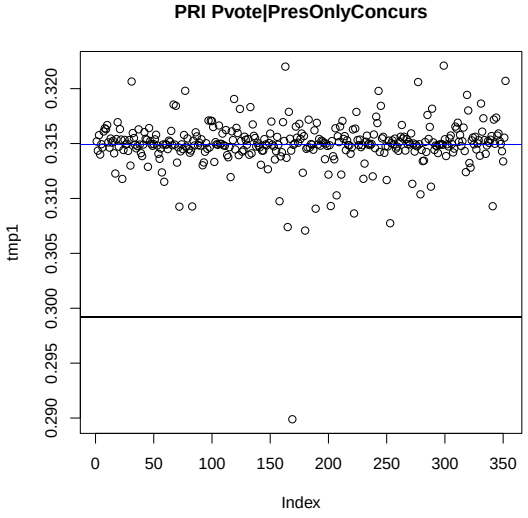

PRI GovOnlyConcurs
tmp1
Index
que2003

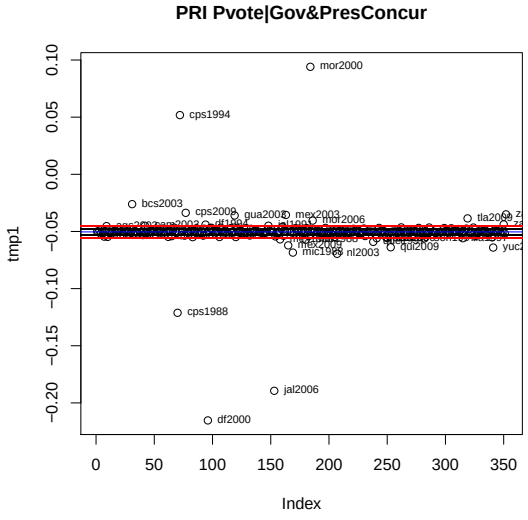

PRI PresOnlyConcurs
tmp1
Index

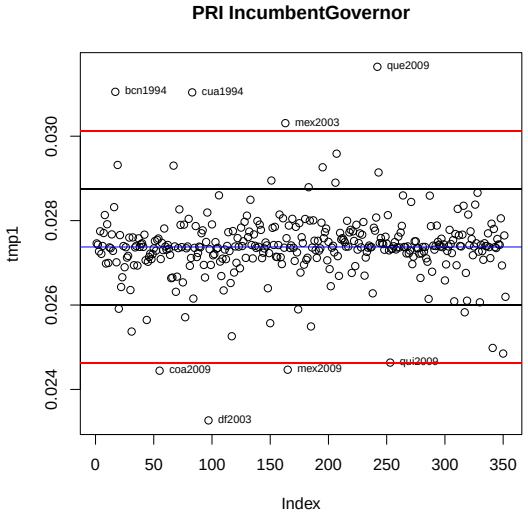

PRI Gov&PresConcur
tmp1
Index
mor2000
cps1994
df2000

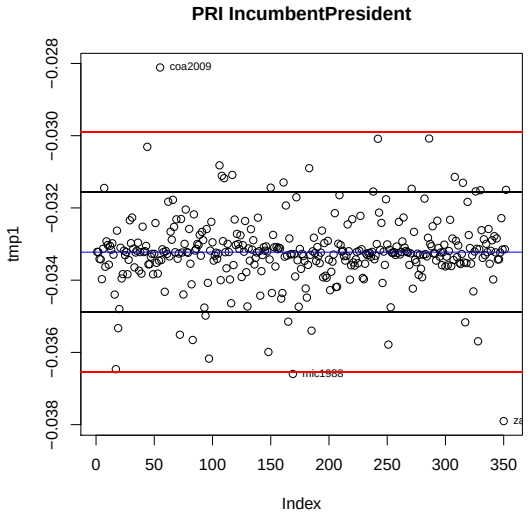

PRI Gvote|GovOnlyConcurs
tmp1
Index

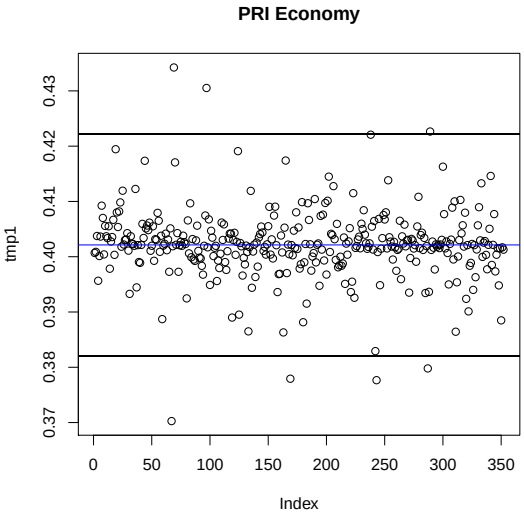

PRI Gvote|Gov&PresConcur
tmp1
Index
df2000
jal2006
cps1994
mor2000

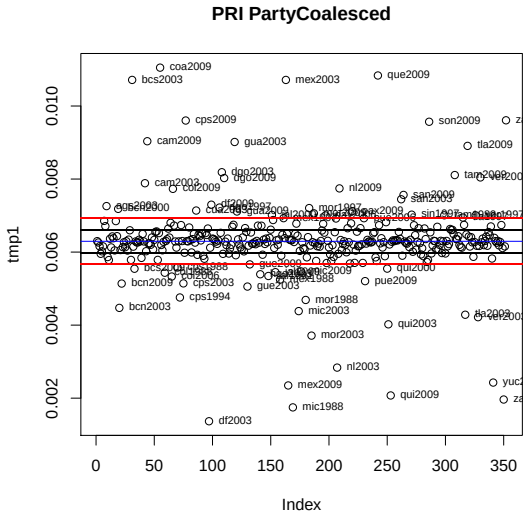

PRI Pvote|PresOnlyConcurs
tmp1
Index

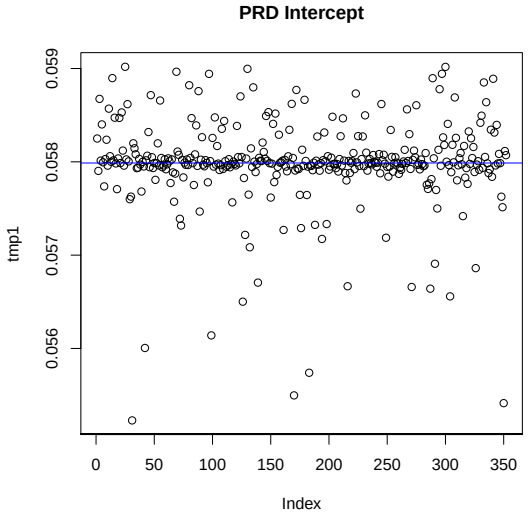

PRI Pvote|Gov&PresConcur
tmp1
Index
mor2000
cps1994
bcs2003
cps1988
jal2006
df2000

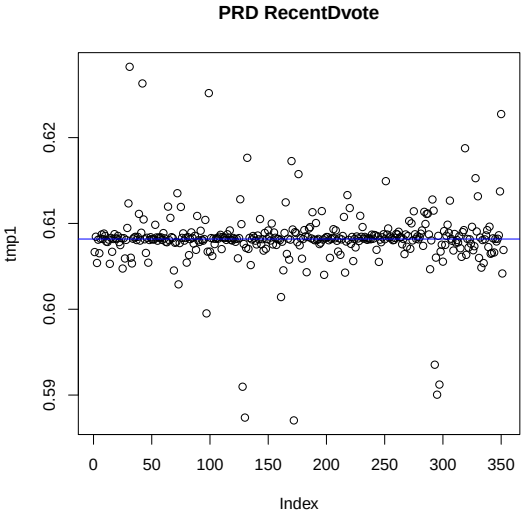

PRI IncumbentGovernor
tmp1
Index
que2009
bcn1994
cua1994
mex2003
coa2009
mex2009
qui2009
df2003

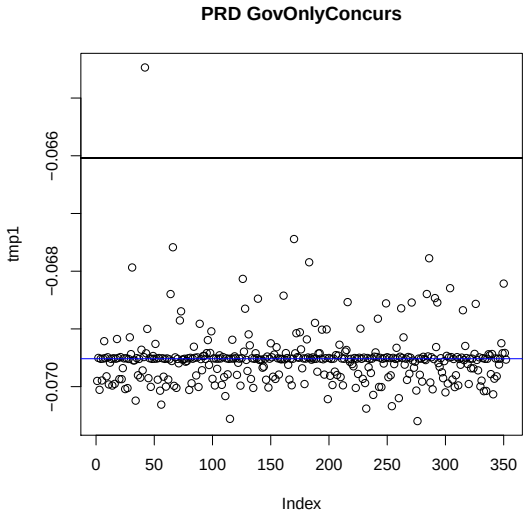

PRI IncumbentPresident
tmp1
Index
coa2009
mic1988

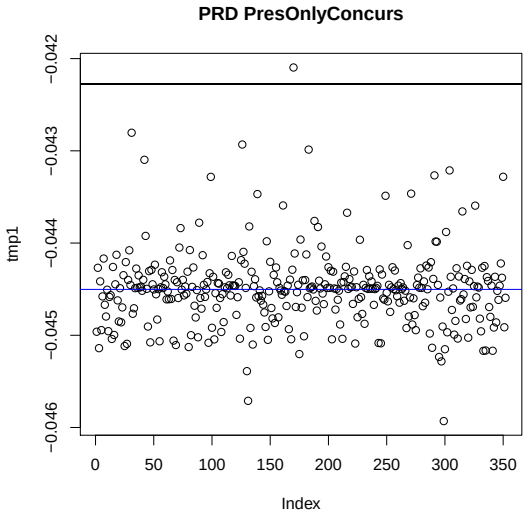

PRI Economy
tmp1
Index

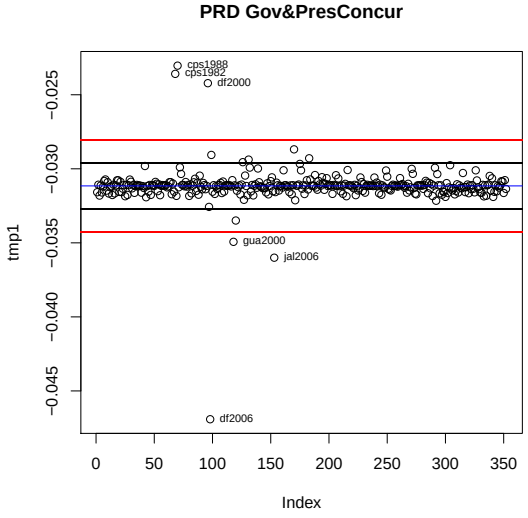

PRI PartyCoalesced
tmp1
Index
coa2009
bcs2003
mex2003
que2009
cps2009
son2009
cam2009
gua2003
tla2009
nl2009
bcn2009
cps2003
gue2003
pue2009
bcn2003
cps1994
mic2003
qui2003
mor2003
nl2003
mex2009
qui2009
mic1988
df2003

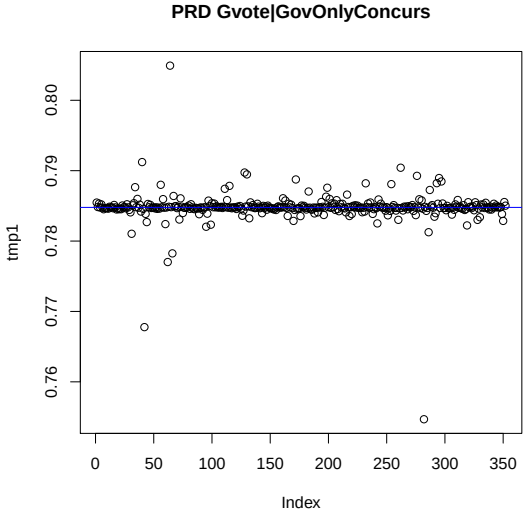

PRD Intercept
tmp1
Index


PRD RecentDvote
tmp1
Index


PRD GovOnlyConcurs
tmp1
−0.066
−0.068
−0.070
0
50
100
150
200
250
300
350
Index


PRD PresOnlyConcurs
tmp1
−0.042
−0.043
−0.044
−0.045
−0.046
0
50
100
150
200
250
300
350
Index


PRD Gov&PresConcur
tmp1
−0.025
−0.030
−0.035
−0.040
−0.045
cps1988
cps1982
df2000
gua2000
jal2006
df2006
0
50
100
150
200
250
300
350
Index


PRD Gvote|GovOnlyConcurs
tmp1
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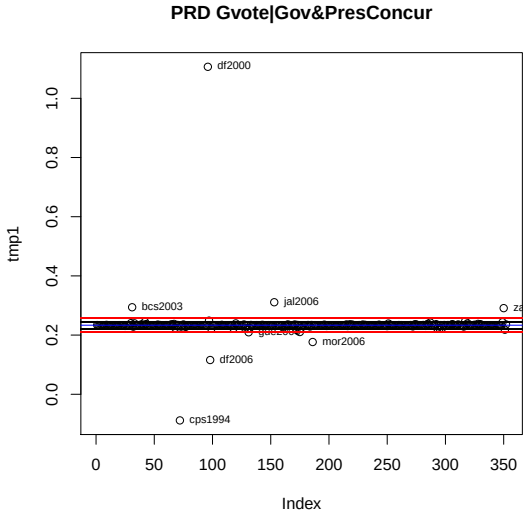
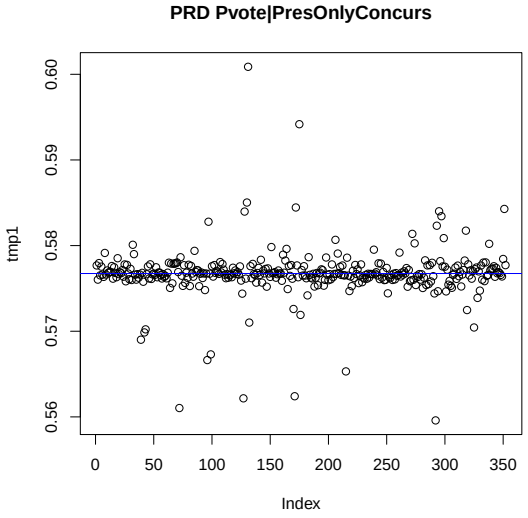
0.79
0.78
0.77
0.76
0
50
100
150
200
250
300
350
Index


PRD Gvote|Gov&PresConcur
tmp1
1.0
0.8
0.6
0.4
0.2
0.0
df2000
bcs2003
jal2006
mor2006
df2006
cps1994
0
50
100
150
200
250
300
350
Index


PRD Pvote|PresOnlyConcurs
tmp1
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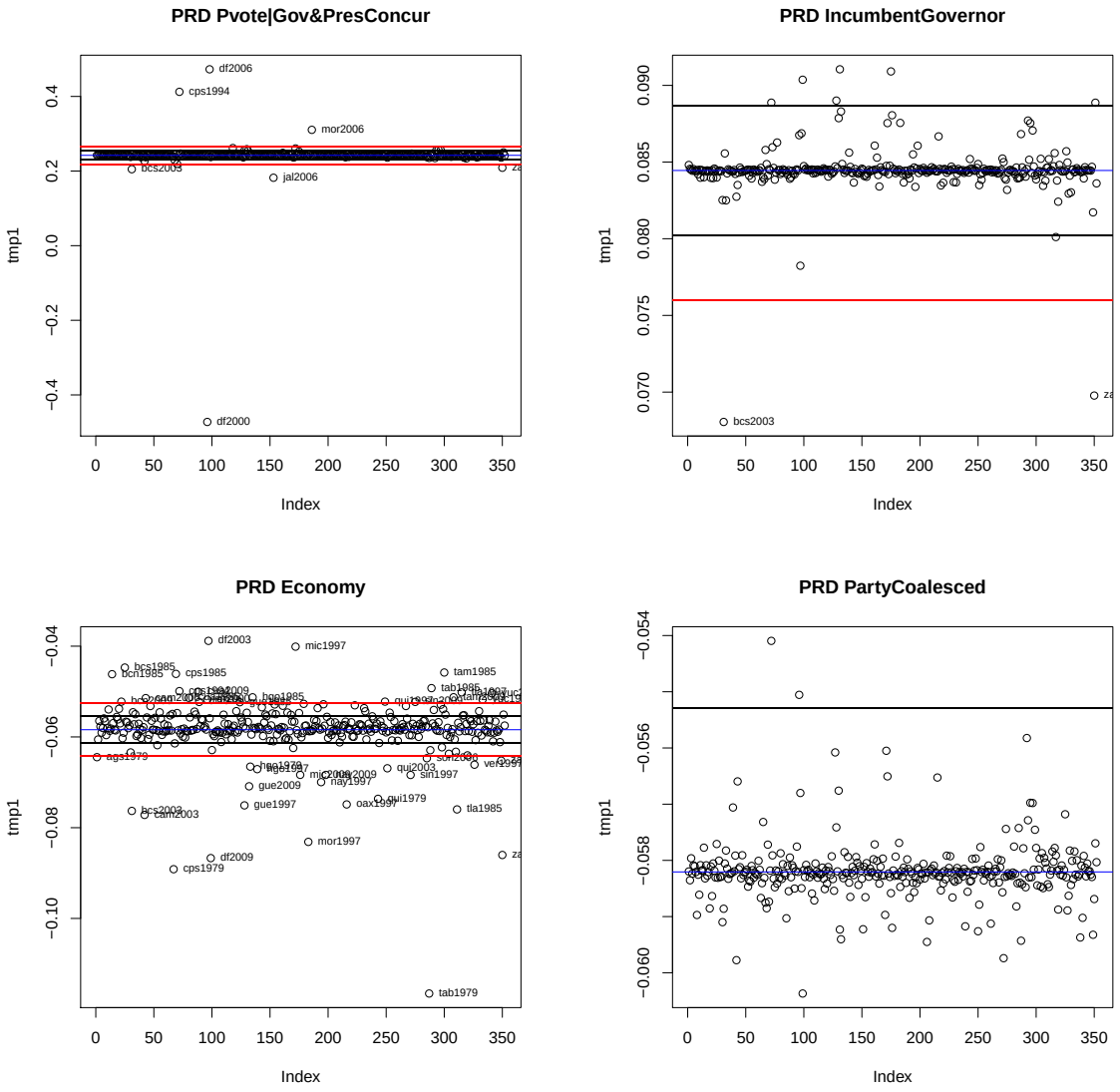
0.58
0.57
0.56
0
50
100
150
200
250
300
350
Index



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