EI Considerations

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11/18/2020

EI Overview

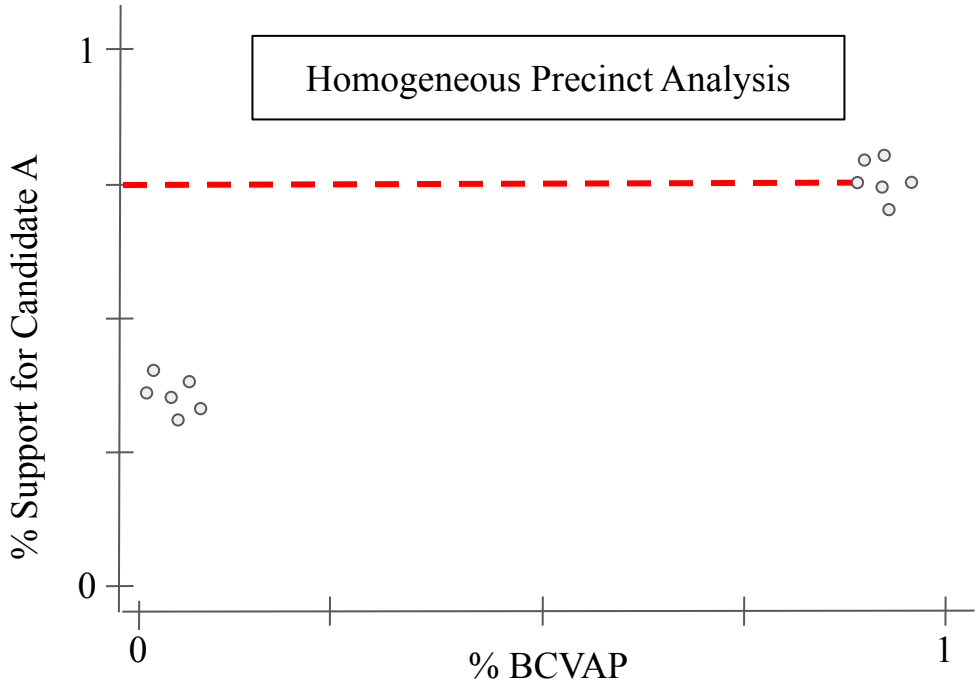
What % of Black voters chose Candidate A?
(e.g. for VRA)

For each precinct we have:

	Candidate A	Candidate B	Totals
BCVAP	?	?	2000
non-BCVAP	?	?	3000
Totals	1000	800	

EI Overview

(Look for patterns across all the precincts)



EI Overview

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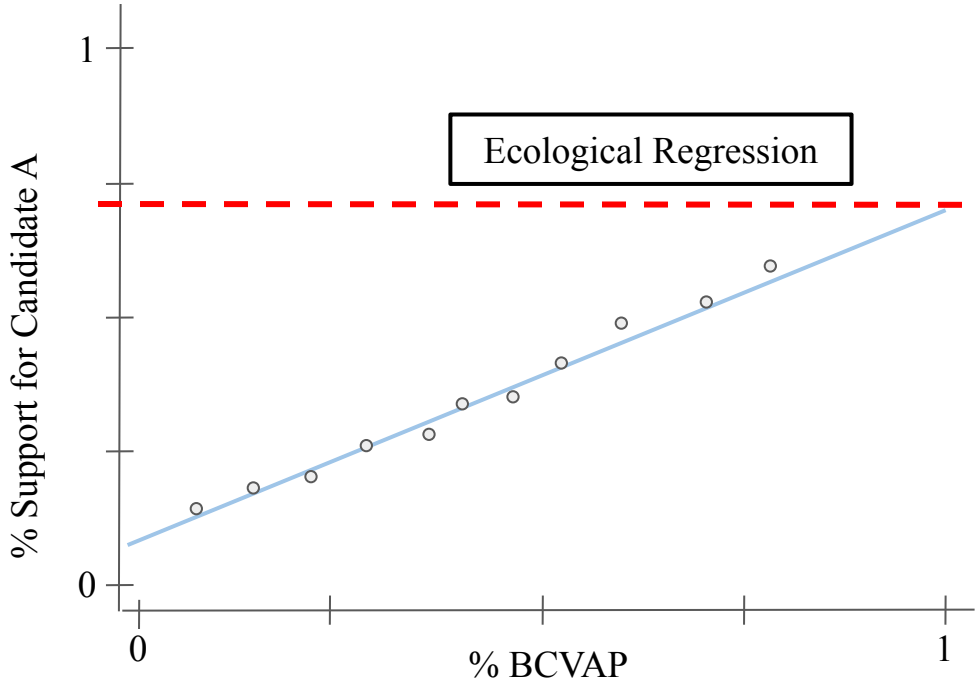
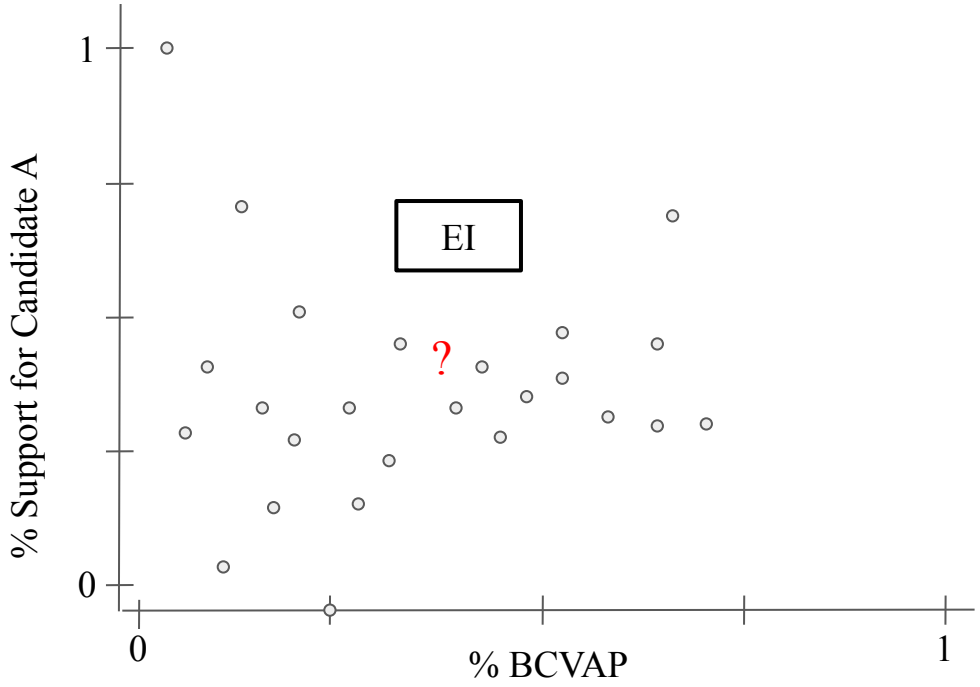


EI Overview

(Look for patterns across all the precincts)



EI Overview

- “EI” is not a single well-defined technique! Lots of flavors:
  - King’s EI, Rosen, Greiner-Quinn, …
  - Underlying distributions (truncated bivariate normal, univariate gamma, multinomial dirichlet)
  - How to address turnout issues (e.g. Double equation vs Single equation, ‘abstain’ columns, etc)
  - Different implementations (e.g. eiPack, pyEI)
  - Lots of parameter knobs to adjust (tuning, mcmc specs, etc)
  - 2x2 vs RxC tables
  - Counts vs Proportions (each have issues); CVAP/VAP/voter file/exit polls

- EI techniques are not always reliable
  - depend on underlying assumptions that do not hold well in many scenarios

- Most practitioners likely treat EI as a “black box” without needing to understand inner-workings

- Reasonable and innocuous-seeming choices can have significant impacts!

Our EI Method

precinct p_i	Candidate 1	Candidate 2	Neither
BCVAP			
HCVAP			
WCVAP			
OCVAP			

Use 4 demographic groups

Our EI Method

precinct p_i	Candidate 1	Candidate 2	Neither
BCVAP			
HCVAP			
WCVAP			
OCVAP			

Use 4 demographic groups	Aggregate precincts statewide

Our EI Method

precinct p_i	Candidate 1	Candidate 2	Neither
BCVAP			
HCVAP			
WCVAP			
OCVAP			

Use 4 demographic groups	Aggregate precincts statewide	Immediately infer turnout

Our EI Method

precinct p_i	Candidate 1	Candidate 2	Neither
BCVAP			
HCVAP			
WCVAP			
OCVAP			

Toggles

Use 4 demographic groups	Aggregate precincts statewide	Immediately infer turnout
Combine White + Other	Aggregate precincts countywide	Make a turnout phase

Chen's EI Method

precinct p_i	Any candidate	Neither
BCVAP		
HCVAP		
WOCVAP		

Phase 1
Turnout

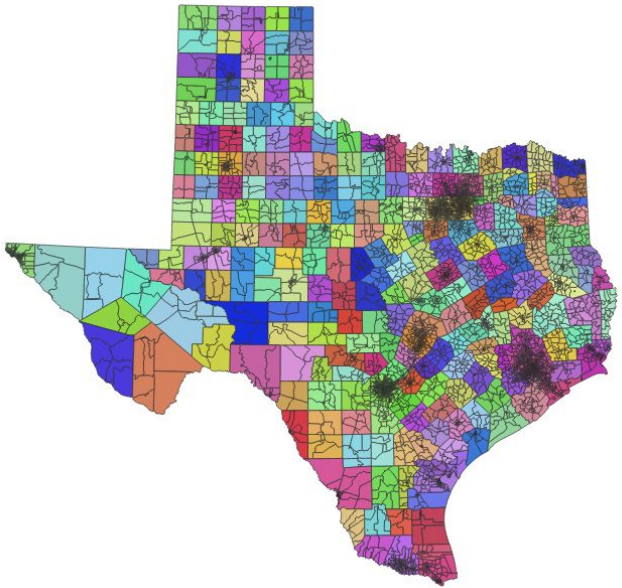
precinct p_i	Candidate 1	Candidate 2
BCVAP		
HCVAP		
WOCVAP		

Phase 2
Candidate Preference

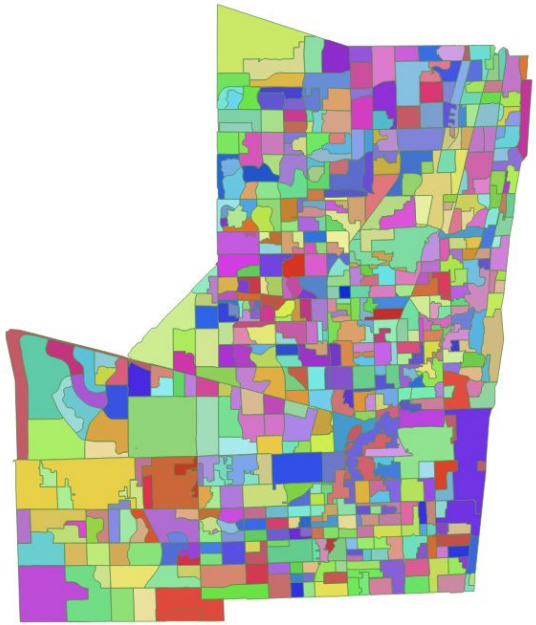
Toggles

Use 4 demographic groups	Aggregate precincts statewide	Immediately infer turnout
Combine White + Other	Aggregate precincts countywide	Make a turnout phase

Data



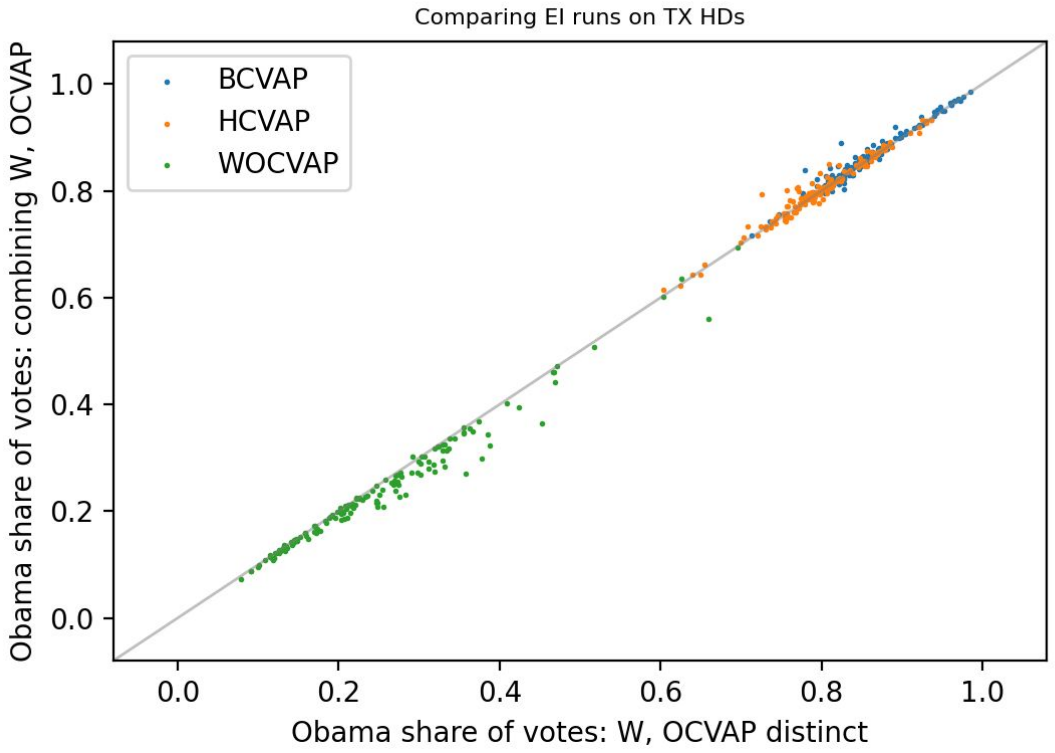
Texas
9083 precincts
~8-14 hours/election



Broward Co., FL
576 precincts
~15 min/election

Results: Consolidating Demographic Groups

- Election: PRES12 General
- Aggregate precinct results to Texas state house districts
- Consolidating tends to slightly underestimate WCVAP support for Obama, *relative to not consolidating*

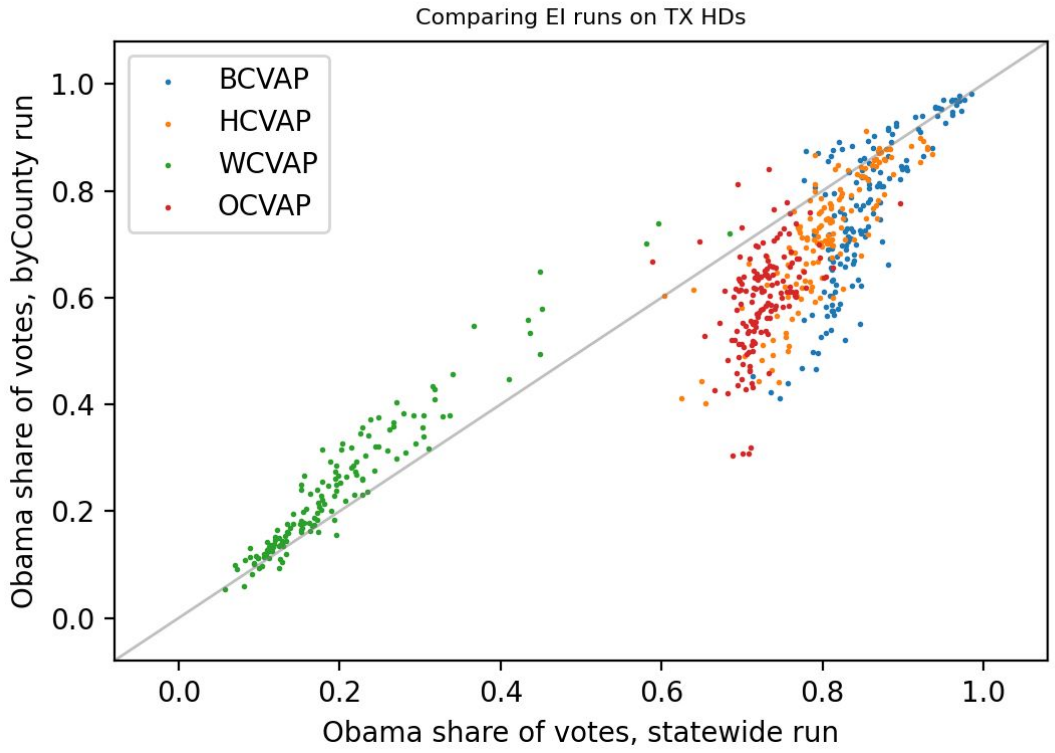


Use 4 demographic groups
Combine White + Other

Results: Statewide vs. County-by-County

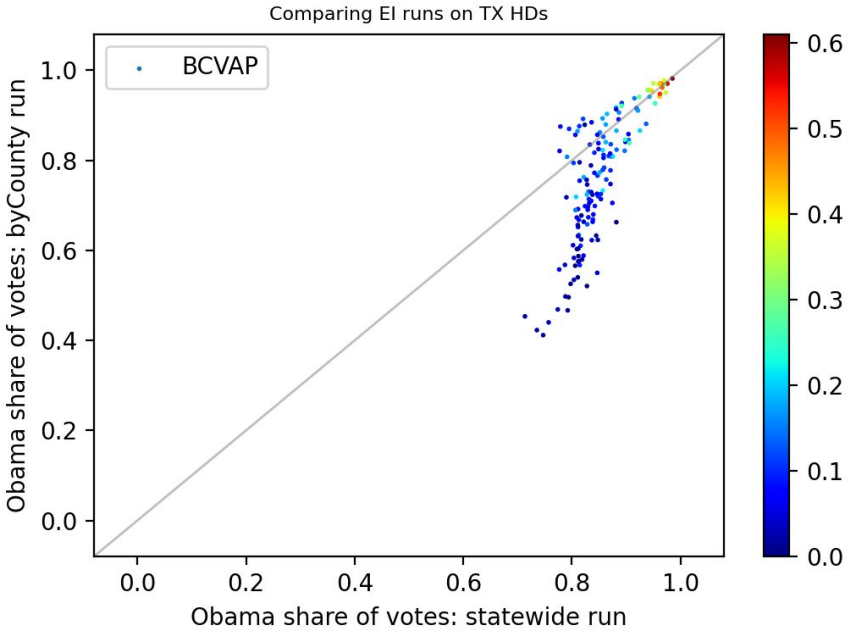
- Election: PRES12 General
- Aggregate precinct results to Texas state house districts
- byCounty tends to overestimate WCVAP support for Obama, *relative to statewide run*
- Underestimates for BCVAP, HCVAP, OCVAP

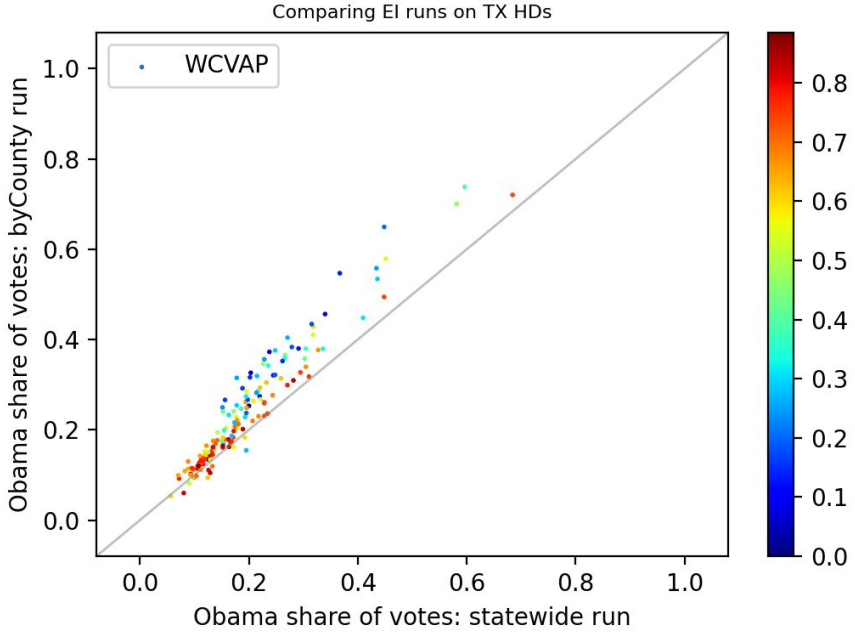
Aggregate precincts statewide
Run EI county-by-county



Results: Statewide vs. County-by-County

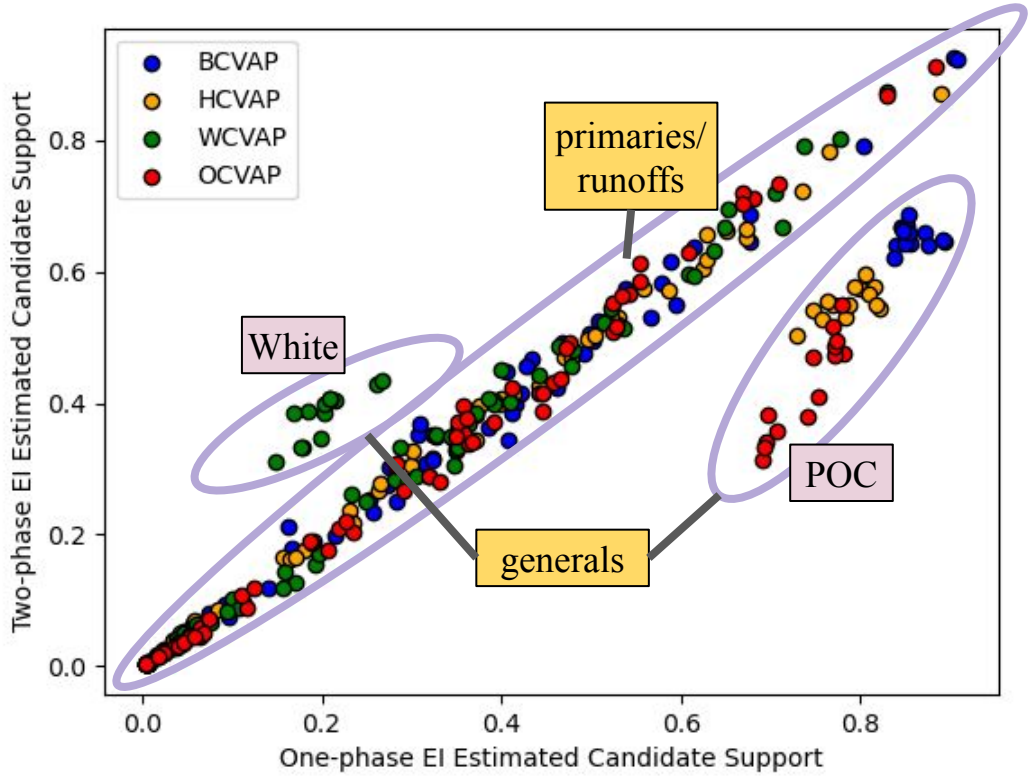
- Which HDs are most affected by this toggle?



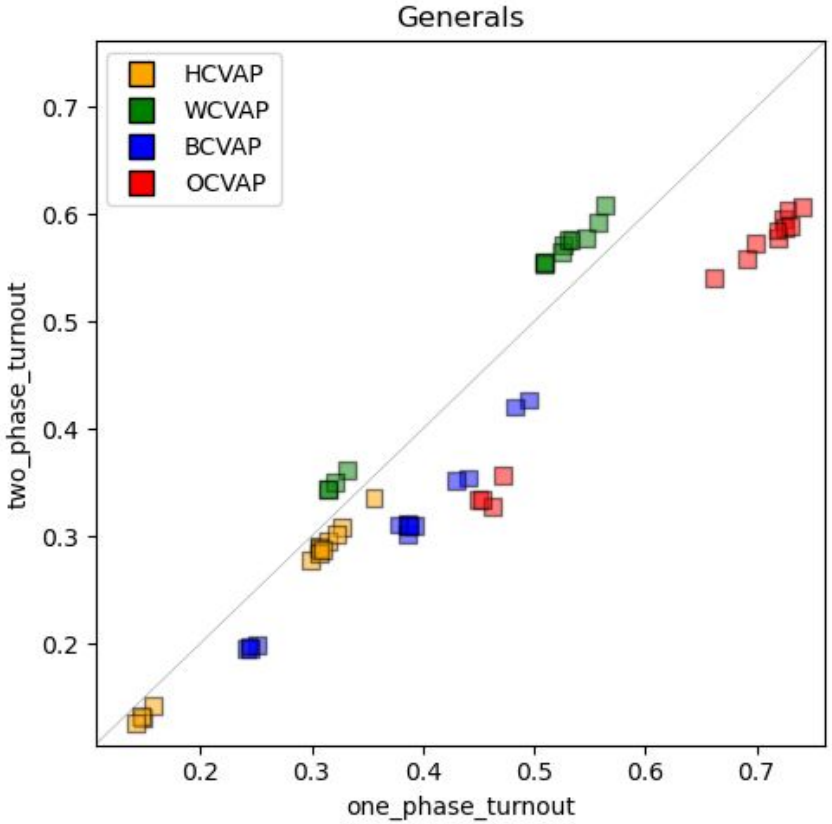


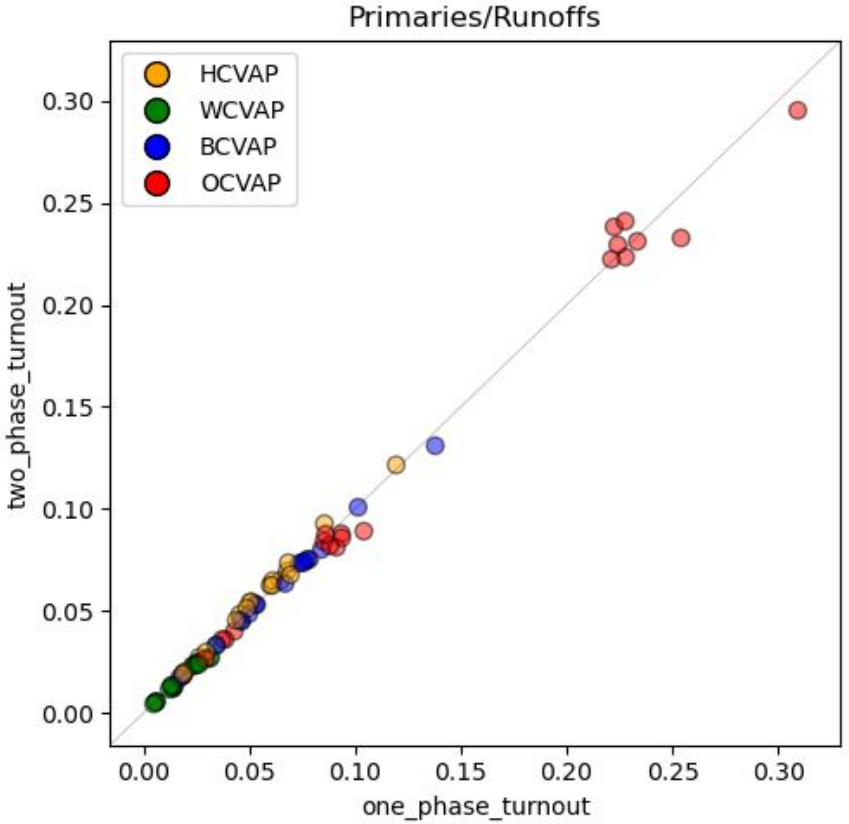
1 Phase vs 2 Phase: Texas Results

One Phase: Estimate candidate support and turnout in single run, using ‘abstain’/‘neither’ column (i.e. Rx(C+1))
Two Phase: First estimate turnout-by-race (Rx2), then feed output into second run to estimate candidate support (RxC)



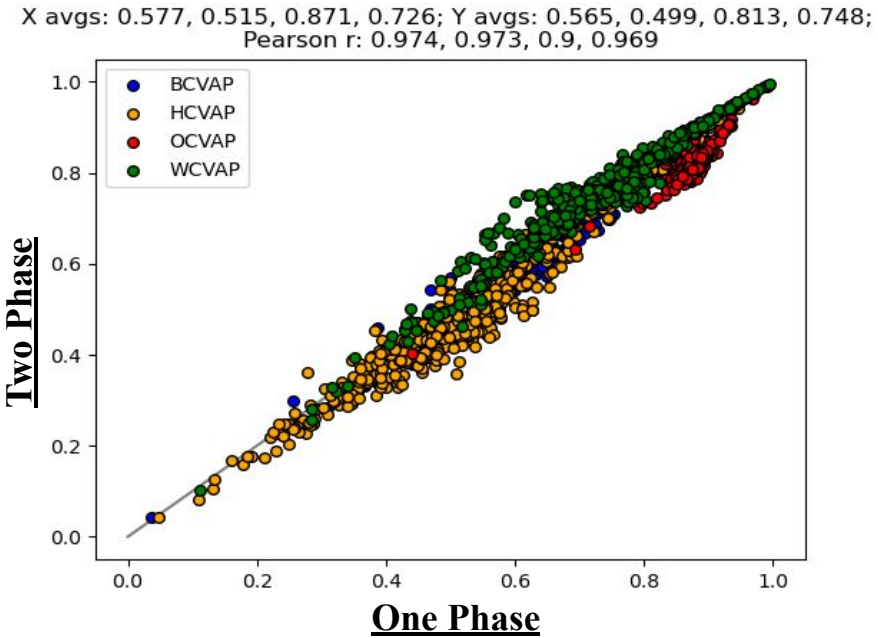
1 Phase vs 2 Phase: Texas Results





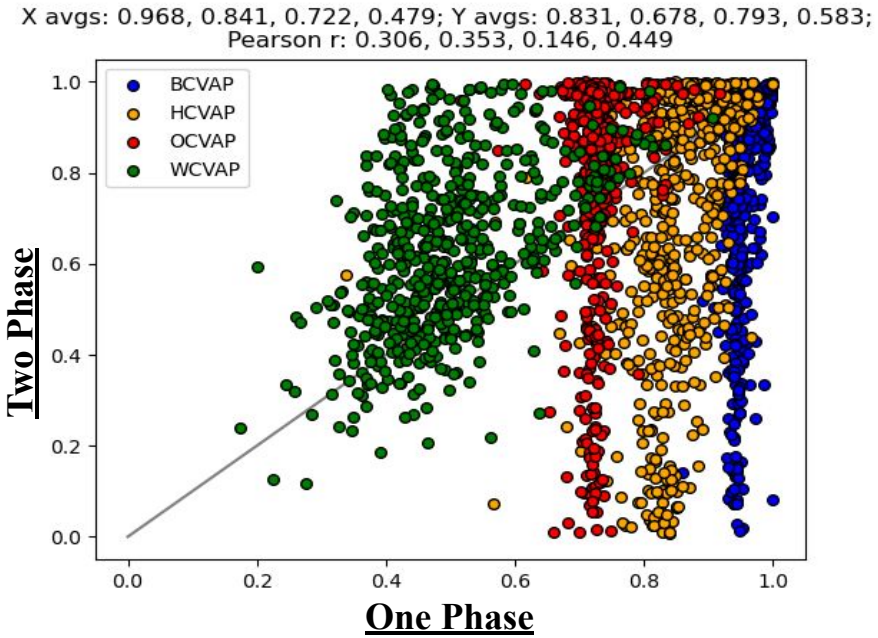
1 Phase vs 2 Phase: Broward 2016 Presidential Results

Turnout



	BCVAP	HCVAP	OCVAP	WCVAP
One Phase	57%	52%	87%	73%
Two Phase	57%	50%	81%	75%

Support Clinton

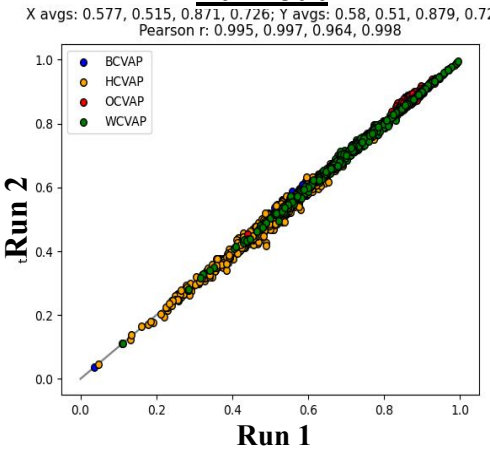


	BCVAP	HCVAP	OCVAP	WCVAP
One Phase	97%	84%	72%	48%
Two Phase	83%	68%	79%	58%

1 Phase vs 2 Phase: Replicability

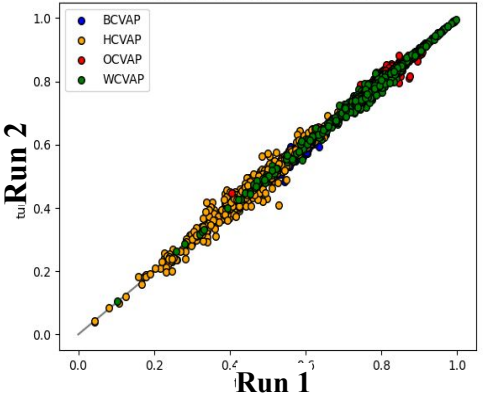
Turnout

One Phase



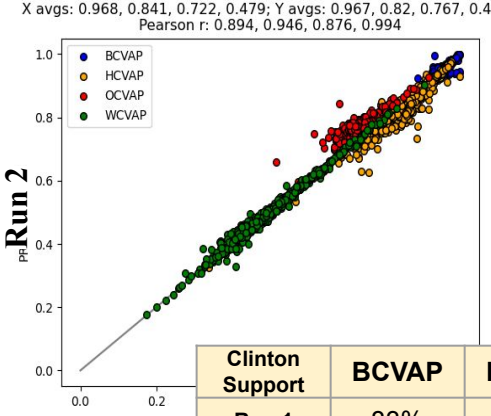
	Pearson r
BCVAP	.995
HCVAP	.997
OCVAP	.964
WCVAP	.998

Two Phase



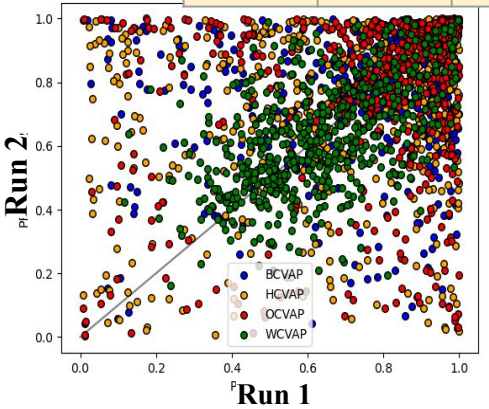
	Pearson r
BCVAP	.993
HCVAP	.992
OCVAP	.918
WCVAP	.996

Support Clinton



	Pearson r
BCVAP	.894
HCVAP	.946
OCVAP	.876
WCVAP	.994

Clinton Support	BCVAP	HCVAP	OCVAP	WCVAP
Run 1	83%	68%	79%	58%
Run 2	84%	69%	78%	58%



	Pearson r
BCVAP	.270
HCVAP	.268
OCVAP	.255
WCVAP	.555

Next Steps

- Understand replicability issue with Two Phase
- Use FL voter file to see how ground-truth turnout-by-race compares to EI estimates
- Repeat analysis for other elections (including primaries)
- Try replicating using PyEI