Medical Marijuana Approval

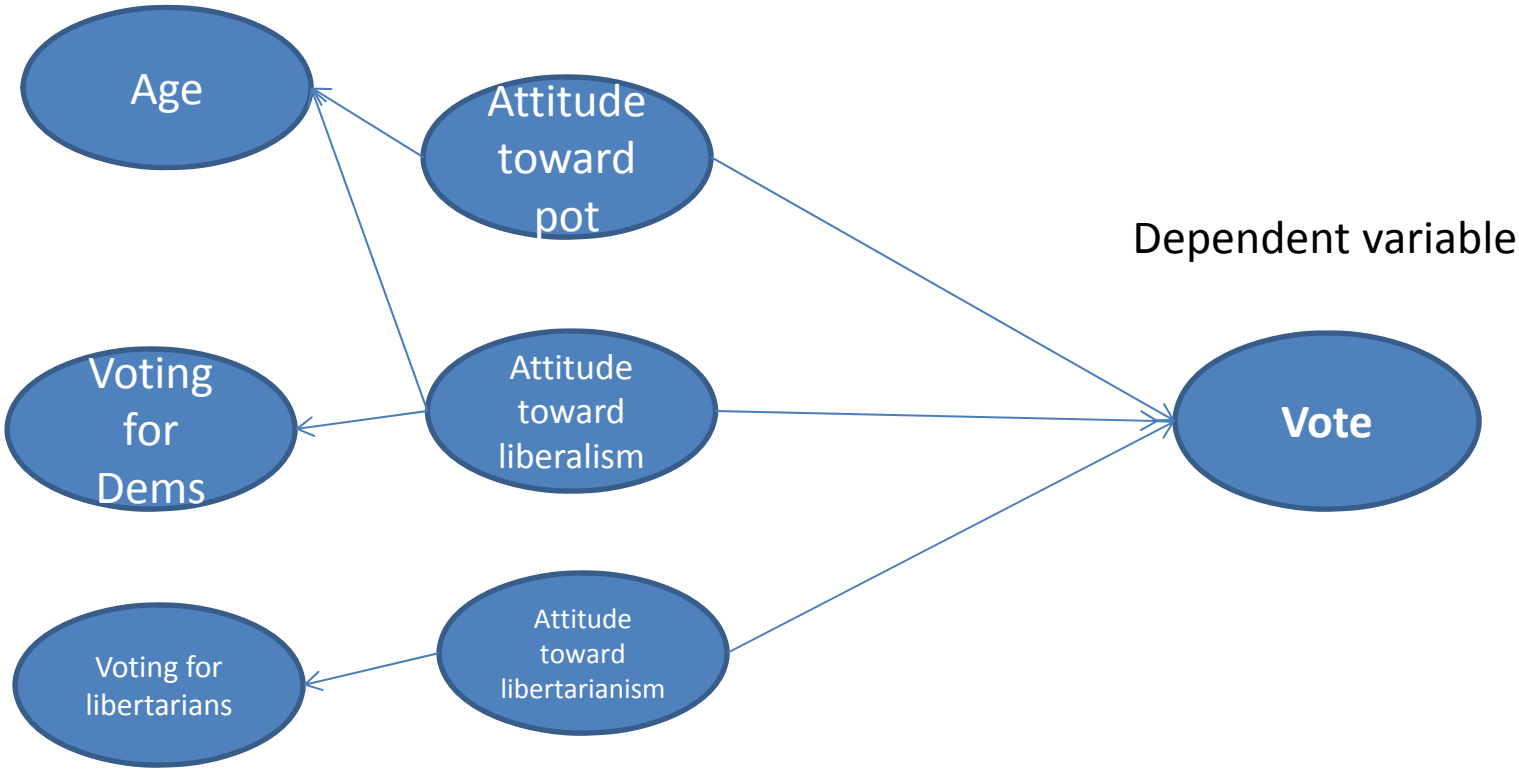
Hypotheses

- Baby boomers are pot heads
- College students are pot heads
- Democrats are pot heads

Model

- General model:
  - P(vote=yes) = f(attitude toward pot, general attitude toward social liberalism, general attitude toward “liberty”)
- Model as expressed:
  - P(vote=yes) = f(being middle aged+, being a young adult, supporting Democratic candidates, supporting libertarian candidates)

Graphically



Indicator variables Latent variables

Aggregated linear probability model

$$Potvote_i = \alpha_i + \beta_1 Age_i + \beta_2 Demvote_i + \varepsilon_i$$

Let n_t = the number of votes cast in town t

$$\sum_1^{n_t} Potvote_i = n_t\alpha_i + \beta_1 \sum_1^{n_t} Age_i + \beta_2 \sum_1^{n_t} Demvote_i + n_t\varepsilon_i$$

Divide through by n_t

$$\overline{Potvote_t} = \bar{\alpha}_t + \beta_1 \overline{Age_t} + \beta_2 \overline{Demvote_t} + \overline{\varepsilon_t}$$

Gay Marriage Example

```
. reg favorgay age [aw=V103]
(sum of wgt is   5.4021e+04)

      Source |       SS       df       MS              Number of obs =   53942
-------------+------------------------------           F(  1, 53940) = 1589.83
       Model |  384.674415     1  384.674415           Prob > F      =  0.0000
    Residual |  13051.3277 53940  .241960098           R-squared     =  0.0286
-------------+------------------------------           Adj R-squared =  0.0286
       Total |  13436.0021 53941  .249087005           Root MSE      =  .49189

------------------------------------------------------------------------------
    favorgay |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         age |  -.0050177   .0001258   -39.87   0.000    -.0052644   -.0047711
       _cons |   .7642193   .0062374   122.52   0.000     .7519938    .7764447
------------------------------------------------------------------------------
```

Gay Marriage Example: Aggregated

```
. reg favorgay age

      Source |       SS       df       MS              Number of obs =    2656
-------------+------------------------------           F(  1,  2654) =  126.98
       Model |  12.5629245     1  12.5629245           Prob > F      =  0.0000
    Residual |  262.584585  2654   .09893918           R-squared     =  0.0457
-------------+------------------------------           Adj R-squared =  0.0453
       Total |  275.147509  2655  .103633714           Root MSE      =  .31455

------------------------------------------------------------------------------
    favorgay |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         age |  -.0062511   .0005547   -11.27   0.000    -.0073389   -.0051633
       _cons |   .7395918   .0285278    25.93   0.000     .6836528    .7955308
------------------------------------------------------------------------------
```

Individual level coefficients:

```
------------------------------------------------------------------------------
    favorgay |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         age |  -.0050177   .0001258   -39.87   0.000    -.0052644   -.0047711
       _cons |   .7642193   .0062374   122.52   0.000     .7519938    .7764447
------------------------------------------------------------------------------
```

Gay Marriage Example: Aggregated & weighted

```
. reg favorgay age

      Source |       SS       df       MS              Number of obs =    2656
-------------+------------------------------           F(  1,  2654) =  126.98
       Model |  12.5629245     1  12.5629245           Prob > F      =  0.0000
    Residual |  262.584585  2654   .09893918           R-squared     =  0.0457
-------------+------------------------------           Adj R-squared =  0.0453
       Total |  275.147509  2655  .103633714           Root MSE      =  .31455

------------------------------------------------------------------------------
    favorgay |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         age |  -.0062511   .0005547   -11.27   0.000    -.0073389   -.0051633
       _cons |   .7395918   .0285278    25.93   0.000     .6836528    .7955308
------------------------------------------------------------------------------
```

Individual level coefficients:

```
------------------------------------------------------------------------------
    favorgay |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         age |  -.0050177   .0001258   -39.87   0.000    -.0052644   -.0047711
       _cons |   .7642193   .0062374   122.52   0.000     .7519938    .7764447
------------------------------------------------------------------------------
```

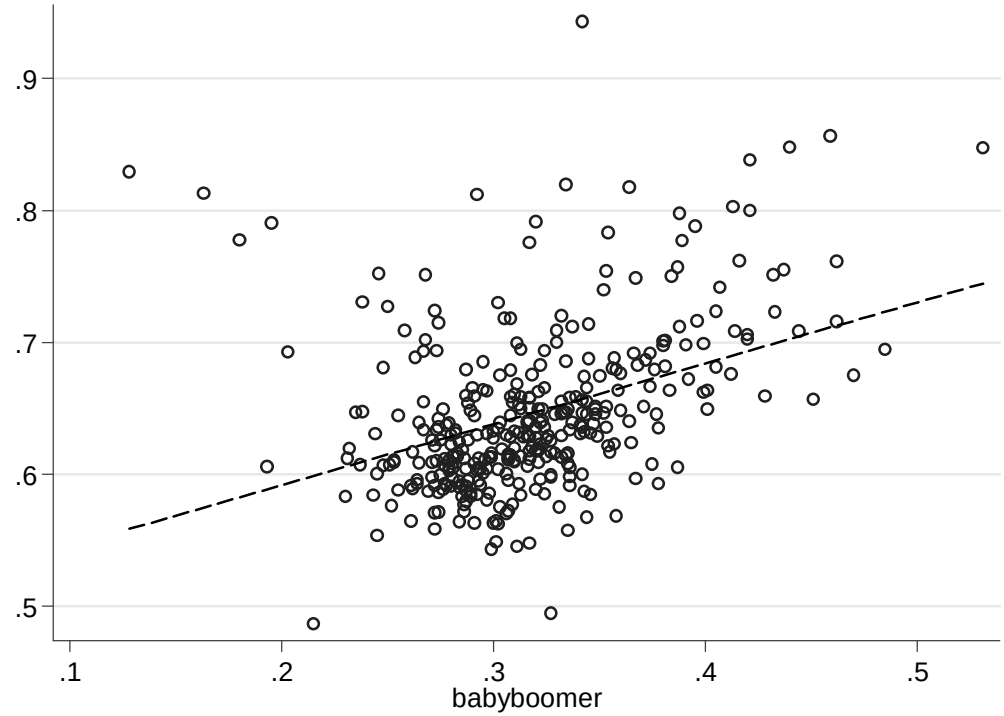
Gay Marriage Example: Aggregated & weighted

```
. reg favorgay age [aw=n]
(sum of wgt is   5.3942e+04)

      Source |       SS       df       MS              Number of obs =    2656
-------------+------------------------------           F(  1,  2654) =  174.92
       Model |  5.36845523     1  5.36845523           Prob > F      =  0.0000
    Residual |  81.4534182  2654  .030690813           R-squared     =  0.0618
-------------+------------------------------           Adj R-squared =  0.0615
       Total |  86.8218735  2655  .032701271           Root MSE      =  .17519

------------------------------------------------------------------------------
    favorgay |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         age |  -.0076449    .000578   -13.23   0.000    -.0087783   -.0065114
       _cons |   .8929256   .0275494    32.41   0.000     .8389052    .9469461
------------------------------------------------------------------------------
```

Unweighted coefficients

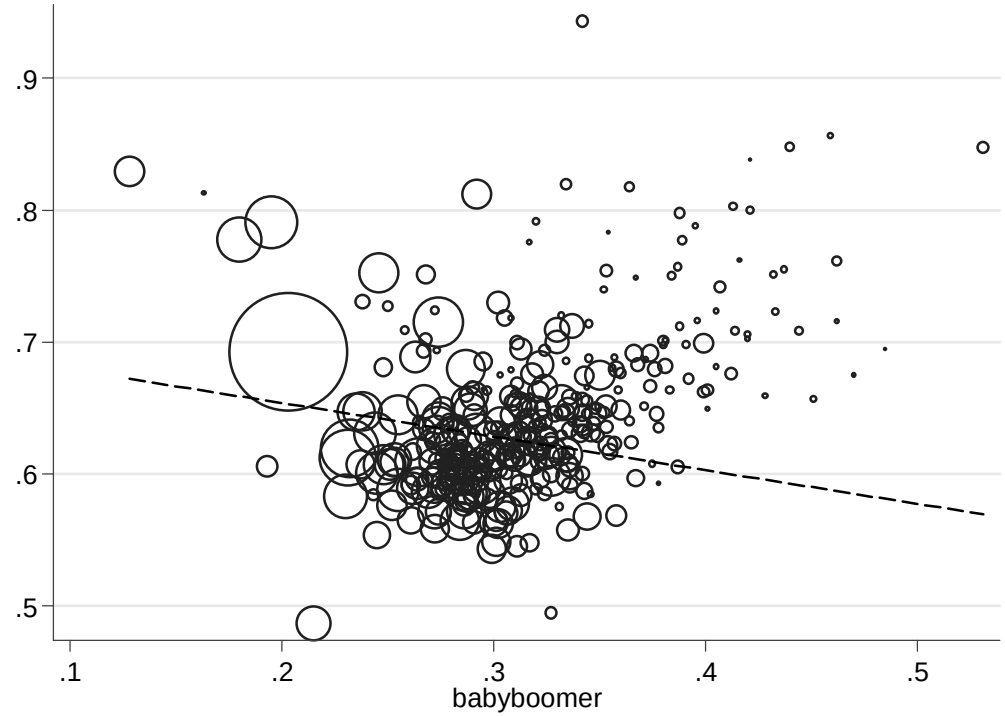
```
------------------------------------------------------------------------------
    favorgay |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         age |  -.0062511   .0005547   -11.27   0.000    -.0073389   -.0051633
       _cons |   .7395918   .0285278    25.93   0.000     .6836528    .7955308
------------------------------------------------------------------------------
```

Issue: Weighting

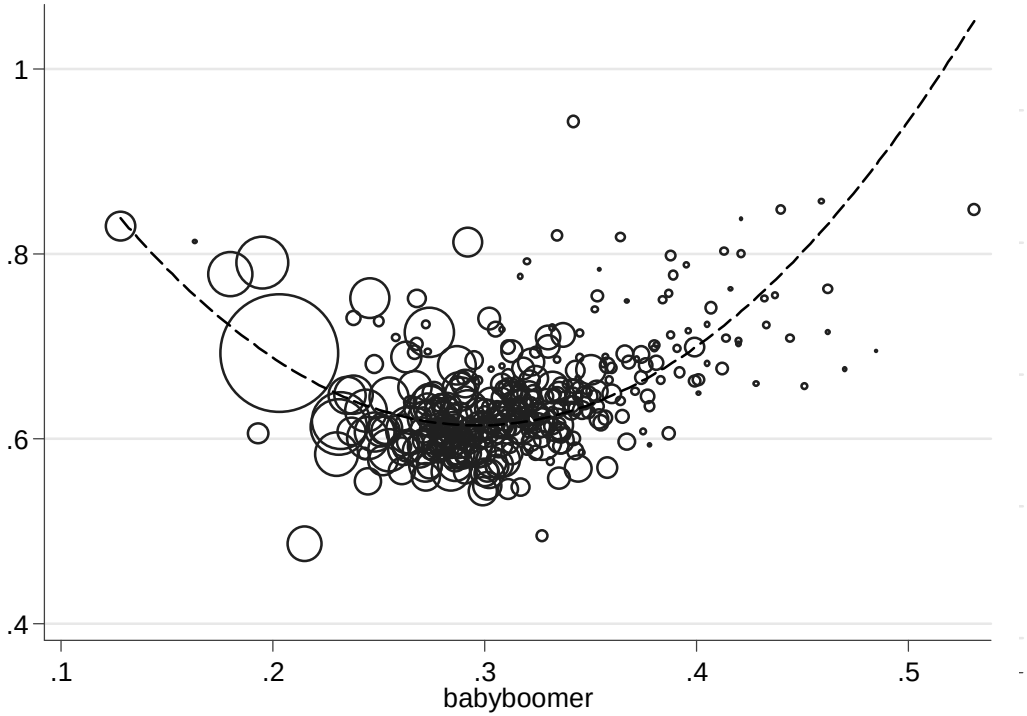


(Note: this is not exactly the graph in the paper. Where is Gosnold?)

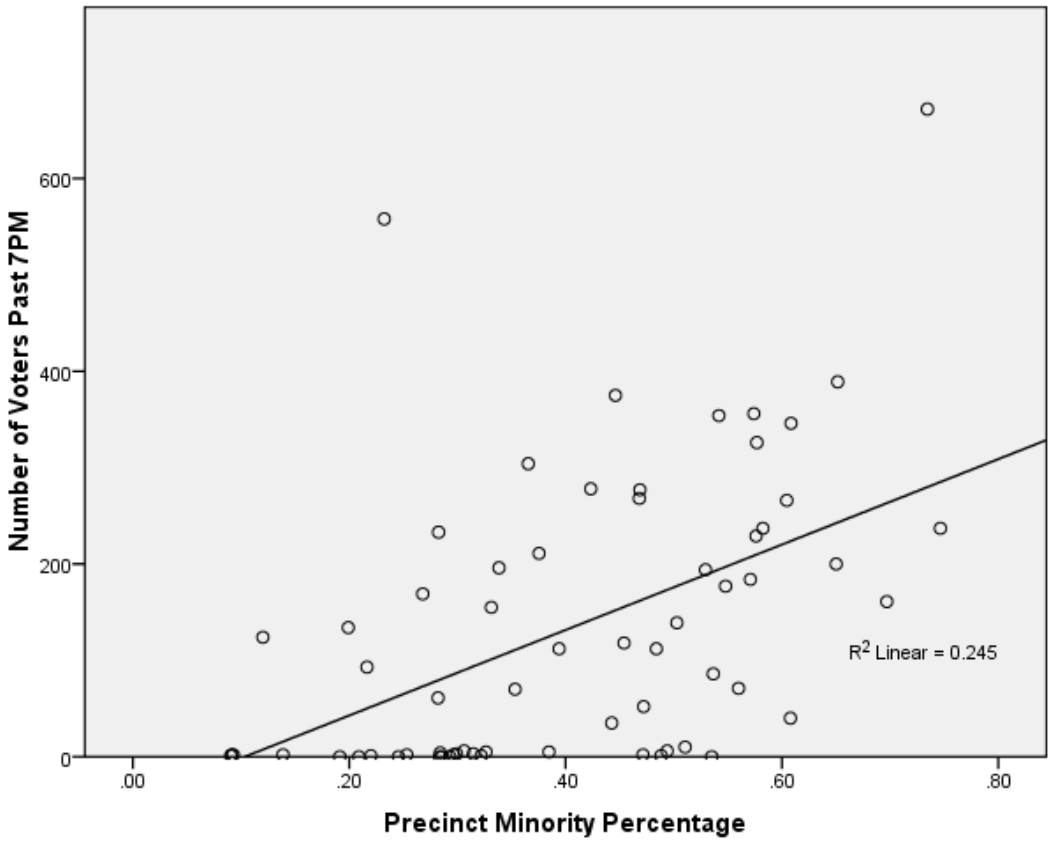
Issue: Weighting



Issue: Weighting



How not to do it



Issue: Omitted variables bias?

```
. regress pctyes Babyboomer eighteentotwentyfour pctdem pctlib
```

Source	SS	df	MS
Model	.627566454	4	.156891613
Residual	.7566227	345	.002193109
Total	1.38418915	349	.003966158

Number of obs	350
F(4, 345)	71.54
Prob > F	0.0000
R-squared	0.4534
Adj R-squared	0.4470
Root MSE	.04683

pctyes	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Babyboomer	.4033424	.0480515	8.39	0.000	.3088316	.4978532
eighteentotwentyfour	.2306135	.0684963	3.37	0.001	.0958906	.3653364
pctdem	.2390349	.022659	10.55	0.000	.1944678	.283602
pctlib	2.663925	.5271681	5.05	0.000	1.627057	3.700793
_cons	.3490238	.0183234	19.05	0.000	.3129842	.3850633

	Paper	Me	Weighted	More controls
Babyboomer	0.403	0.522	0.581	0.389
	(0.048)	(0.055)	(0.078)	(0.068)
18-24	0.231	0.296	0.502	0.089
	(0.068)	(0.069)	(0.062)	(0.132)
Pctdem	0.239	0.266	0.254	0.172
	(0.023)	(0.021)	(0.024)	(0.021)
Pctlib	2.66	2.31	4.55	4.87
	(0.530)	(0.520)	(0.850)	(0.710)
College pct.	---	---	---	0.217
				(0.115)
Grad degree pct.	---	---	---	0.178
				(0.026)
Kids under 18	---	---	---	-0.192
				(0.030)
Intercept	0.349	0.278	0.223	0.371
	(0.018)	(0.022)	(0.033)	(0.033)
N	350	350	350	350
R^2	0.45	0.48	0.45	0.631