

# VIOLENT CRIME TRENDS AND THE FORMATION OF PUBLIC ATTITUDES ABOUT GUN CONTROL

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## Motivation:

Over the past two decades, trends in crime and gun violence have changed dramatically. After peaking in the early 1990s, the overall violent crime rate has fallen precipitously, and yet, since 2000, the frequency and scale of incidents of mass gun violence have been steadily on the rise. Studies have shown that support for gun control has decreased over time, but that a majority of the public still supports a number of gun-related policies. In turn, in this project, I seek to answer two questions:

- (1) How have changes in the nature and frequency of violent crime influenced public opinion on gun policy?
- (2) Has the process of attitude change occurred differently across states and/or demographic groups?

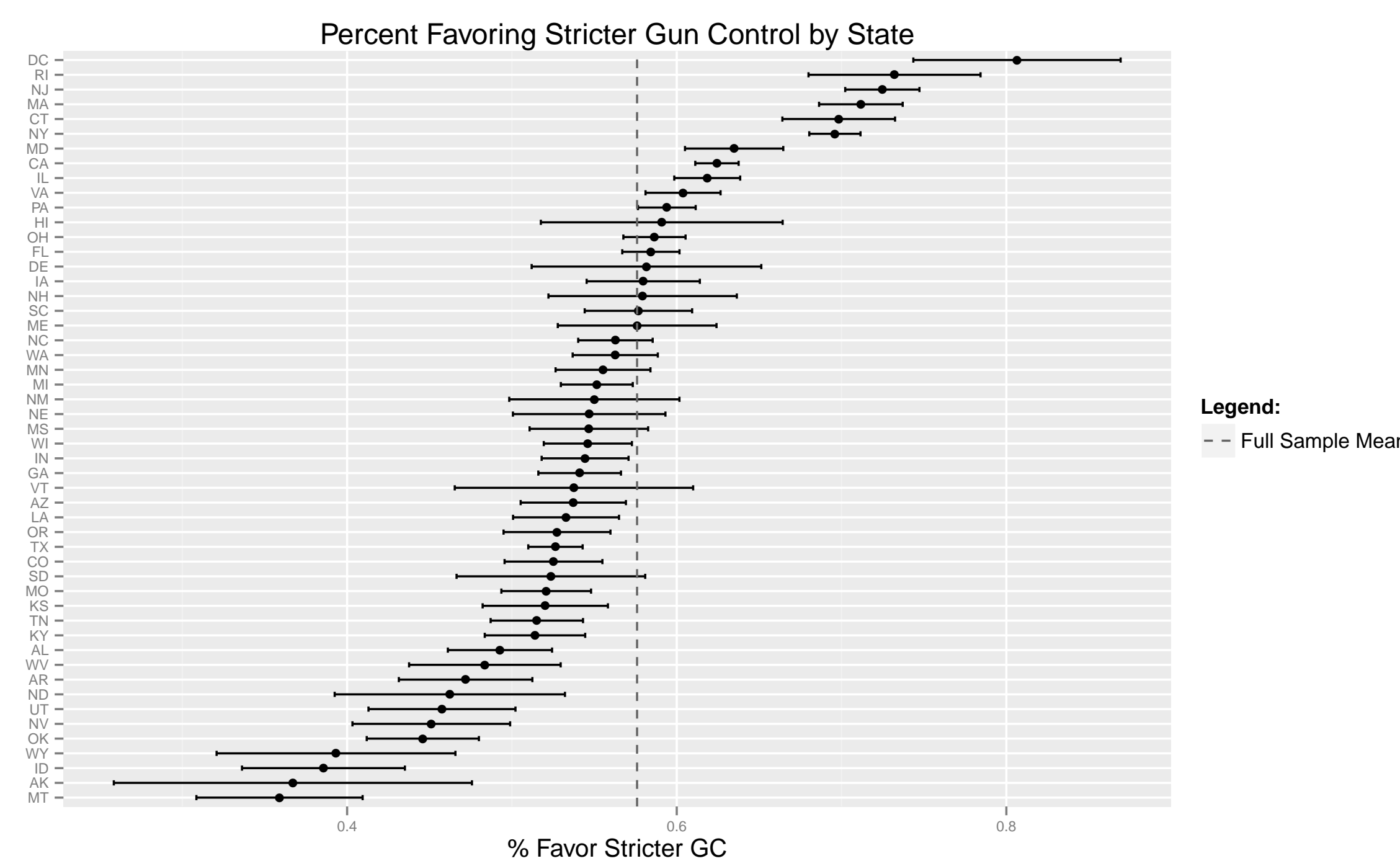
## Data

Question of interest: *In general, do you think gun control laws should be made more strict, less strict, or kept as they are now?*

- Question asked in 52 nationally representative surveys from 1989 - 2013
- Primarily polls from news organizations, but sample also includes random subset of 6,000 respondents from 2010 and 2012 CCES
- Full sample = 58,219 respondents
- Responses in favor of *stricter* gun control coded 1, 0 otherwise
- State-level variables: Republican vote share, the state-level violent crime rate, and indicators for mass shootings. Individual variables shown below:

Variable	Mean	St. Dev.	Min	Max	Categorical Values
Female	0.500	0.500	0	1	0: Male; 1: Female
Black	0.100	0.300	0	1	0: Non-black; 1: Black
Age	2.702	0.982	1	4	1: 18-29; 2: 30-44; 3: 45-64; 4: 65+
Education	2.965	0.959	1	4	1: < HS; 2: HS; 3: Some College; 4: College/Post-Grad

Fig. 1: Summary Statistics



## Methodological Approach

Drawing on earlier work by Shirley and Gelman (2014), I model attitudes about gun control using an overparameterized hierarchical bayesian logistic regression model. Modeling opinion in this way has three main benefits:

- (1) Overparameterization → estimation of national-level trends, along with state deviations from those trends.
- (2) Hierarchical → shrinkage across groups, meaning categories with low sample sizes are weighted more towards group mean. This is necessary given that only 19,148 of the  $51 \times 25 \times 2 \times 2 \times 4 \times 4 = 81,600$  possible groups are represented in the data.
- (3) Estimation of population-level trends is possible via poststratification.

## Individual Level

The respondent level of the model is shown below. Note that each  $\alpha$  term represents a piece of the state-specific intercept, and each  $\delta$  term represents a piece of the state-specific slope (change over time).

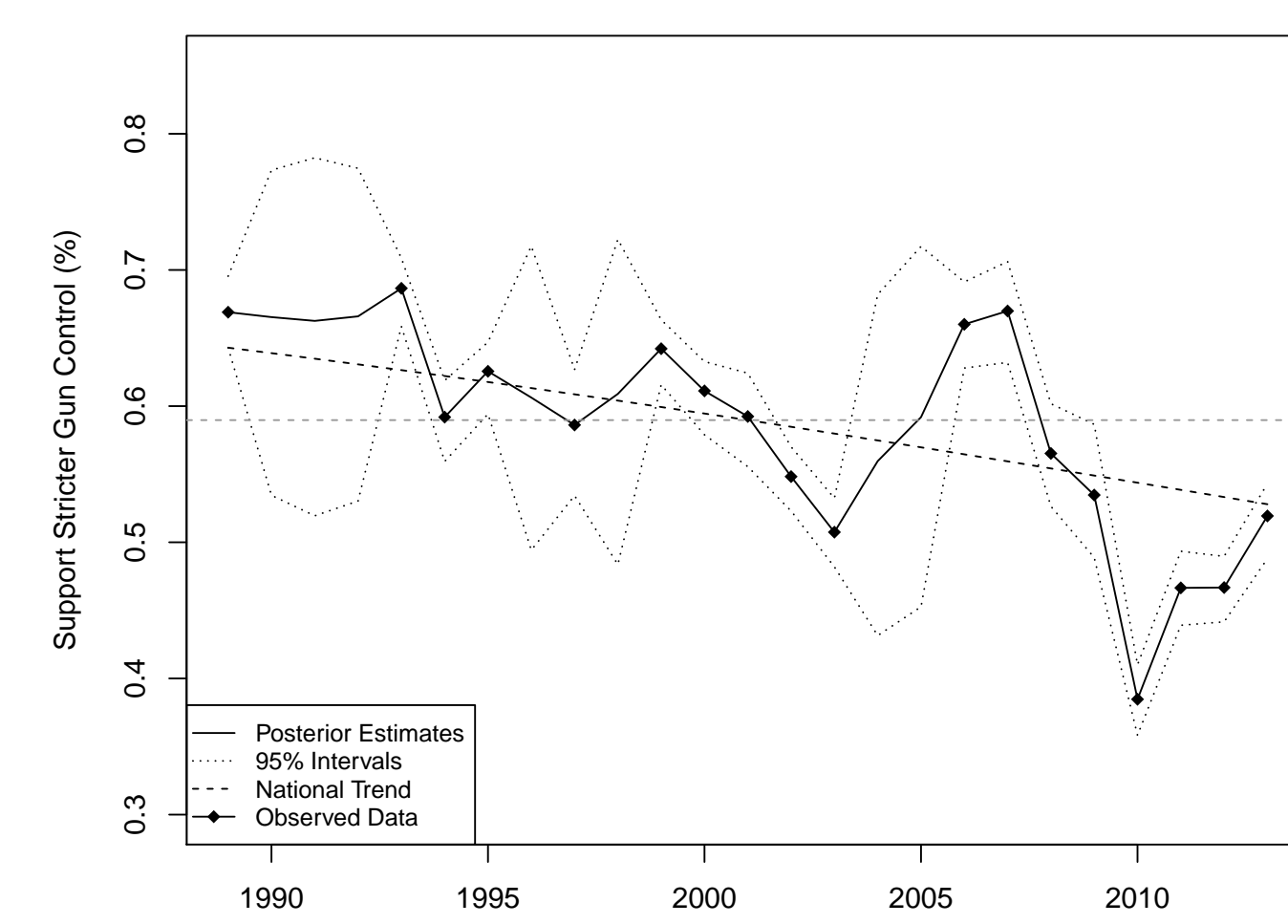
$$P(Y_i = 1) = \text{logit}^{-1}(\alpha_{(s,t)[i]}^{state-year} + \alpha_{(a,s)[i]}^{age-state} + \alpha_{(e,s)[i]}^{educ-state} + \delta_{(a,s)[i]}^{age-state} X_i^{year} + \delta_{(e,s)[i]}^{educ-state} X_i^{year} + \beta_{s[i]}^{black-state} X_i^{black} + \delta_{s[i]}^{black-state} X_i^{black} X_i^{year} + \beta_{s[i]}^{female-state} X_i^{female} + \delta_{s[i]}^{female-state} X_i^{female} X_i^{year} + \beta_{s[i]}^{black-female-state} X_i^{black} X_i^{female} + \delta_{s[i]}^{black-female-state} X_i^{black} X_i^{female} X_i^{year})$$

## Group Level Examples

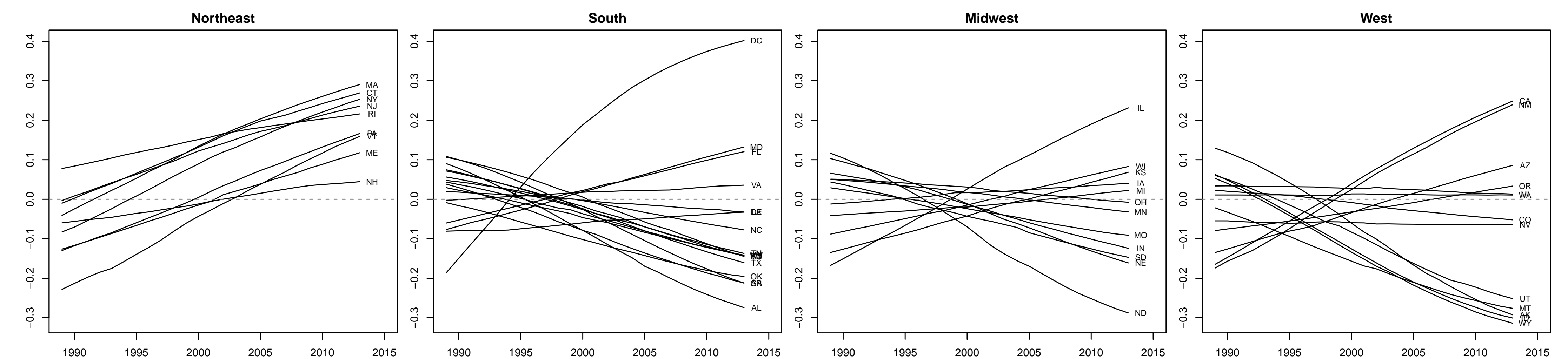
Each term also has a group level model. Here are two examples:

$$\begin{aligned} \alpha_{(s,t)}^{state-year} &\sim N(\alpha_t^{year} + \alpha_s^{state} + \delta_s^{state} X_t^{year}, \sigma_{state-year}^2) \\ \alpha_t^{year} &\sim N(\mu + \mu_\delta X_t^{year} + \phi(\alpha_{t-1}^{year} - \mu - \mu_\delta X_{t-1}^{year}), \sigma_{year}^2) \\ \alpha_s^{state} &\sim N(\alpha_{r[s]}^{region} + \beta Z_1^{state}, \sigma_{state-r[s]}^2) \\ \delta_s^{state} &\sim N(\delta_{r[s]}^{region} + \gamma Z_2^{state}, \tau_{state-r[s]}^2) \\ \alpha_{(a,s)}^{age-state} &\sim N(\alpha_{(a,r[s])}^{age-region}, \sigma_{age-state_{a[s]}}^2) \\ \alpha_{(a,r)}^{age-region} &\sim N(\alpha_a^{age}, \sigma_{age-region_a}^2) \end{aligned}$$

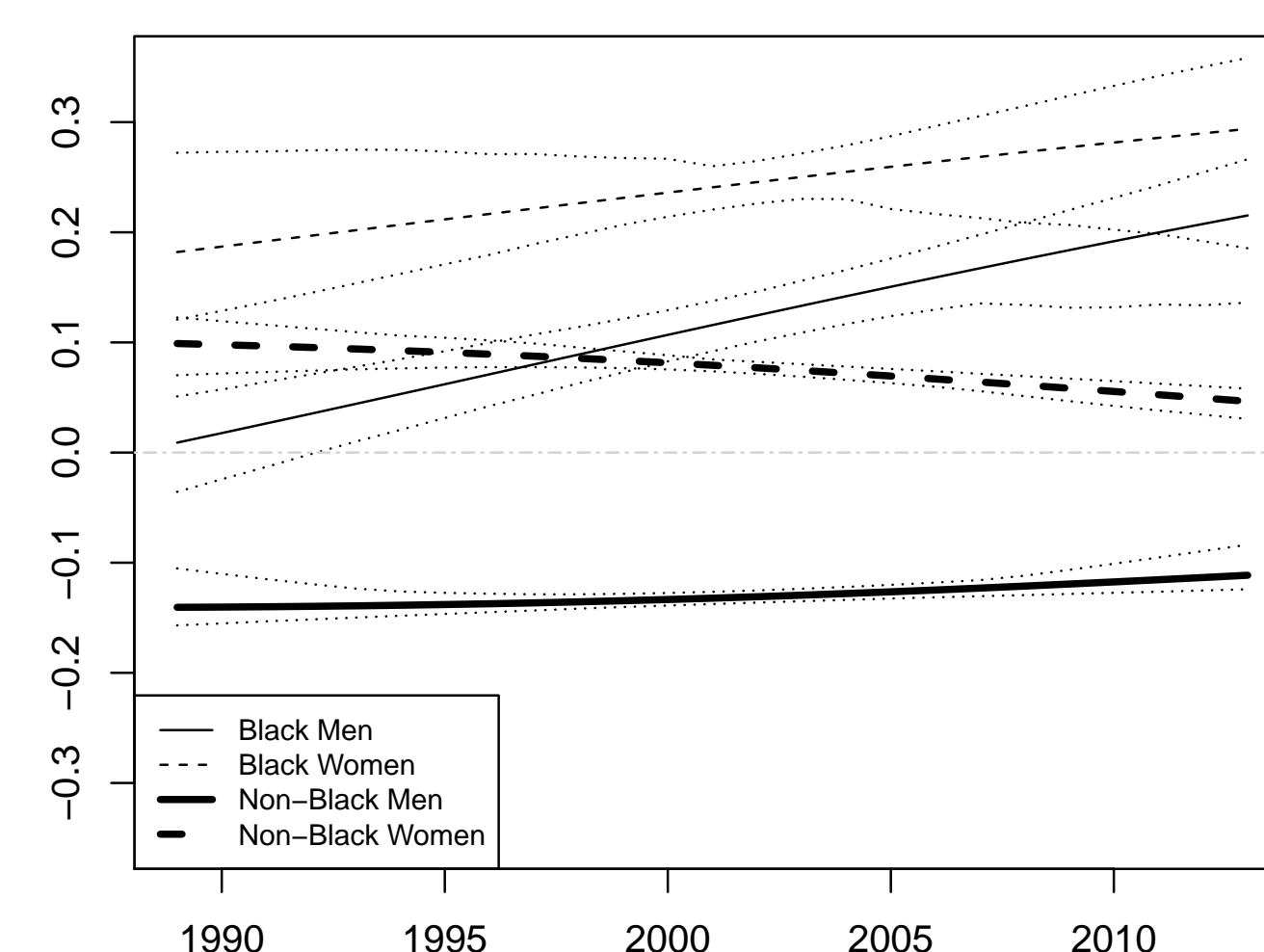
## National Average Trend (NAT)



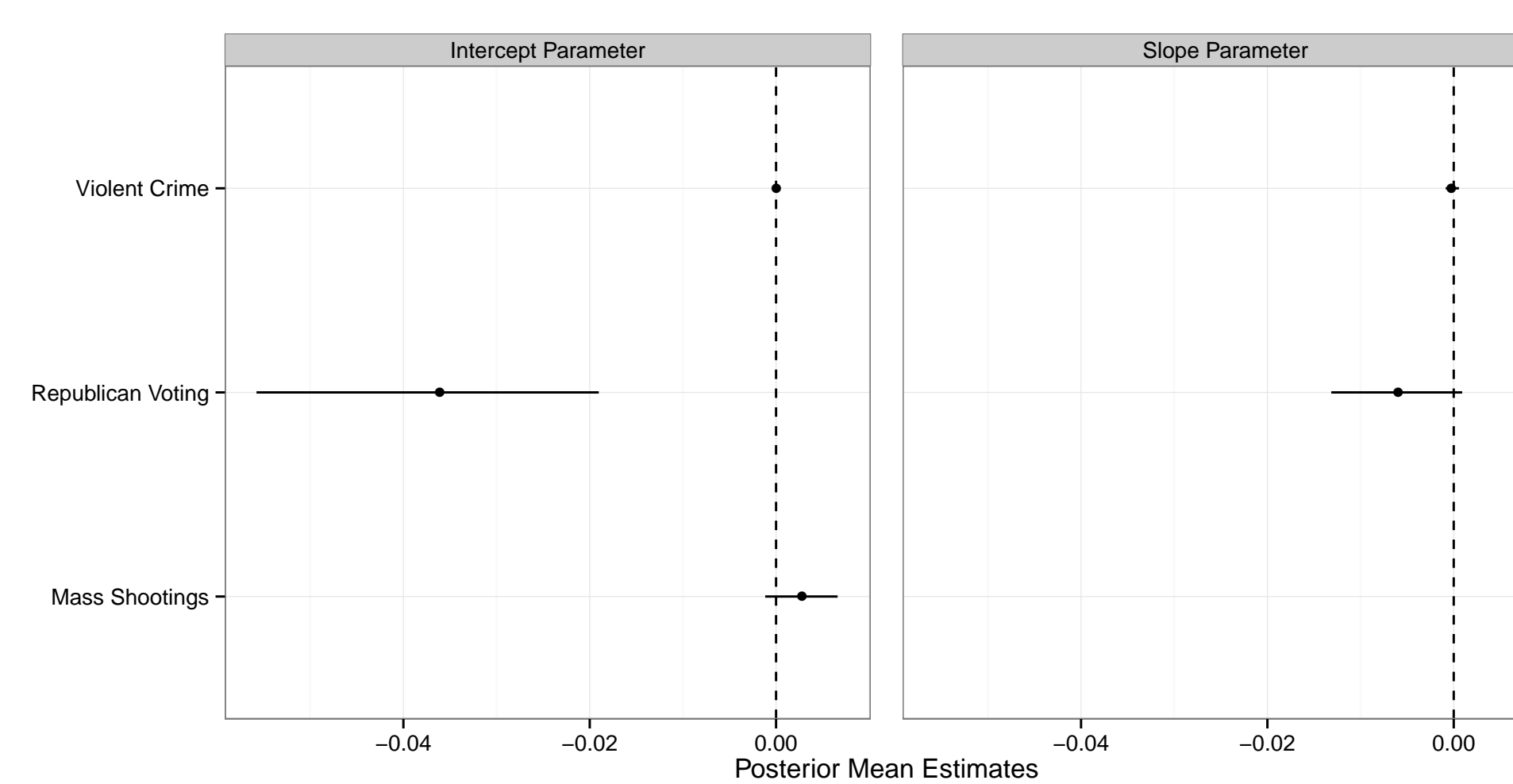
## State-Deviations from the National Trend by Region



## Race-Sex Deviations from NAT



## Group Level Coefficients



## Conclusions/Extensions

- Model confirms steady decline in support (approx.  $\frac{1}{2}\%$  per year) for *stricter* gun control measures for the 'average' survey respondent.
- No clear effect of mass violence on attitudes. Parameterization may be issue.
- Precisely estimated null effect of overall violent crime rate on attitudes.
- Republican voting correlated with baseline attitudes ( $p < .01$ ) and changes in attitudes over time ( $p < .10$ ). Effect is small: 2 std. deviation increase yields  $< 2\%$  change.
- Significant variation within and across regions. Unobserved state-level factors are important. Urban/Rural and gun ownership proxy need to be added.
- Partisanship is clearly important. Considering including this in the model and not poststratifying.