County Model First Draft

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```
setwd("~/Desktop/Reed_Senior_Thesis/Data_and_results/data")
model_sample <- read_csv("model_indiv_sample.csv")
```

```
## Warning: Missing column names filled in: 'X1' [1]
```

```
## Warning: Duplicated column names deduplicated: 'X1' => 'X1_1' [13]
```

```
## Parsed with column specification:
## cols(
##   .default = col_integer(),
##   COUNTY = col_character(),
##   ACTIVE = col_character(),
##   PARTY = col_character(),
##   GENDER = col_character(),
##   ELECTION_TYPE = col_character(),
##   ELECTION_DATE = col_date(format = ""),
##   PCT_URBAN = col_double(),
##   PCT_WHITE = col_double(),
##   PCT_REGISTERED = col_double(),
##   PCT_OF_STATE_POP = col_double(),
##   PCT_OF_STATE_REG = col_double()
## )
```

```
## See spec(...) for full column specifications.
```

```
demographics <- read_csv("colorado_demographic_stats_by_county.csv")
```

```
## Warning: Missing column names filled in: 'X1' [1]
```

```
## Parsed with column specification:
## cols(
##   X1 = col_integer(),
##   COUNTY = col_character(),
##   URBAN = col_integer(),
##   RURAL = col_integer(),
##   PCT_URBAN = col_double(),
##   TOTAL_POP = col_integer(),
##   WHITE = col_integer(),
##   PCT_WHITE = col_double(),
##   TOTAL_REGISTERED = col_integer(),
##   REP = col_integer(),
##   DEM = col_integer(),
##   OTHER = col_integer(),
##   UAF = col_integer(),
##   PCT_REGISTERED = col_double(),
##   PCT_OF_STATE_POP = col_double(),
##   PCT_OF_STATE_REG = col_double()
## )
```

```r
#Run the model
md_1 <- glmer(family = "binomial", data = model_sample,
              voted ~ (1|COUNTY) + PCT_URBAN + PCT_WHITE)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl =
## control$checkConv, : Model failed to converge with max|grad| = 0.00165893
## (tol = 0.001, component 1)
```

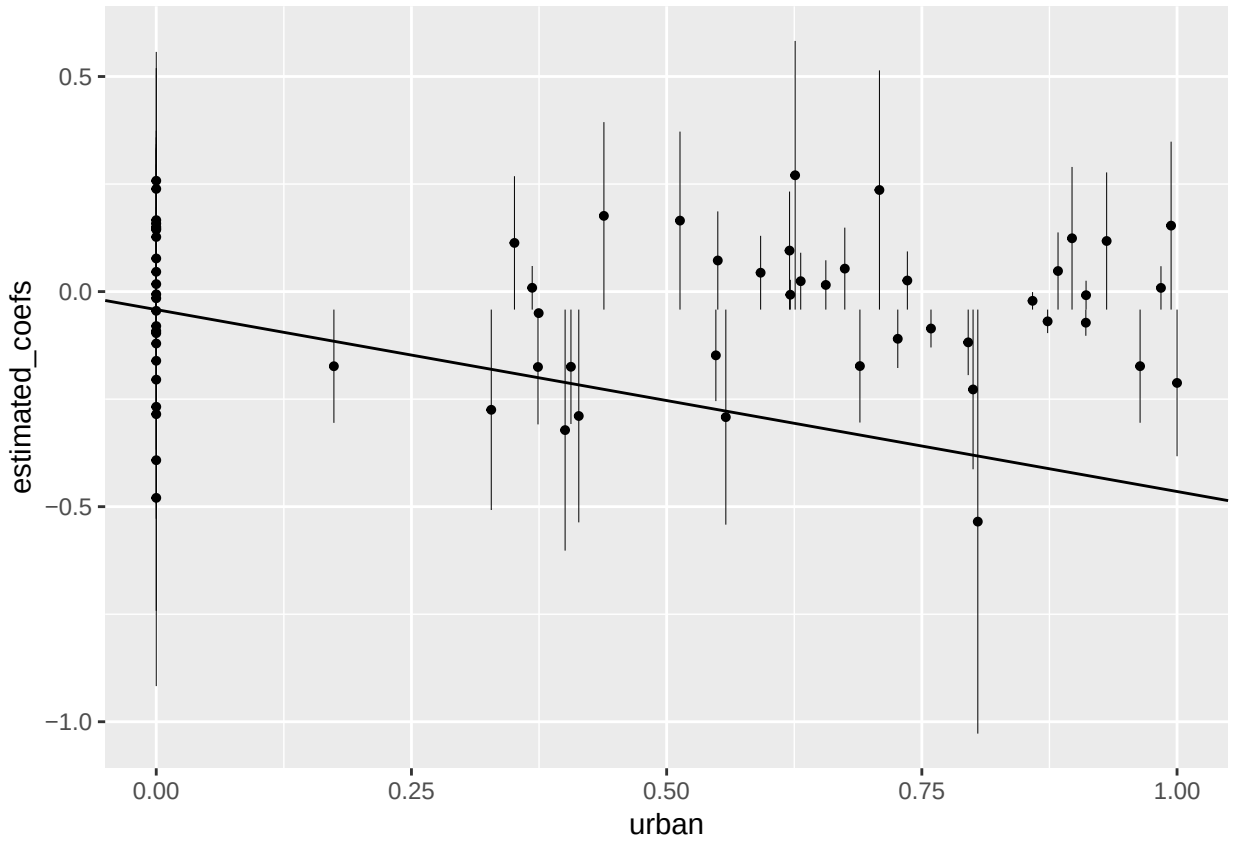
```r
#Display results
arm::display(md_1)
```

```
## glmer(formula = voted ~ (1 | COUNTY) + PCT_URBAN + PCT_WHITE,
##     data = model_sample, family = "binomial")
##             coef.est coef.se
## (Intercept) -0.04     0.08
## PCT_URBAN   -0.42     0.06
## PCT_WHITE    0.07     0.10
##
## Error terms:
##  Groups   Name        Std.Dev.
##  COUNTY   (Intercept) 0.19
##  Residual             1.00
## ---
## number of obs: 370586, groups: COUNTY, 64
## AIC = 499976, DIC = 499520.5
## deviance = 499744.3
```

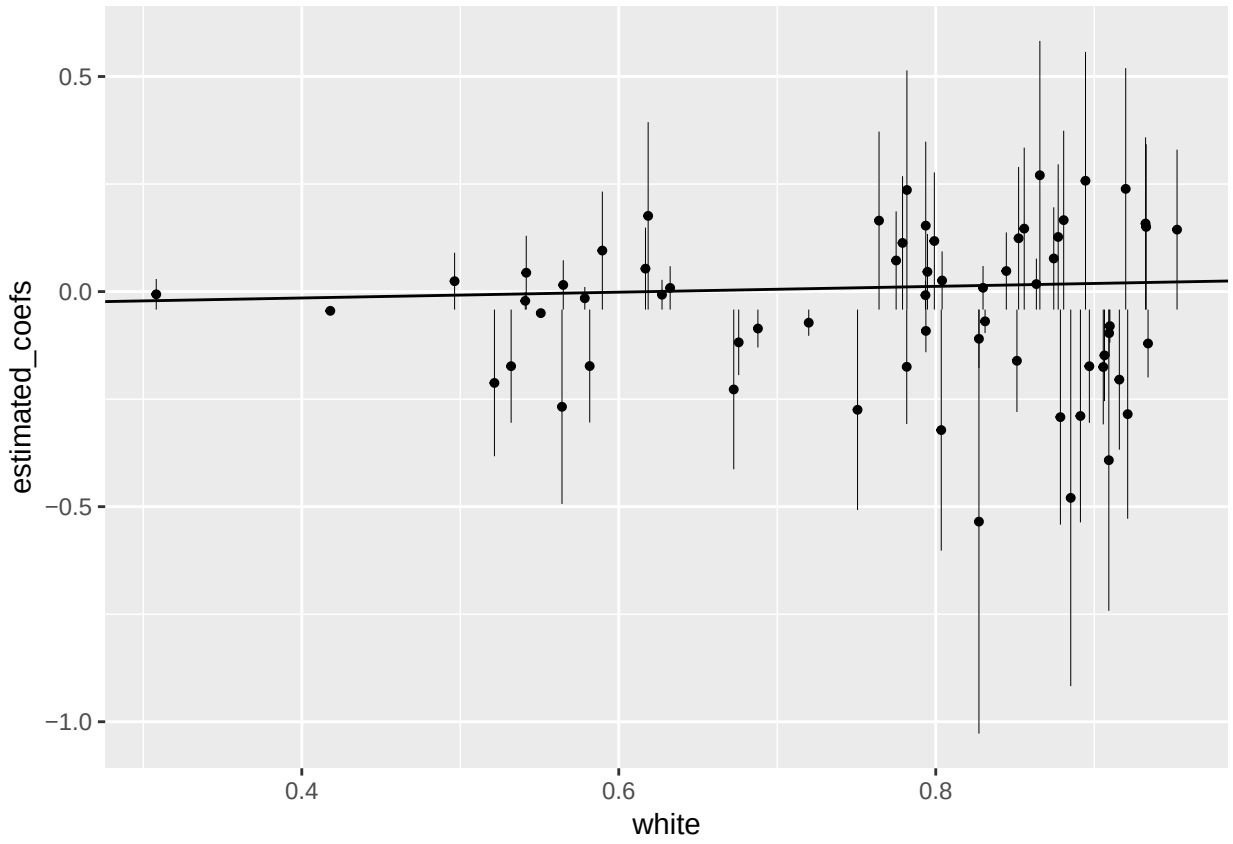
```r
#Fixed effects
fixef(md_1)
```

```
## (Intercept)   PCT_URBAN   PCT_WHITE
## -0.04186451 -0.42289055  0.06749027
```

```r
##########################
##Diagnostics and Plots##
##########################

##12.6 Graphs
county_coefs <- coef(md_1)[[1]][,1]

plot_data <- data.frame(cbind(county_coefs, demographics$PCT_URBAN, demographics$PCT_WHITE), ranef(md_1

names(plot_data) <- c("estimated_coefs", "urban", "white", "coef_se")

##Urban pop graph (12.6)
ggplot(plot_data, aes(x = urban, y = estimated_coefs)) +
  geom_pointrange(aes(ymin= estimated_coefs-coef_se, ymax=estimated_coefs+coef_se), size = .1) +
  geom_abline(slope = fixef(md_1)[2], intercept = fixef(md_1)[1])
```




```
##White pop graph (12.6)
ggplot(plot_data, aes(x = white, y = estimated_coefs)) +
  geom_pointrange(aes(ymin= estimated_coefs-coef_se, ymax=estimated_coefs+coef_se), size = .1) +
  geom_abline(slope = fixef(md_1)[3], intercept = fixef(md_1)[1])
```


0.5
0.0
−0.5
−1.0
estimated_coefs
0.4
0.6
0.8
white