# P4 Penultimate Analyses

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Table 1: Unweighted Descriptive Statistics

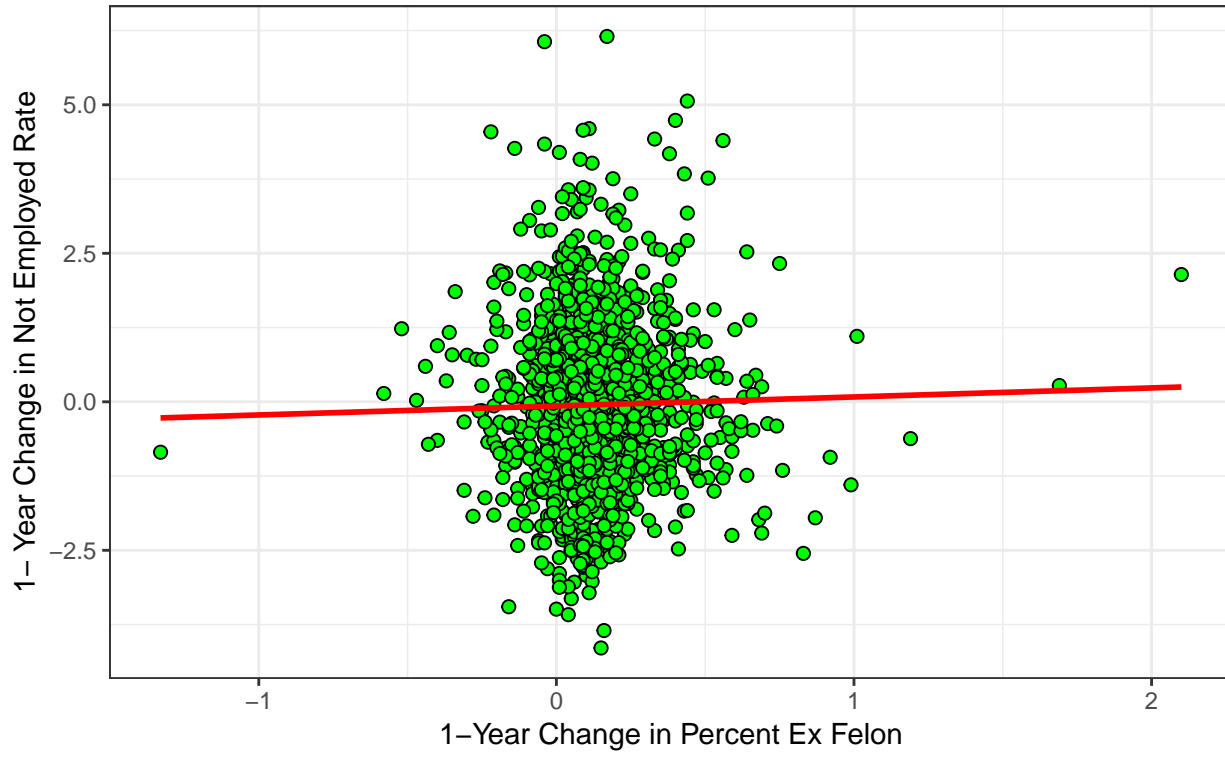| Statistic | N | Mean | St. Dev. | Min | Pctl(25) | Median | Pctl(75) | Max |
|---|---|---|---|---|---|---|---|---|
| Ex-Felon Percentage | 1,550 | 3.761 | 1.757 | 0.440 | 2.450 | 3.425 | 4.700 | 12.340 |
| Not Employed Rate | 1,550 | 20.608 | 4.373 | 10.622 | 17.654 | 20.404 | 23.241 | 40.773 |
| Unemployment Rate | 1,550 | 4.903 | 1.915 | 1.557 | 3.575 | 4.529 | 5.863 | 15.802 |
| Idleness Rate | 1,550 | 16.290 | 3.336 | 8.232 | 14.099 | 16.010 | 18.396 | 30.494 |
| Can't Find Work Rate | 850 | 15.736 | 3.228 | 8.232 | 13.698 | 15.675 | 17.782 | 26.832 |
| Population Share 16-25 | 1,550 | 19.483 | 2.708 | 13.331 | 17.547 | 18.882 | 20.899 | 30.243 |
| Population Share 26-35 | 1,550 | 19.973 | 3.072 | 12.553 | 17.418 | 20.136 | 22.191 | 32.668 |
| Population Share 36-45 | 1,550 | 18.805 | 2.444 | 12.446 | 17.068 | 18.934 | 20.554 | 29.022 |
| Population Share 46-55 | 1,550 | 15.359 | 2.712 | 10.274 | 12.913 | 14.907 | 17.822 | 23.034 |
| Population Share 56-65 | 1,550 | 11.912 | 1.639 | 6.368 | 10.808 | 11.777 | 12.914 | 17.791 |
| Population Share 66+ | 1,550 | 14.467 | 2.256 | 3.526 | 13.277 | 14.646 | 15.751 | 20.604 |
| Ovr. Unemployment Rate t | 1,550 | 6.035 | 2.138 | 2.219 | 4.548 | 5.606 | 7.148 | 17.831 |
| Ovr. Unemployment Rate t-1 | 1,500 | 5.940 | 2.075 | 2.219 | 4.480 | 5.540 | 6.970 | 17.831 |
| Ovr. Unemployment Rate t-2 | 1,450 | 5.849 | 2.019 | 2.219 | 4.442 | 5.492 | 6.828 | 17.831 |
| Ovr. Unemployment Rate t-3 | 1,400 | 5.866 | 2.040 | 2.219 | 4.441 | 5.495 | 6.860 | 17.831 |
| Disability Rate | 1,150 | 0.580 | 0.153 | 0.242 | 0.474 | 0.559 | 0.665 | 1.190 |
| SSI Rate | 1,550 | 21.445 | 9.921 | 3.817 | 14.181 | 18.966 | 26.520 | 59.248 |
| Marriage Rate | 1,550 | 68.993 | 6.150 | 53.088 | 64.104 | 68.099 | 73.669 | 86.494 |
| Effective Wage | 1,550 | 4.711 | 1.293 | 3.100 | 3.350 | 4.270 | 5.150 | 8.550 |
| Mean TANF Maximum | 1,550 | 382.618 | 151.914 | 92.000 | 281.667 | 356.500 | 473.333 | 925.333 |
| Unemployment Compensation | 1,550 | 350.348 | 67.075 | 157.124 | 302.552 | 348.668 | 394.420 | 581.813 |

Scatterplot of First Differences – Not Employed Rate
OLS Fit

1–Year Change in Not Employed Rate (y-axis)

1–Year Change in Percent Ex Felon (x-axis)

**p4 Overall Models**

Table 2: Fixed Effects Regression

|  | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Ex-Felon Percentage | 0.423** (0.129) | 0.253 (0.240) | 0.219 (0.198) | 0.254* (0.102) | 0.252** (0.093) |
| Population Share 26-35 |  | 0.212 (0.154) | 0.195 (0.149) | 0.128** (0.043) | 0.148*** (0.041) |
| Pop. Share 36-45 |  | 0.319 (0.191) | 0.315 (0.189) | −0.018 (0.046) | 0.006 (0.042) |
| Pop. Share 46-55 |  | 0.128 (0.148) | 0.080 (0.148) | −0.167* (0.066) | −0.119* (0.058) |
| Pop. Share 56-65 |  | 0.023 (0.193) | 0.073 (0.174) | 0.119* (0.056) | 0.202*** (0.051) |
| Pop. Share 66+ |  | 0.274 (0.148) | 0.323* (0.152) | 0.038 (0.055) | 0.073 (0.050) |
| SSI Rate |  |  | −0.052 (0.076) | −0.091** (0.029) | −0.061* (0.029) |
| Marriage Rate |  |  | 0.075 (0.090) | 0.001 (0.026) | 0.001 (0.024) |
| Effective Wage |  |  | 0.567* (0.273) | 0.105 (0.128) | 0.017 (0.122) |
| Mean TANF Maximum |  |  | −0.003 (0.003) | −0.000 (0.001) | −0.000 (0.001) |
| Unemployment Comp. |  |  | 0.009* (0.003) | 0.000 (0.002) | −0.001 (0.001) |
| Ovr. Unemp. Rate t-1 |  |  |  | 0.821*** (0.058) | 0.048 (0.029) |
| Ovr. Unemp. Rate t-2 |  |  |  | −0.080* (0.041) | −0.021 (0.027) |
| Ovr. Unemp. Rate t-3 |  |  |  | 0.113* (0.049) | 0.225*** (0.044) |
| Ovr. Unemp. Rate t |  |  |  |  | 0.821*** (0.041) |
| State FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,550 | 1,550 | 1,550 | 1,400 | 1,400 |
| $R^2$ | 0.030 | 0.031 | 0.059 | 0.389 | 0.533 |
| Adjusted $R^2$ | −0.023 | −0.026 | 0.001 | 0.346 | 0.500 |

*Notes:* ***Significant at the 0.1 percent level.
**Significant at the 1 percent level.
*Significant at the 5 percent level.
Clustered Standard Errors by State and Year.
Weighted by State-Year total pop.

Table 3: Models of Alternative Employment Measures

| | Idleness | Unemployment | Can't Find Work |
|---|---|---|---|
| | (1) | (2) | (3) |
| Ex-Felon Percentage | 0.253** (0.089) | 0.025 (0.042) | 0.167 (0.120) |
| Population Share 26-35 | 0.095* (0.044) | 0.049** (0.017) | 0.168** (0.052) |
| Pop. Share 36-45 | −0.047 (0.043) | 0.023 (0.018) | 0.112** (0.038) |
| Pop. Share 46-55 | −0.154* (0.062) | −0.032 (0.025) | 0.019 (0.059) |
| Pop. Share 56-65 | 0.163** (0.052) | −0.053** (0.020) | 0.154* (0.063) |
| Pop. Share 66+ | 0.022 (0.050) | 0.011 (0.021) | 0.139* (0.057) |
| SSI Rate | −0.052 (0.028) | −0.044*** (0.010) | −0.045 (0.034) |
| Marriage Rate | 0.024 (0.023) | −0.009 (0.010) | −0.056 (0.029) |
| Effective Wage | 0.094 (0.123) | 0.061 (0.045) | 0.043 (0.106) |
| Mean TANF Maximum | −0.000 (0.001) | 0.000 (0.000) | −0.001 (0.002) |
| Unemployment Comp. | −0.001 (0.001) | 0.001 (0.001) | 0.003 (0.002) |
| Ovr. Unemp. Rate t-1 | 0.035 (0.030) | 0.875*** (0.039) | 0.122* (0.057) |
| Ovr. Unemp. Rate t-2 | −0.002 (0.027) | −0.108*** (0.030) | 0.068 (0.050) |
| Ovr. Unemp. Rate t-3 | 0.236*** (0.043) | −0.114*** (0.023) | 0.176*** (0.043) |
| Ovr. Unemp. Rate t | 0.108** (0.041) | | 0.026 (0.060) |
| State FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |
| Observations | 1,400 | 1,400 | 850 |
| $R^2$ | 0.131 | 0.621 | 0.076 |
| Adjusted $R^2$ | 0.070 | 0.595 | −0.020 |

*Notes:* ***Significant at the 0.1 percent level.
**Significant at the 1 percent level.
*Significant at the 5 percent level.
Clustered Standard Errors by State and Year
Weighted by State-Year total pop.

Table 4: Alternative Sample Models

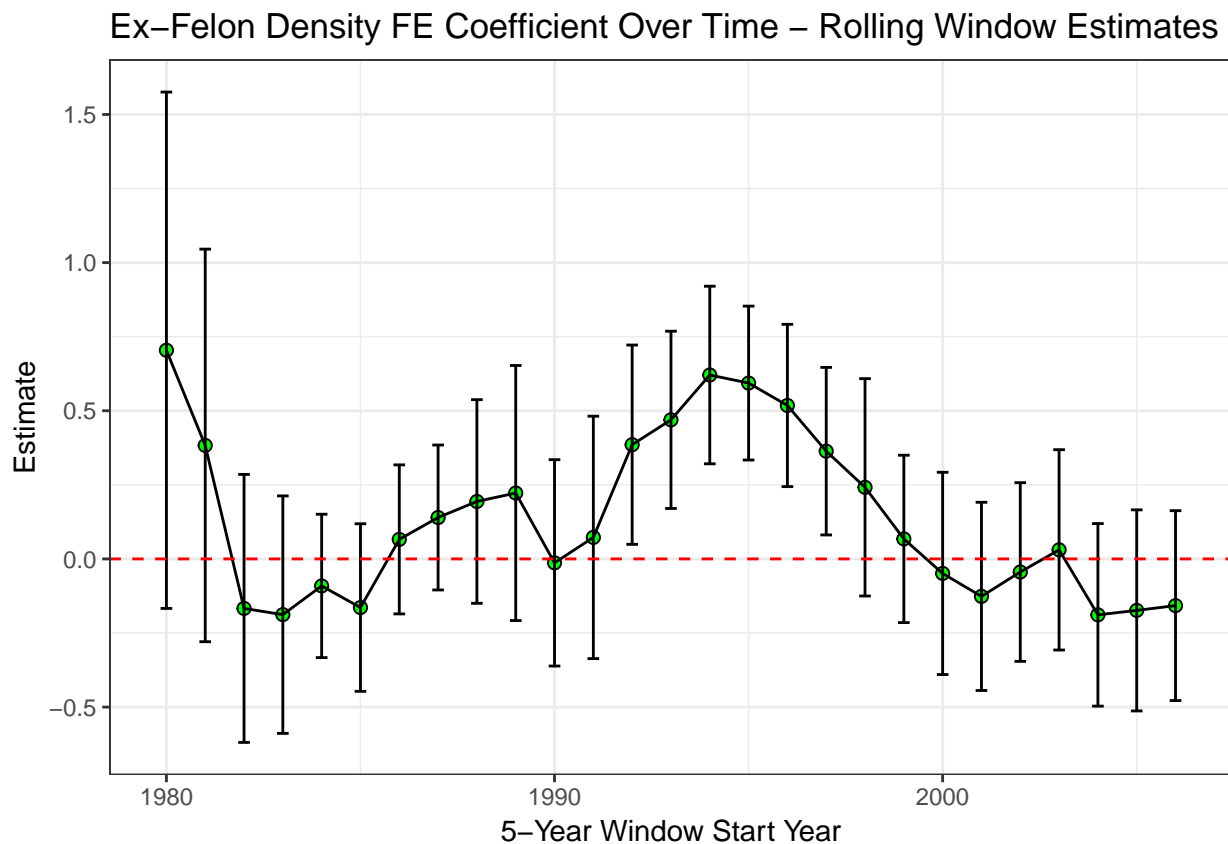| | PA Male | PA Female | PA Black | PA White | WA All |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Ex-Felon Percentage | 0.017 (0.083) | 0.497*** (0.148) | 0.303 (0.171) | 0.325** (0.105) | 0.244* (0.100) |
| Population Share 26-35 | 0.184*** (0.035) | 0.140* (0.062) | 0.523*** (0.110) | 0.126* (0.051) | 0.116* (0.047) |
| Pop. Share 36-45 | 0.183*** (0.041) | −0.130* (0.063) | 0.256* (0.119) | −0.012 (0.045) | 0.048 (0.044) |
| Pop. Share 46-55 | 0.107* (0.042) | −0.369*** (0.105) | −0.176 (0.164) | −0.149* (0.071) | −0.179** (0.059) |
| Pop. Share 56-65 | 0.144*** (0.037) | 0.197* (0.086) | 0.576*** (0.134) | 0.178** (0.061) | 0.398*** (0.058) |
| Pop. Share 66+ | 0.215*** (0.041) | −0.044 (0.079) | 0.238* (0.120) | 0.056 (0.055) | 0.146** (0.051) |
| SSI Rate | 0.029 (0.030) | −0.134*** (0.039) | 0.065 (0.057) | −0.087** (0.033) | −0.035 (0.030) |
| Marriage Rate | −0.176*** (0.018) | 0.117** (0.039) | −0.166*** (0.008) | 0.033 (0.023) | 0.006 (0.028) |
| Effective Wage | −0.097 (0.091) | 0.168 (0.226) | −0.727* (0.333) | 0.138 (0.135) | 0.125 (0.111) |
| Mean TANF Maximum | 0.000 (0.001) | −0.001 (0.002) | 0.001 (0.003) | −0.000 (0.002) | 0.000 (0.001) |
| Unemployment Comp. | 0.000 (0.001) | −0.001 (0.002) | −0.006 (0.003) | −0.001 (0.002) | −0.000 (0.001) |
| Ovr. Unemp. Rate t-1 | 0.071* (0.033) | 0.029 (0.044) | −0.066 (0.122) | 0.072* (0.033) | 0.083** (0.026) |
| Ovr. Unemp. Rate t-2 | −0.065* (0.030) | 0.044 (0.040) | −0.008 (0.110) | −0.040 (0.032) | 0.004 (0.028) |
| Ovr. Unemp. Rate t-3 | 0.065* (0.030) | 0.374*** (0.074) | 0.670*** (0.102) | 0.144** (0.048) | 0.218*** (0.038) |
| Ovr. Unemp. Rate t | 0.987*** (0.047) | 0.674*** (0.067) | 1.175*** (0.116) | 0.769*** (0.048) | 0.812*** (0.049) |
| State FE | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,400 | 1,400 | 1,379 | 1,400 | 1,400 |
| $R^2$ | 0.574 | 0.323 | 0.030 | 0.470 | 0.566 |
| Adjusted $R^2$ | 0.545 | 0.275 | −0.039 | 0.433 | 0.535 |

*Notes:*        ***Significant at the 0.1 percent level.
 **Significant at the 1 percent level.
 *Significant at the 5 percent level.
 Clustered Standard Errors by State and Year.
 Weighted by State-Year total pop.

5

**Rolling-Window Models and Plot**

Ex–Felon Density FE Coefficient Over Time – Rolling Window Estimates



## Felon Density Map

```
#Read in the geojson of state boundaries
#You could also use the tidycensus package: https://walkerke.github.io/tidycensus/

census_api_key("ecda17575f4d914b502c70f2bae7a5f3d253792d")
```

## To install your API key for use in future sessions, run this function with `install = TRUE`.

```
#vars <- load_variables(year = 2010, dataset = "sf1")

states <- get_decennial(geography = "state", variables = "P001001", #output = "wide",
                        geometry = T, shift_geo = T) %>% mutate(id=tolower(NAME))
```

## Getting data from the 2010 decennial Census

## Using feature geometry obtained from the albersusa package

## Please note: Alaska and Hawaii are being shifted and are not to scale.

```
fd <- fe %>% group_by(STATENAME) %>% summarize(density = mean(pctexfel)) %>% rename(id = STATENAME) %
fd.t <- fe %>% group_by(YEAR, STATENAME) %>% summarize(density = mean(pctexfel)) %>% rename(id = STAT

fd.1980 <- fd.t %>% filter(YEAR==1980)
fd.2010 <- fd.t %>% filter(YEAR==2010)
```

```r
usa <- states %>% inner_join(fd, by = "id")
usa.1980 <- states %>% inner_join(fd.1980, by = "id")
usa.2010 <- states %>% inner_join(fd.2010, by = "id")

#average across years
ggplot(usa) +
  geom_sf(aes(geometry = geometry, fill=density)) + #geom_sf works with sf data frames
  coord_sf(crs=2163)+ #Specify crs of the projection. This is Albers equal area.
  scale_fill_distiller(palette = "Spectral",
                       breaks = c(seq(1,8,1)),
                       limits = c(1,8),
                      name = "Percent") +
  ggtitle("Ex-Felon Density in the United States: 1980-2010",
          subtitle = "Shannon et al. 2017")+
  theme(axis.text = element_blank(),
  axis.line = element_blank(),
  axis.ticks = element_blank(),
  panel.border = element_blank(),
  panel.grid = element_blank(),
  axis.title = element_blank(),
  panel.background = element_blank(),
  panel.grid.major = element_line(colour="transparent"), #Removes graticule lines
  plot.subtitle = element_text(face="italic"))
```
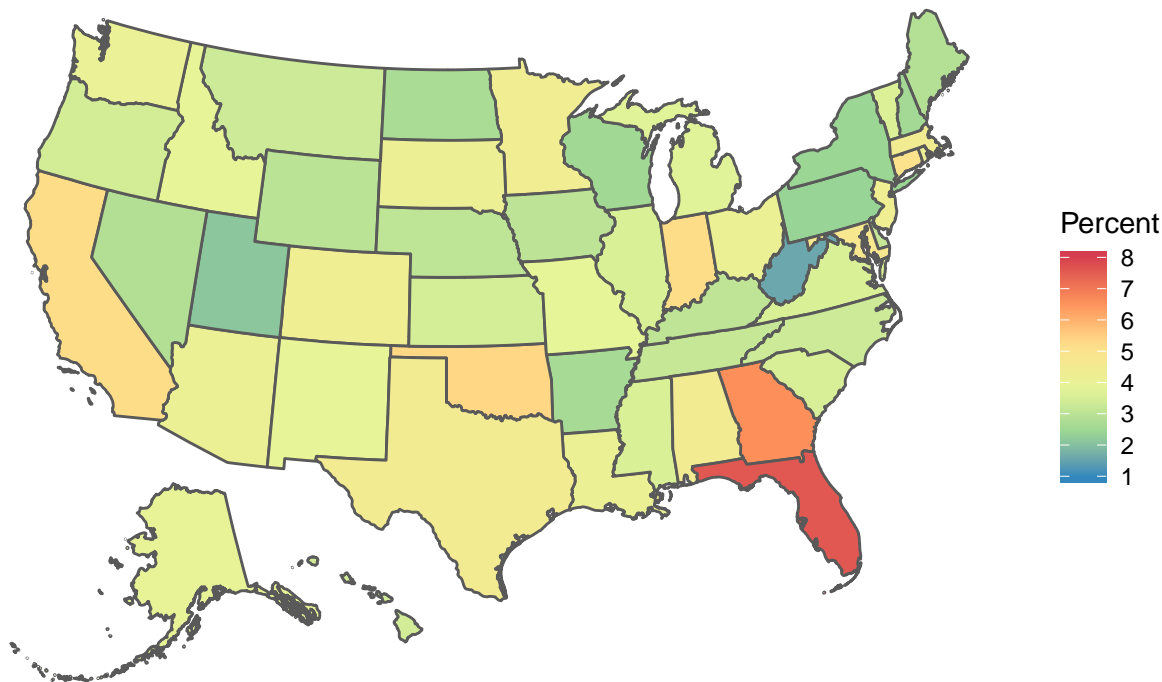
Ex−Felon Density in the United States: 1980−2010

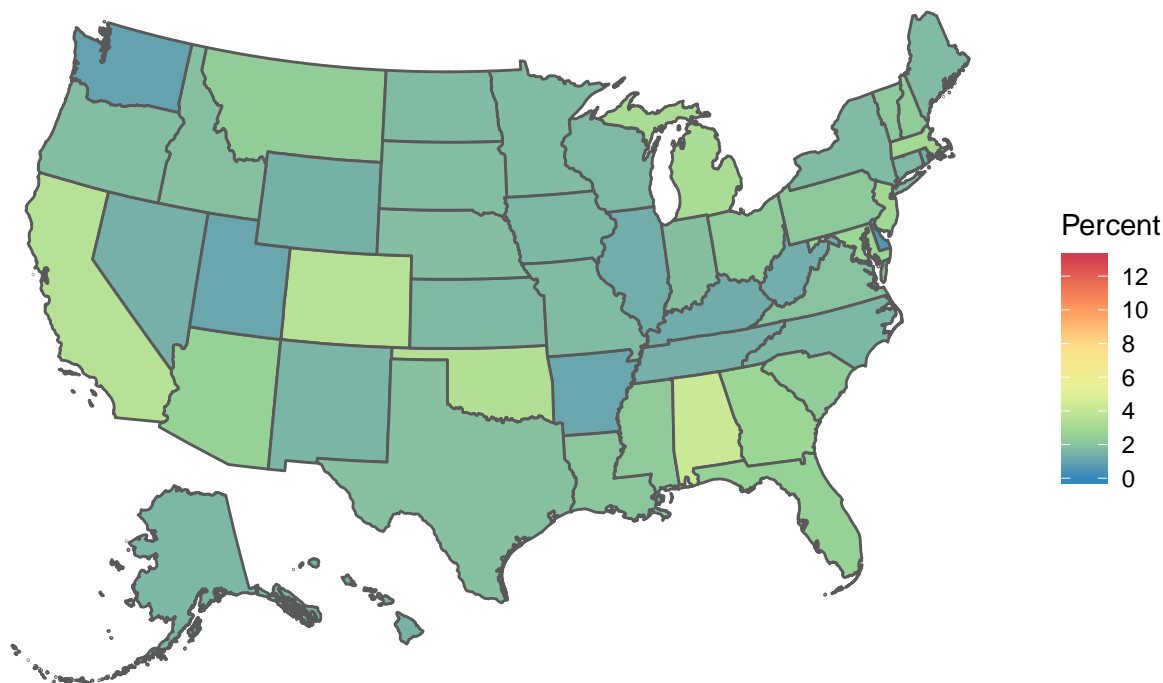*Shannon et al. 2017*



```r
#1980
ggplot(usa.1980) +
  geom_sf(aes(geometry = geometry, fill=density)) +
  coord_sf(crs=2163)+
```

```
  scale_fill_distiller(palette = "Spectral",
                       breaks = c(seq(0,13,2)),
                       limits = c(0,13),
                       name = "Percent") +
ggtitle("Ex-Felon Density in the United States: 1980",
        subtitle = "Shannon et al. 2017")+
theme(axis.text = element_blank(),
axis.line = element_blank(),
axis.ticks = element_blank(),
panel.border = element_blank(),
panel.grid = element_blank(),
axis.title = element_blank(),
panel.background = element_blank(),
panel.grid.major = element_line(colour="transparent"), #Removes graticule lines
plot.subtitle = element_text(face="italic"))
```

Ex–Felon Density in the United States: 1980
*Shannon et al. 2017*



```
#2010
ggplot(usa.2010) +
  geom_sf(aes(geometry = geometry, fill=density)) +
  coord_sf(crs=2163)+
  scale_fill_distiller(palette = "Spectral",
                       breaks = c(seq(0,13,2)),
                       limits = c(0,13),
                       name = "Percent") +
ggtitle("Ex-Felon Density in the United States: 2010",
        subtitle = "Shannon et al. 2017")+
theme(axis.text = element_blank(),
axis.line = element_blank(),
```
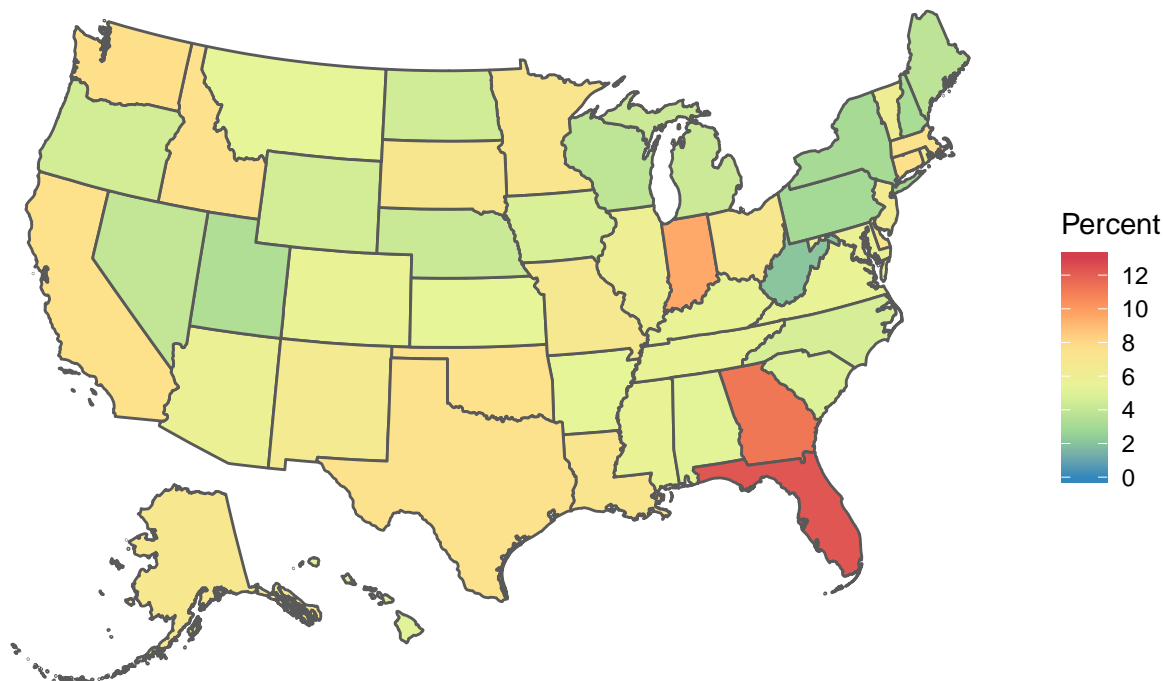
```
axis.ticks = element_blank(),
panel.border = element_blank(),
panel.grid = element_blank(),
axis.title = element_blank(),
panel.background = element_blank(),
panel.grid.major = element_line(colour="transparent"), #Removes graticule lines
plot.subtitle = element_text(face="italic"))
```

## Ex–Felon Density in the United States: 2010
*Shannon et al. 2017*



```
usa.t <- states %>% inner_join(., fd.t, by = "id") #fd.t being state-year dataframe

map <- ggplot(usa.t) +
  geom_sf(aes(geometry = geometry, fill=density, frame = YEAR)) + #frame = specifies animation
    coord_sf(crs=2163)+
  scale_fill_distiller(palette = "Spectral",
                       breaks = c(seq(0,13,2)),
                       limits = c(0,13),
                       name = "Percent") +
  ggtitle("Ex-Felon Density in the United States: ",
          subtitle = "Shannon et al. 2017")+
  theme(axis.text = element_blank(),
  axis.line = element_blank(),
  axis.ticks = element_blank(),
  panel.border = element_blank(),
  panel.grid = element_blank(),
  axis.title = element_blank(),
  panel.background = element_blank(),
  plot.subtitle = element_text(face="italic"),
  panel.grid.major = element_line(colour="transparent"),
```

```
  plot.title = element_text(face="bold"))
```

## Warning: Ignoring unknown aesthetics: frame

```
gganimate(map, interval=1, ani.width = 750, ani.height = 450,
          filename = "density_time.gif", saver = "gif", title_frame = TRUE)
```

## Executing:
## "convert -loop 0 -delay 100 Rplot1.png Rplot2.png Rplot3.png
##      Rplot4.png Rplot5.png Rplot6.png Rplot7.png Rplot8.png
##      Rplot9.png Rplot10.png Rplot11.png Rplot12.png Rplot13.png
##      Rplot14.png Rplot15.png Rplot16.png Rplot17.png Rplot18.png
##      Rplot19.png Rplot20.png Rplot21.png Rplot22.png Rplot23.png
##      Rplot24.png Rplot25.png Rplot26.png Rplot27.png Rplot28.png
##      Rplot29.png Rplot30.png Rplot31.png "density_time.gif""

## Output at: density_time.gif