

SEM Preliminary

Ryan Larson - UMN

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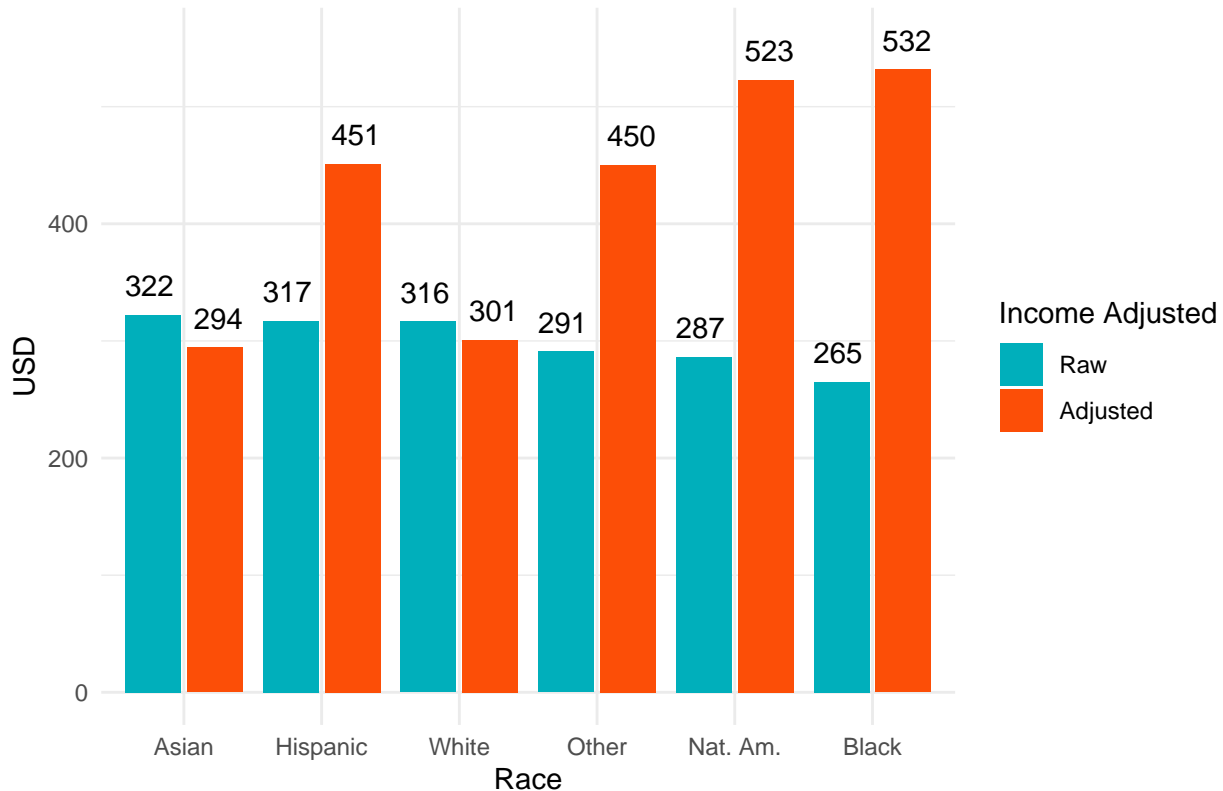
```
#bar graph - median household income comes from ACS 2017 5-year estimates
adj <- data.frame(Race = c("Asian", "Black", "Hispanic", "Nat. Am.", "Other", "White"),
  race_med_inc = c(71865, 32743, 46232, 36017, 42476, 69069),
  ovr_med_inc = rep(65699, 6))

monsanc.short %>%
  select(race_impute, total_ff) %>%
  filter(!is.na(race_impute)) %>%
  mutate(Race = case_when(
    race_impute=="asian"~"Asian",
    race_impute=="black"~"Black",
    race_impute=="hispanic"~"Hispanic",
    race_impute=="nat. am."~"Nat. Am.",
    race_impute=="other"~"Other",
    race_impute=="white"~"White"
  )) %>%
  select(-race_impute) %>%
  left_join(adj, by = "Race") %>%
  mutate(race_adj = (ovr_med_inc/race_med_inc)) %>%
  group_by(Race) %>%
  summarize(
    `Raw_USD` = mean(total_ff, na.rm = T),
    `Adjusted_USD` = mean(total_ff*race_adj, na.rm = T),
    `Raw_sd` = sd(total_ff, na.rm = T),
    `Adjusted_sd` = sd(total_ff*race_adj, na.rm=T)
  ) %>%
  gather(key = "variable", value = "value", -Race) %>%
  separate(variable, into = c("adjusted", "stat"), sep = "_") %>%
  spread(key = "stat", value = "value") %>%
  mutate(Race = factor(Race, levels =
    c("Asian", "Hispanic", "White",
      "Other", "Nat. Am.", "Black")),
    `Income Adjusted` = factor(adjusted, levels = c("Raw", "Adjusted"))) %>%
  select(-adjusted) %>%
  ggplot()+
  geom_bar(aes(x=Race, y=USD, fill=`Income Adjusted`),
    stat="identity",
    position = position_dodge2())+
  geom_text(aes(x=Race, y=USD+25, group=`Income Adjusted`,
    label = round(USD,0)),
    position = position_dodge2(width = 1))+
```

```
labs(title = "Figure 1: Fine/Fee Orders by Race")+
scale_fill_manual(values = c("#00AFBB", "#FC4E07"))+
theme_minimal()
```

```
## Warning: Column `Race` joining character vector and factor, coercing into
## character vector
```

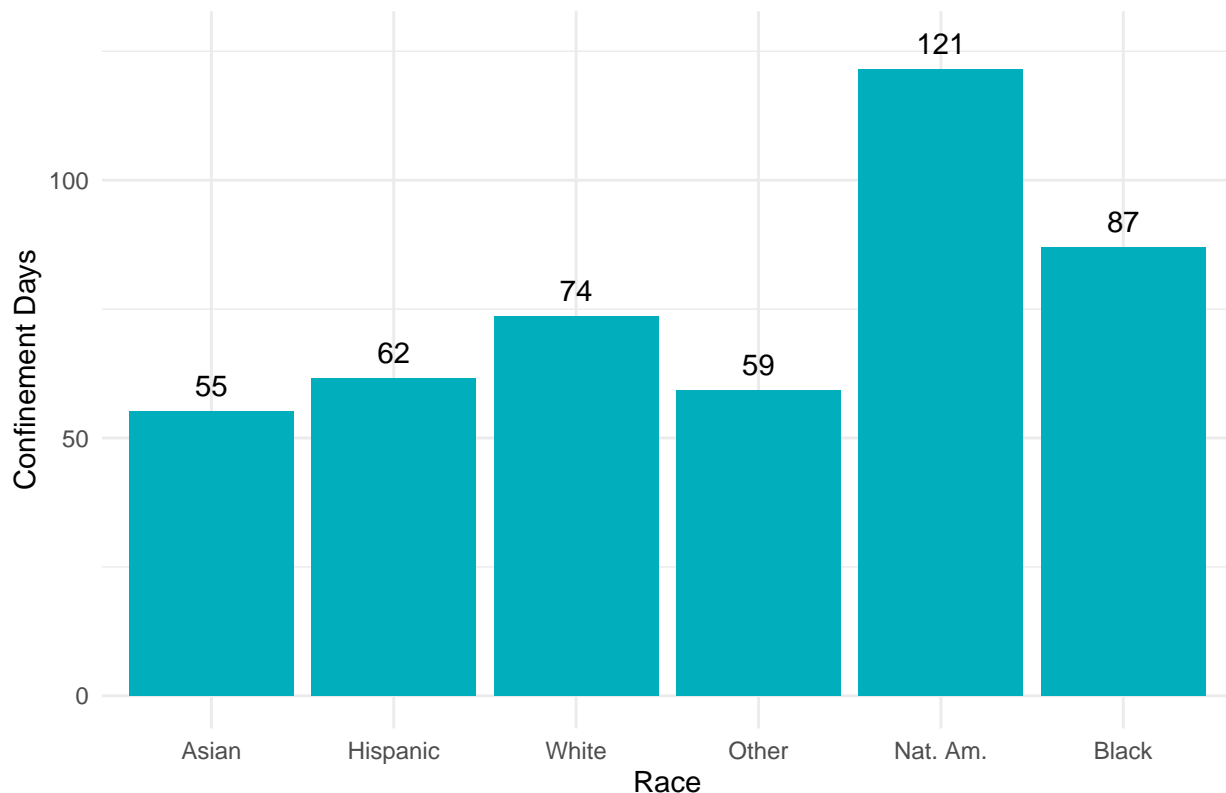
Figure 1: Fine/Fee Orders by Race



```
#confinement bar graph
monsanc.short %>%
  select(race_impute, conf_days) %>%
  filter(!is.na(race_impute)) %>%
  mutate(Race = case_when(
    race_impute=="asian"~"Asian",
    race_impute=="black"~"Black",
    race_impute=="hispanic"~"Hispanic",
    race_impute=="nat. am."~"Nat. Am.",
    race_impute=="other"~"Other",
    race_impute=="white"~"White"
  )) %>%
  select(-race_impute) %>%
  group_by(Race) %>%
  summarize(
    `Confinement Days` = mean(conf_days, na.rm = T),
  ) %>%
```

```
gather(key = "variable", value = "value", -Race) %>%
separate(variable, into = "stat", sep = "_") %>%
spread(key = "stat", value = "value") %>%
mutate(Race = factor(Race, levels =
                     c("Asian", "Hispanic", "White",
                       "Other", "Nat. Am.", "Black")))
) %>%
ggplot()+
  geom_bar(aes(x=Race, y=`Confinement Days`),
           fill = "#00AFBB",
           stat="identity",
           position = position_dodge2())+
  geom_text(aes(x=Race, y=`Confinement Days`+5,
               label = round(`Confinement Days`,0)),
           position = position_dodge2(width = 1))+
  labs(title = "Figure 2: Confinement Length by Race")+
  theme_minimal()+
  theme(legend.position = "none")
```

Figure 2: Confinement Length by Race



```
#Multivariate Regression - when all predictors are identical across models
#equivalent to separate OLS, but more efficient and takes into account error covariance

#multivariate fixed effects regression
mv.fe <- lm(cbind(total_ff_log, conf_days_log)~black+hispanic+asian+nativeam+other.race+
```

```

male+log(age)+priors+trial_flag+felony+gross.mis+drug+alcohol. DUI + hunt.fish + other.o
as.factor(filed_county)+as.factor(sentence_year), data = monsanc.short)
summary(mv.fe)

```

```
## Response total_ff_log :
```

```
##
```

```
## Call:
```

```
## lm(formula = total_ff_log ~ black + hispanic + asian + nativeam +
##     other.race + male + log(age) + priors + trial_flag + felony +
##     gross.mis + drug + alcohol. dui + hunt.fish + other.offense +
##     as.factor(filed_county) + as.factor(sentence_year), data = monsanc.short)
##
```

```
## Residuals:
```

```
##      Min       1Q   Median       3Q      Max
## -6.4918 -0.3597  0.2527  0.8113  4.0050
##
```

```
## Coefficients:
```

| | Estimate | Std. Error | t value |
|---|------------|------------|----------|
| ## (Intercept) | 5.5522726 | 0.0280015 | 198.285 |
| ## black | -0.2331832 | 0.0036265 | -64.300 |
| ## hispanic | 0.0686770 | 0.0050480 | 13.605 |
| ## asian | 0.0422147 | 0.0076353 | 5.529 |
| ## nativeam | -0.3241791 | 0.0065702 | -49.341 |
| ## other.race | -0.0576104 | 0.0098561 | -5.845 |
| ## male | 0.0402246 | 0.0029900 | 13.453 |
| ## log(age) | -0.0370783 | 0.0040535 | -9.147 |
| ## priors | -0.0147102 | 0.0001568 | -93.820 |
| ## trial_flagTRUE | -0.5733726 | 0.1276128 | -4.493 |
| ## felony | -0.5734504 | 0.0053324 | -107.542 |
| ## gross.mis | 0.0317508 | 0.0048129 | 6.597 |
| ## drug | 0.2881355 | 0.0082553 | 34.903 |
| ## alcohol. dui | 0.5594800 | 0.0065581 | 85.311 |
| ## hunt.fish | -0.0733299 | 0.0149257 | -4.913 |
| ## other.offense | 0.3100623 | 0.0058254 | 53.226 |
| ## as.factor(filed_county)Anoka County | -0.7960665 | 0.0240408 | -33.113 |
| ## as.factor(filed_county)Becker County | 0.2486650 | 0.0280916 | 8.852 |
| ## as.factor(filed_county)Beltrami County | -0.1305011 | 0.0260968 | -5.001 |
| ## as.factor(filed_county)Benton County | -0.3377242 | 0.0309323 | -10.918 |
| ## as.factor(filed_county)Big Stone County | -0.1663641 | 0.0598385 | -2.780 |
| ## as.factor(filed_county)Blue Earth County | -0.2209814 | 0.0256745 | -8.607 |
| ## as.factor(filed_county)Brown County | -0.1143477 | 0.0324694 | -3.522 |
| ## as.factor(filed_county)Carlton County | -0.1083222 | 0.0280511 | -3.862 |
| ## as.factor(filed_county)Carver County | -0.0894771 | 0.0266935 | -3.352 |
| ## as.factor(filed_county)Cass County | -0.4478152 | 0.0292924 | -15.288 |
| ## as.factor(filed_county)Chippewa County | -0.0872577 | 0.0387501 | -2.252 |
| ## as.factor(filed_county)Chisago County | -0.5269652 | 0.0279709 | -18.840 |
| ## as.factor(filed_county)Clay County | -0.0530315 | 0.0259658 | -2.042 |

| | | | |
|--|------------|-----------|---------|
| ## as.factor(filed_county)Clearwater County | -0.1976388 | 0.0454444 | -4.349 |
| ## as.factor(filed_county)Cook County | -0.4345341 | 0.0535245 | -8.118 |
| ## as.factor(filed_county)Cottonwood County | -0.1666987 | 0.0414069 | -4.026 |
| ## as.factor(filed_county)Crow Wing County | -0.2182920 | 0.0261218 | -8.357 |
| ## as.factor(filed_county)Dakota County | -0.2602279 | 0.0238191 | -10.925 |
| ## as.factor(filed_county)Dodge County | -0.7365958 | 0.0368125 | -20.009 |
| ## as.factor(filed_county)Douglas County | -0.0102371 | 0.0297208 | -0.344 |
| ## as.factor(filed_county)Faribault County | -0.0428740 | 0.0379819 | -1.129 |
| ## as.factor(filed_county)Fillmore County | -0.2337141 | 0.0365493 | -6.394 |
| ## as.factor(filed_county)Freeborn County | -0.3790434 | 0.0297691 | -12.733 |
| ## as.factor(filed_county)Goodhue County | -0.5458986 | 0.0262106 | -20.827 |
| ## as.factor(filed_county)Grant County | -0.2093602 | 0.0569097 | -3.679 |
| ## as.factor(filed_county)Hennepin County | -0.8969213 | 0.0234860 | -38.190 |
| ## as.factor(filed_county)Houston County | -0.4813848 | 0.0344929 | -13.956 |
| ## as.factor(filed_county)Hubbard County | -0.2765464 | 0.0323811 | -8.540 |
| ## as.factor(filed_county)Isanti County | -0.4239494 | 0.0303079 | -13.988 |
| ## as.factor(filed_county)Itasca County | -0.1117201 | 0.0272618 | -4.098 |
| ## as.factor(filed_county)Jackson County | -0.1324449 | 0.0437334 | -3.028 |
| ## as.factor(filed_county)Kanabec County | -0.3187094 | 0.0342385 | -9.309 |
| ## as.factor(filed_county)Kandiyohi County | -0.1921893 | 0.0277924 | -6.915 |
| ## as.factor(filed_county)Kittson County | -0.0696199 | 0.0771880 | -0.902 |
| ## as.factor(filed_county)Koochiching County | -0.7618849 | 0.0387337 | -19.670 |
| ## as.factor(filed_county)Lac qui Parle County | -0.2059447 | 0.0570699 | -3.609 |
| ## as.factor(filed_county)Lake County | -0.3250324 | 0.0426284 | -7.625 |
| ## as.factor(filed_county)Lake of the Woods County | -0.4447039 | 0.0495520 | -8.974 |
| ## as.factor(filed_county)LeSueur County | -0.2963140 | 0.0326293 | -9.081 |
| ## as.factor(filed_county)Lincoln County | -0.0375020 | 0.0658395 | -0.570 |
| ## as.factor(filed_county)Lyon County | -0.0817199 | 0.0305917 | -2.671 |
| ## as.factor(filed_county)Mahnomon County | -0.1613203 | 0.0358313 | -4.502 |
| ## as.factor(filed_county)Marshall County | -0.1543103 | 0.0485696 | -3.177 |
| ## as.factor(filed_county)Martin County | -0.3868864 | 0.0325588 | -11.883 |
| ## as.factor(filed_county)McLeod County | -0.5366192 | 0.0292800 | -18.327 |
| ## as.factor(filed_county)Meeker County | -0.0371669 | 0.0373835 | -0.994 |
| ## as.factor(filed_county)Mille Lacs County | 0.1090388 | 0.0289650 | 3.765 |
| ## as.factor(filed_county)Morrison County | -0.1506703 | 0.0306403 | -4.917 |
| ## as.factor(filed_county)Mower County | -0.3113376 | 0.0282315 | -11.028 |
| ## as.factor(filed_county)Murray County | 0.0237472 | 0.0549203 | 0.432 |
| ## as.factor(filed_county>Nicollet County | -0.1868843 | 0.0301315 | -6.202 |
| ## as.factor(filed_county>Nobles County | -0.1399807 | 0.0324621 | -4.312 |
| ## as.factor(filed_county)Norman County | -0.1311630 | 0.0511215 | -2.566 |
| ## as.factor(filed_county>Olmsted County | -0.6049011 | 0.0247967 | -24.394 |
| ## as.factor(filed_county>Otter Tail County | 0.0603070 | 0.0277617 | 2.172 |
| ## as.factor(filed_county>Pennington County | -0.4101449 | 0.0357236 | -11.481 |
| ## as.factor(filed_county>Pine County | -0.4555523 | 0.0299075 | -15.232 |
| ## as.factor(filed_county>Pipestone County | -0.0724239 | 0.0491050 | -1.475 |
| ## as.factor(filed_county>Polk County | -0.1336793 | 0.0287266 | -4.653 |
| ## as.factor(filed_county>Pope County | -0.2225148 | 0.0423910 | -5.249 |
| ## as.factor(filed_county>Ramsey County | -0.0450036 | 0.0236585 | -1.902 |

| | | | |
|--|--------------|-----------|---------|
| ## as.factor(filed_county)Red Lake County | -0.6514731 | 0.0542371 | -12.012 |
| ## as.factor(filed_county)Redwood County | 0.0225470 | 0.0328042 | 0.687 |
| ## as.factor(filed_county)Renville County | -0.8018423 | 0.0341126 | -23.506 |
| ## as.factor(filed_county)Rice County | -0.0179930 | 0.0273357 | -0.658 |
| ## as.factor(filed_county)Rock County | -0.1328223 | 0.0534179 | -2.486 |
| ## as.factor(filed_county)Roseau County | -0.1366782 | 0.0332617 | -4.109 |
| ## as.factor(filed_county)Scott County | -0.1586984 | 0.0245237 | -6.471 |
| ## as.factor(filed_county)Sherburne County | -0.3551422 | 0.0263580 | -13.474 |
| ## as.factor(filed_county)Sibley County | -0.5756912 | 0.0371121 | -15.512 |
| ## as.factor(filed_county)St. Louis County | -0.2566774 | 0.0241950 | -10.609 |
| ## as.factor(filed_county)Stearns County | -0.0948650 | 0.0244407 | -3.881 |
| ## as.factor(filed_county)Steele County | -0.0962732 | 0.0285500 | -3.372 |
| ## as.factor(filed_county)Stevens County | -0.3564820 | 0.0500162 | -7.127 |
| ## as.factor(filed_county)Swift County | -0.1647553 | 0.0421515 | -3.909 |
| ## as.factor(filed_county)Todd County | 0.0314306 | 0.0345151 | 0.911 |
| ## as.factor(filed_county)Traverse County | -0.6923948 | 0.0717512 | -9.650 |
| ## as.factor(filed_county)Wabasha County | -0.5466112 | 0.0322416 | -16.954 |
| ## as.factor(filed_county)Wadena County | -0.0528958 | 0.0350934 | -1.507 |
| ## as.factor(filed_county)Waseca County | -0.4823020 | 0.0360826 | -13.367 |
| ## as.factor(filed_county)Washington County | -0.2645267 | 0.0243533 | -10.862 |
| ## as.factor(filed_county)Watsonwan County | -0.0796635 | 0.0386478 | -2.061 |
| ## as.factor(filed_county)Wilkin County | -0.2509724 | 0.0433836 | -5.785 |
| ## as.factor(filed_county)Winona County | -0.4017271 | 0.0276688 | -14.519 |
| ## as.factor(filed_county)Wright County | -0.6512796 | 0.0257817 | -25.261 |
| ## as.factor(filed_county)Yellow Medicine County | -0.0329757 | 0.0391007 | -0.843 |
| ## as.factor(sentence_year)2011 | 0.0403965 | 0.0046172 | 8.749 |
| ## as.factor(sentence_year)2012 | 0.0241468 | 0.0045706 | 5.283 |
| ## as.factor(sentence_year)2013 | 0.0962124 | 0.0048704 | 19.755 |
| ## as.factor(sentence_year)2014 | 0.1236732 | 0.0046715 | 26.474 |
| ## as.factor(sentence_year)2015 | 0.1691010 | 0.0047630 | 35.503 |
| ## as.factor(sentence_year)2016 | 0.2396817 | 0.0063875 | 37.524 |
| ## as.factor(sentence_year)2017 | 0.4656282 | 0.0114060 | 40.823 |
| ## as.factor(sentence_year)2018 | 0.5818077 | 0.0178544 | 32.586 |
| ## | Pr(> t) | | |
| ## (Intercept) | < 2e-16 *** | | |
| ## black | < 2e-16 *** | | |
| ## hispanic | < 2e-16 *** | | |
| ## asian | 3.22e-08 *** | | |
| ## nativeam | < 2e-16 *** | | |
| ## other.race | 5.06e-09 *** | | |
| ## male | < 2e-16 *** | | |
| ## log(age) | < 2e-16 *** | | |
| ## priors | < 2e-16 *** | | |
| ## trial_flagTRUE | 7.02e-06 *** | | |
| ## felony | < 2e-16 *** | | |
| ## gross.mis | 4.20e-11 *** | | |
| ## drug | < 2e-16 *** | | |
| ## alcohol.dui | < 2e-16 *** | | |

```

## hunt.fish 8.97e-07 ***
## other.offense < 2e-16 ***
## as.factor(filed_county)Anoka County < 2e-16 ***
## as.factor(filed_county)Becker County < 2e-16 ***
## as.factor(filed_county)Beltrami County 5.71e-07 ***
## as.factor(filed_county)Benton County < 2e-16 ***
## as.factor(filed_county)Big Stone County 0.005432 **
## as.factor(filed_county)Blue Earth County < 2e-16 ***
## as.factor(filed_county)Brown County 0.000429 ***
## as.factor(filed_county)Carlton County 0.000113 ***
## as.factor(filed_county)Carver County 0.000802 ***
## as.factor(filed_county)Cass County < 2e-16 ***
## as.factor(filed_county)Chippewa County 0.024335 *
## as.factor(filed_county)Chisago County < 2e-16 ***
## as.factor(filed_county)Clay County 0.041116 *
## as.factor(filed_county)Clearwater County 1.37e-05 ***
## as.factor(filed_county)Cook County 4.73e-16 ***
## as.factor(filed_county)Cottonwood County 5.68e-05 ***
## as.factor(filed_county)Crow Wing County < 2e-16 ***
## as.factor(filed_county)Dakota County < 2e-16 ***
## as.factor(filed_county)Dodge County < 2e-16 ***
## as.factor(filed_county)Douglas County 0.730514
## as.factor(filed_county)Faribault County 0.258982
## as.factor(filed_county)Fillmore County 1.61e-10 ***
## as.factor(filed_county)Freeborn County < 2e-16 ***
## as.factor(filed_county)Goodhue County < 2e-16 ***
## as.factor(filed_county)Grant County 0.000234 ***
## as.factor(filed_county)Hennepin County < 2e-16 ***
## as.factor(filed_county)Houston County < 2e-16 ***
## as.factor(filed_county)Hubbard County < 2e-16 ***
## as.factor(filed_county)Isanti County < 2e-16 ***
## as.factor(filed_county)Itasca County 4.17e-05 ***
## as.factor(filed_county)Jackson County 0.002458 **
## as.factor(filed_county)Kanabec County < 2e-16 ***
## as.factor(filed_county)Kandiyohi County 4.68e-12 ***
## as.factor(filed_county)Kittson County 0.367083
## as.factor(filed_county)Koochiching County < 2e-16 ***
## as.factor(filed_county)Lac qui Parle County 0.000308 ***
## as.factor(filed_county)Lake County 2.45e-14 ***
## as.factor(filed_county)Lake of the Woods County < 2e-16 ***
## as.factor(filed_county)LeSueur County < 2e-16 ***
## as.factor(filed_county)Lincoln County 0.568951
## as.factor(filed_county)Lyon County 0.007556 **
## as.factor(filed_county)Mahnommen County 6.73e-06 ***
## as.factor(filed_county)Marshall County 0.001488 **
## as.factor(filed_county)Martin County < 2e-16 ***
## as.factor(filed_county)McLeod County < 2e-16 ***
## as.factor(filed_county)Meeker County 0.320122

```

| | |
|--|--------------|
| ## as.factor(filed_county)Mille Lacs County | 0.000167 *** |
| ## as.factor(filed_county)Morrison County | 8.77e-07 *** |
| ## as.factor(filed_county)Mower County | < 2e-16 *** |
| ## as.factor(filed_county)Murray County | 0.665456 |
| ## as.factor(filed_county)Nicollet County | 5.57e-10 *** |
| ## as.factor(filed_county)Nobles County | 1.62e-05 *** |
| ## as.factor(filed_county)Norman County | 0.010297 * |
| ## as.factor(filed_county)Olmsted County | < 2e-16 *** |
| ## as.factor(filed_county)Otter Tail County | 0.029833 * |
| ## as.factor(filed_county)Pennington County | < 2e-16 *** |
| ## as.factor(filed_county)Pine County | < 2e-16 *** |
| ## as.factor(filed_county)Pipestone County | 0.140245 |
| ## as.factor(filed_county)Polk County | 3.26e-06 *** |
| ## as.factor(filed_county)Pope County | 1.53e-07 *** |
| ## as.factor(filed_county)Ramsey County | 0.057142 . |
| ## as.factor(filed_county)Red Lake County | < 2e-16 *** |
| ## as.factor(filed_county)Redwood County | 0.491882 |
| ## as.factor(filed_county)Renville County | < 2e-16 *** |
| ## as.factor(filed_county)Rice County | 0.510395 |
| ## as.factor(filed_county)Rock County | 0.012902 * |
| ## as.factor(filed_county)Roseau County | 3.97e-05 *** |
| ## as.factor(filed_county)Scott County | 9.72e-11 *** |
| ## as.factor(filed_county)Sherburne County | < 2e-16 *** |
| ## as.factor(filed_county)Sibley County | < 2e-16 *** |
| ## as.factor(filed_county)St. Louis County | < 2e-16 *** |
| ## as.factor(filed_county)Stearns County | 0.000104 *** |
| ## as.factor(filed_county)Steele County | 0.000746 *** |
| ## as.factor(filed_county)Stevens County | 1.02e-12 *** |
| ## as.factor(filed_county)Swift County | 9.28e-05 *** |
| ## as.factor(filed_county)Todd County | 0.362488 |
| ## as.factor(filed_county)Traverse County | < 2e-16 *** |
| ## as.factor(filed_county)Wabasha County | < 2e-16 *** |
| ## as.factor(filed_county)Wadena County | 0.131738 |
| ## as.factor(filed_county)Waseca County | < 2e-16 *** |
| ## as.factor(filed_county)Washington County | < 2e-16 *** |
| ## as.factor(filed_county)Watonwan County | 0.039277 * |
| ## as.factor(filed_county)Wilkin County | 7.25e-09 *** |
| ## as.factor(filed_county)Winona County | < 2e-16 *** |
| ## as.factor(filed_county)Wright County | < 2e-16 *** |
| ## as.factor(filed_county)Yellow Medicine County | 0.399030 |
| ## as.factor(sentence_year)2011 | < 2e-16 *** |
| ## as.factor(sentence_year)2012 | 1.27e-07 *** |
| ## as.factor(sentence_year)2013 | < 2e-16 *** |
| ## as.factor(sentence_year)2014 | < 2e-16 *** |
| ## as.factor(sentence_year)2015 | < 2e-16 *** |
| ## as.factor(sentence_year)2016 | < 2e-16 *** |
| ## as.factor(sentence_year)2017 | < 2e-16 *** |
| ## as.factor(sentence_year)2018 | < 2e-16 *** |


```

## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.437 on 1176337 degrees of freedom
## (417664 observations deleted due to missingness)
## Multiple R-squared:  0.1055, Adjusted R-squared:  0.1054
## F-statistic: 1273 on 109 and 1176337 DF,  p-value: < 2.2e-16
##
##
## Response conf_days_log :
##
## Call:
## lm(formula = conf_days_log ~ black + hispanic + asian + nativeam +
##     other.race + male + log(age) + priors + trial_flag + felony +
##     gross.mis + drug + alcohol. DUI + hunt.fish + other.offense +
##     as.factor(filed_county) + as.factor(sentence_year), data = monsanc.short)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.8370 -1.0269 -0.5434  1.0899  8.6987
##
## Coefficients:
##
##              Estimate Std. Error t value
## (Intercept)      1.6257982   0.0323219   50.300
## black              0.1638590   0.0041860   39.144
## hispanic          -0.0218853   0.0058268   -3.756
## asian             -0.0416176   0.0088134   -4.722
## nativeam           0.5653311   0.0075839   74.544
## other.race         0.0620629   0.0113768    5.455
## male              0.1110123   0.0034513   32.166
## log(age)           0.2609909   0.0046789   55.780
## priors             0.0276099   0.0001810  152.555
## trial_flagTRUE     1.4103038   0.1473023    9.574
## felony            3.0428714   0.0061551  494.367
## gross.mis          2.7271055   0.0055555  490.884
## drug              -1.4504143   0.0095290 -152.210
## alcohol.DUI        -0.0630136   0.0075699   -8.324
## hunt.fish          -2.1140942   0.0172286 -122.709
## other.offense      -1.3220390   0.0067242 -196.610
## as.factor(filed_county)Anoka County    -0.5209688   0.0277501  -18.774
## as.factor(filed_county)Becker County     0.2576506   0.0324259    7.946
## as.factor(filed_county)Beltrami County  -0.0453973   0.0301233   -1.507
## as.factor(filed_county)Benton County     0.0158022   0.0357049    0.443
## as.factor(filed_county)Big Stone County  -0.6586148   0.0690711   -9.535
## as.factor(filed_county)Blue Earth County -0.9956482   0.0296358  -33.596
## as.factor(filed_county)Brown County      -0.6640086   0.0374791  -17.717
## as.factor(filed_county)Carlton County    -0.4243000   0.0323791  -13.104
## as.factor(filed_county)Carver County     -1.6056979   0.0308120  -52.113

```

| | | | |
|--|------------|-----------|---------|
| ## as.factor(filed_county)Cass County | -0.1935666 | 0.0338120 | -5.725 |
| ## as.factor(filed_county)Chippewa County | -0.5329177 | 0.0447289 | -11.914 |
| ## as.factor(filed_county)Chisago County | -0.6143414 | 0.0322866 | -19.028 |
| ## as.factor(filed_county)Clay County | -0.3672835 | 0.0299721 | -12.254 |
| ## as.factor(filed_county)Clearwater County | -0.0398219 | 0.0524561 | -0.759 |
| ## as.factor(filed_county)Cook County | -0.7448623 | 0.0617828 | -12.056 |
| ## as.factor(filed_county)Cottonwood County | -0.5719074 | 0.0477956 | -11.966 |
| ## as.factor(filed_county)Crow Wing County | -0.0287875 | 0.0301522 | -0.955 |
| ## as.factor(filed_county)Dakota County | -1.3681990 | 0.0274942 | -49.763 |
| ## as.factor(filed_county)Dodge County | -1.6734157 | 0.0424923 | -39.382 |
| ## as.factor(filed_county)Douglas County | -0.1639453 | 0.0343065 | -4.779 |
| ## as.factor(filed_county)Faribault County | -0.5347968 | 0.0438421 | -12.198 |
| ## as.factor(filed_county)Fillmore County | -0.3384585 | 0.0421885 | -8.023 |
| ## as.factor(filed_county)Freeborn County | -0.3724847 | 0.0343622 | -10.840 |
| ## as.factor(filed_county)Goodhue County | -1.6121207 | 0.0302547 | -53.285 |
| ## as.factor(filed_county)Grant County | -0.6996444 | 0.0656903 | -10.651 |
| ## as.factor(filed_county)Hennepin County | -0.7705051 | 0.0271097 | -28.422 |
| ## as.factor(filed_county)Houston County | -0.0898479 | 0.0398149 | -2.257 |
| ## as.factor(filed_county)Hubbard County | -0.0476701 | 0.0373772 | -1.275 |
| ## as.factor(filed_county)Isanti County | -0.4041189 | 0.0349841 | -11.551 |
| ## as.factor(filed_county)Itasca County | -0.2712645 | 0.0314680 | -8.620 |
| ## as.factor(filed_county)Jackson County | -0.8589574 | 0.0504811 | -17.015 |
| ## as.factor(filed_county)Kanabec County | -0.3629856 | 0.0395212 | -9.185 |
| ## as.factor(filed_county)Kandiyohi County | -0.4069315 | 0.0320805 | -12.685 |
| ## as.factor(filed_county)Kittson County | -0.6295938 | 0.0890975 | -7.066 |
| ## as.factor(filed_county)Koochiching County | -0.3660259 | 0.0447100 | -8.187 |
| ## as.factor(filed_county)Lac qui Parle County | -0.6602173 | 0.0658753 | -10.022 |
| ## as.factor(filed_county)Lake County | -0.5390656 | 0.0492056 | -10.955 |
| ## as.factor(filed_county)Lake of the Woods County | -0.6674512 | 0.0571974 | -11.669 |
| ## as.factor(filed_county)LeSueur County | -1.6859822 | 0.0376637 | -44.764 |
| ## as.factor(filed_county)Lincoln County | -0.3873637 | 0.0759979 | -5.097 |
| ## as.factor(filed_county)Lyon County | -0.1255273 | 0.0353117 | -3.555 |
| ## as.factor(filed_county)Mahnomon County | -0.1970042 | 0.0413598 | -4.763 |
| ## as.factor(filed_county)Marshall County | -0.2941915 | 0.0560635 | -5.247 |
| ## as.factor(filed_county)Martin County | -0.1359372 | 0.0375823 | -3.617 |
| ## as.factor(filed_county)McLeod County | -1.2486169 | 0.0337977 | -36.944 |
| ## as.factor(filed_county)Meeker County | -0.5888333 | 0.0431514 | -13.646 |
| ## as.factor(filed_county)Mille Lacs County | -0.2185050 | 0.0334340 | -6.535 |
| ## as.factor(filed_county)Morrison County | -0.2119162 | 0.0353679 | -5.992 |
| ## as.factor(filed_county)Mower County | -0.3111607 | 0.0325873 | -9.549 |
| ## as.factor(filed_county)Murray County | -1.1013718 | 0.0633940 | -17.373 |
| ## as.factor(filed_county)Nicollet County | -0.9813228 | 0.0347806 | -28.215 |
| ## as.factor(filed_county)Nobles County | -0.1835807 | 0.0374708 | -4.899 |
| ## as.factor(filed_county)Norman County | -0.3946316 | 0.0590091 | -6.688 |
| ## as.factor(filed_county)Olmsted County | -1.4855196 | 0.0286226 | -51.900 |
| ## as.factor(filed_county>Otter Tail County | -0.3384969 | 0.0320451 | -10.563 |
| ## as.factor(filed_county)Pennington County | -0.2603544 | 0.0412354 | -6.314 |
| ## as.factor(filed_county)Pine County | -0.4539958 | 0.0345219 | -13.151 |

| | | | |
|--|--------------|-----------|---------|
| ## as.factor(filed_county)Pipestone County | -1.5698309 | 0.0566814 | -27.696 |
| ## as.factor(filed_county)Polk County | 0.0904686 | 0.0331589 | 2.728 |
| ## as.factor(filed_county)Pope County | -0.7256073 | 0.0489315 | -14.829 |
| ## as.factor(filed_county)Ramsey County | -0.6128230 | 0.0273087 | -22.441 |
| ## as.factor(filed_county)Red Lake County | -0.5930413 | 0.0626054 | -9.473 |
| ## as.factor(filed_county)Redwood County | -0.3001675 | 0.0378656 | -7.927 |
| ## as.factor(filed_county)Renville County | -0.5424482 | 0.0393758 | -13.776 |
| ## as.factor(filed_county)Rice County | -0.5006964 | 0.0315533 | -15.868 |
| ## as.factor(filed_county)Rock County | -1.1856217 | 0.0616598 | -19.228 |
| ## as.factor(filed_county)Roseau County | -0.5373008 | 0.0383937 | -13.994 |
| ## as.factor(filed_county)Scott County | -1.6488187 | 0.0283074 | -58.247 |
| ## as.factor(filed_county)Sherburne County | -0.1773811 | 0.0304248 | -5.830 |
| ## as.factor(filed_county)Sibley County | -1.5715865 | 0.0428382 | -36.687 |
| ## as.factor(filed_county)St. Louis County | -0.5155622 | 0.0279281 | -18.460 |
| ## as.factor(filed_county)Stearns County | -0.1682554 | 0.0282117 | -5.964 |
| ## as.factor(filed_county)Steele County | -0.4233987 | 0.0329550 | -12.848 |
| ## as.factor(filed_county)Stevens County | -0.7440037 | 0.0577333 | -12.887 |
| ## as.factor(filed_county)Swift County | -0.2888517 | 0.0486551 | -5.937 |
| ## as.factor(filed_county)Todd County | -0.3815651 | 0.0398405 | -9.577 |
| ## as.factor(filed_county)Traverse County | -0.5074517 | 0.0828217 | -6.127 |
| ## as.factor(filed_county)Wabasha County | -1.7022222 | 0.0372162 | -45.739 |
| ## as.factor(filed_county)Wadena County | -0.3383443 | 0.0405080 | -8.353 |
| ## as.factor(filed_county)Waseca County | -0.4915697 | 0.0416498 | -11.802 |
| ## as.factor(filed_county)Washington County | -0.2184428 | 0.0281108 | -7.771 |
| ## as.factor(filed_county)Watsonwan County | -0.3923723 | 0.0446108 | -8.795 |
| ## as.factor(filed_county)Wilkin County | -0.7255920 | 0.0500773 | -14.489 |
| ## as.factor(filed_county)Winona County | -1.0650711 | 0.0319378 | -33.348 |
| ## as.factor(filed_county)Wright County | -0.0991583 | 0.0297596 | -3.332 |
| ## as.factor(filed_county)Yellow Medicine County | -0.5676584 | 0.0451335 | -12.577 |
| ## as.factor(sentence_year)2011 | -0.0277903 | 0.0053296 | -5.214 |
| ## as.factor(sentence_year)2012 | -0.0038796 | 0.0052758 | -0.735 |
| ## as.factor(sentence_year)2013 | -0.0358731 | 0.0056218 | -6.381 |
| ## as.factor(sentence_year)2014 | 0.0145147 | 0.0053923 | 2.692 |
| ## as.factor(sentence_year)2015 | 0.0002286 | 0.0054979 | 0.042 |
| ## as.factor(sentence_year)2016 | 0.0756112 | 0.0073730 | 10.255 |
| ## as.factor(sentence_year)2017 | -0.2261182 | 0.0131659 | -17.175 |
| ## as.factor(sentence_year)2018 | -0.5694852 | 0.0206091 | -27.633 |
| ## | Pr(> t) | | |
| ## (Intercept) | < 2e-16 *** | | |
| ## black | < 2e-16 *** | | |
| ## hispanic | 0.000173 *** | | |
| ## asian | 2.33e-06 *** | | |
| ## nativeam | < 2e-16 *** | | |
| ## other.race | 4.89e-08 *** | | |
| ## male | < 2e-16 *** | | |
| ## log(age) | < 2e-16 *** | | |
| ## priors | < 2e-16 *** | | |
| ## trial_flagTRUE | < 2e-16 *** | | |

```

## felony < 2e-16 ***
## gross.mis < 2e-16 ***
## drug < 2e-16 ***
## alcohol.dui < 2e-16 ***
## hunt.fish < 2e-16 ***
## other.offense < 2e-16 ***
## as.factor(filed_county)Anoka County < 2e-16 ***
## as.factor(filed_county)Becker County 1.93e-15 ***
## as.factor(filed_county)Beltrami County 0.131798
## as.factor(filed_county)Benton County 0.658071
## as.factor(filed_county)Big Stone County < 2e-16 ***
## as.factor(filed_county)Blue Earth County < 2e-16 ***
## as.factor(filed_county)Brown County < 2e-16 ***
## as.factor(filed_county)Carlton County < 2e-16 ***
## as.factor(filed_county)Carver County < 2e-16 ***
## as.factor(filed_county)Cass County 1.04e-08 ***
## as.factor(filed_county)Chippewa County < 2e-16 ***
## as.factor(filed_county)Chisago County < 2e-16 ***
## as.factor(filed_county)Clay County < 2e-16 ***
## as.factor(filed_county)Clearwater County 0.447765
## as.factor(filed_county)Cook County < 2e-16 ***
## as.factor(filed_county)Cottonwood County < 2e-16 ***
## as.factor(filed_county)Crow Wing County 0.339709
## as.factor(filed_county)Dakota County < 2e-16 ***
## as.factor(filed_county)Dodge County < 2e-16 ***
## as.factor(filed_county)Douglas County 1.76e-06 ***
## as.factor(filed_county)Faribault County < 2e-16 ***
## as.factor(filed_county)Fillmore County 1.04e-15 ***
## as.factor(filed_county)Freeborn County < 2e-16 ***
## as.factor(filed_county)Goodhue County < 2e-16 ***
## as.factor(filed_county)Grant County < 2e-16 ***
## as.factor(filed_county)Hennepin County < 2e-16 ***
## as.factor(filed_county)Houston County 0.024031 *
## as.factor(filed_county)Hubbard County 0.202175
## as.factor(filed_county)Isanti County < 2e-16 ***
## as.factor(filed_county)Itasca County < 2e-16 ***
## as.factor(filed_county)Jackson County < 2e-16 ***
## as.factor(filed_county)Kanabec County < 2e-16 ***
## as.factor(filed_county)Kandiyohi County < 2e-16 ***
## as.factor(filed_county)Kittson County 1.59e-12 ***
## as.factor(filed_county)Koochiching County 2.69e-16 ***
## as.factor(filed_county)Lac qui Parle County < 2e-16 ***
## as.factor(filed_county)Lake County < 2e-16 ***
## as.factor(filed_county)Lake of the Woods County < 2e-16 ***
## as.factor(filed_county)LeSueur County < 2e-16 ***
## as.factor(filed_county)Lincoln County 3.45e-07 ***
## as.factor(filed_county)Lyon County 0.000378 ***
## as.factor(filed_county)Mahnommen County 1.91e-06 ***

```

```

## as.factor(filed_county)Marshall County      1.54e-07 ***
## as.factor(filed_county)Martin County        0.000298 ***
## as.factor(filed_county)McLeod County         < 2e-16 ***
## as.factor(filed_county)Meeker County         < 2e-16 ***
## as.factor(filed_county)Mille Lacs County     6.35e-11 ***
## as.factor(filed_county)Morrison County       2.08e-09 ***
## as.factor(filed_county)Mower County          < 2e-16 ***
## as.factor(filed_county)Murray County         < 2e-16 ***
## as.factor(filed_county)Nicollet County       < 2e-16 ***
## as.factor(filed_county)Nobles County         9.62e-07 ***
## as.factor(filed_county)Norman County         2.27e-11 ***
## as.factor(filed_county)Olmsted County        < 2e-16 ***
## as.factor(filed_county)Otter Tail County     < 2e-16 ***
## as.factor(filed_county)Pennington County     2.72e-10 ***
## as.factor(filed_county)Pine County           < 2e-16 ***
## as.factor(filed_county)Pipestone County      < 2e-16 ***
## as.factor(filed_county)Polk County           0.006366 **
## as.factor(filed_county)Pope County           < 2e-16 ***
## as.factor(filed_county)Ramsey County         < 2e-16 ***
## as.factor(filed_county)Red Lake County       < 2e-16 ***
## as.factor(filed_county)Redwood County        2.24e-15 ***
## as.factor(filed_county)Renville County       < 2e-16 ***
## as.factor(filed_county)Rice County           < 2e-16 ***
## as.factor(filed_county)Rock County           < 2e-16 ***
## as.factor(filed_county)Roseau County         < 2e-16 ***
## as.factor(filed_county)Scott County          < 2e-16 ***
## as.factor(filed_county)Sherburne County      5.54e-09 ***
## as.factor(filed_county)Sibley County         < 2e-16 ***
## as.factor(filed_county)St. Louis County      < 2e-16 ***
## as.factor(filed_county)Stearns County        2.46e-09 ***
## as.factor(filed_county)Steele County         < 2e-16 ***
## as.factor(filed_county)Stevens County        < 2e-16 ***
## as.factor(filed_county)Swift County          2.91e-09 ***
## as.factor(filed_county)Todd County           < 2e-16 ***
## as.factor(filed_county)Traverse County       8.96e-10 ***
## as.factor(filed_county)Wabasha County        < 2e-16 ***
## as.factor(filed_county)Wadena County         < 2e-16 ***
## as.factor(filed_county)Waseca County         < 2e-16 ***
## as.factor(filed_county)Washington County    7.81e-15 ***
## as.factor(filed_county)Watsonwan County      < 2e-16 ***
## as.factor(filed_county)Wilkin County         < 2e-16 ***
## as.factor(filed_county)Winona County         < 2e-16 ***
## as.factor(filed_county)Wright County         0.000862 ***
## as.factor(filed_county)Yellow Medicine County < 2e-16 ***
## as.factor(sentence_year)2011                1.85e-07 ***
## as.factor(sentence_year)2012                0.462124
## as.factor(sentence_year)2013                1.76e-10 ***
## as.factor(sentence_year)2014                0.007108 **

```

```
## as.factor(sentence_year)2015 0.966835
## as.factor(sentence_year)2016 < 2e-16 ***
## as.factor(sentence_year)2017 < 2e-16 ***
## as.factor(sentence_year)2018 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.658 on 1176337 degrees of freedom
## (417664 observations deleted due to missingness)
## Multiple R-squared:  0.4756, Adjusted R-squared:  0.4756
## F-statistic:  9789 on 109 and 1176337 DF,  p-value: < 2.2e-16

#descriptive stats for mv.fe model
monsanc.short$miss <- seq_len(nrow(monsanc.short)) %in% na.action(mv.fe)

#descriptive statistics for variables in analysis
ds <- monsanc.short %>%
  filter(miss==FALSE) %>%
  select(total_ff, conf_days,
         white,black,hispanic,asian,nativeam,other.race,
         male,age,priors,trial_flag,
         felony,gross.mis,mis, petty.mis,
         violent,drug,alcohol. DUI,hunt.fish,other.offense,
         cap_ratio) %>%
  gather() %>%
  group_by(key) %>%
  summarize(
    mean = round(mean(value, na.rm=T),2),
    sd = round(sd(value, na.rm=T),2),
    min = min(value, na.rm=T),
    max = max(value, na.rm=T)
  )

print(ds, n = Inf)
```

```
## # A tibble: 22 x 5
##   key          mean    sd  min    max
##   <chr>        <dbl> <dbl> <dbl> <dbl>
## 1 age          32     11.5  15    115
## 2 alcohol.dui  0.15   0.36  0      1
## 3 asian        0.03   0.18  0      1
## 4 black        0.23   0.42  0      1
## 5 cap_ratio    0.75   0.15  0.2    1.15
## 6 conf_days    77.1   369.  0    44087
## 7 drug         0.04   0.2   0      1
## 8 felony       0.1    0.3   0      1
## 9 gross.mis    0.1    0.3   0      1
## 10 hispanic    0.08   0.28  0      1
```

```
## 11 hunt.fish      0.01    0.1    0      1
## 12 male           0.72    0.45    0      1
## 13 mis            0.8     0.4    0      1
## 14 nativeam       0.05    0.22    0      1
## 15 other.offense  0.72    0.45    0      1
## 16 other.race     0.02    0.14    0      1
## 17 petty.mis      0       0      0      0
## 18 priors         7.61    8.95    0     168
## 19 total_ff       303.    225.    0    1000
## 20 trial_flag     0       0.01    0      1
## 21 violent        0.07    0.26    0      1
## 22 white          0.580   0.49    0      1
```

#FE instrumental Variables Regression

```
iv.fe <- ivreg(total_ff_log~conf_days_log+black+hispanic+asian+nativeam+other.race+male+log(age)+
               priors+trial_flag+felony+gross.mis+
               drug+alcohol. DUI+hunt.fish+other.offense+
               as.factor(filed_county)+as.factor(sentence_year)|
               cap_ratio+black+hispanic+asian+nativeam+other.race+male+log(age)+
               priors+trial_flag+felony+gross.mis+
               drug+alcohol. DUI+hunt.fish+other.offense+
               as.factor(filed_county)+as.factor(sentence_year),
               data = monsanc.short)

summary(iv.fe, diagnostics=T)
```

```
##
## Call:
## ivreg(formula = total_ff_log ~ conf_days_log + black + hispanic +
##       asian + nativeam + other.race + male + log(age) + priors +
##       trial_flag + felony + gross.mis + drug + alcohol. dui + hunt.fish +
##       other.offense + as.factor(filed_county) + as.factor(sentence_year) |
##       cap_ratio + black + hispanic + asian + nativeam + other.race +
##       male + log(age) + priors + trial_flag + felony + gross.mis +
##       drug + alcohol. dui + hunt.fish + other.offense + as.factor(filed_county) +
##       as.factor(sentence_year), data = monsanc.short)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -16.9035  -1.7640   0.7884   1.9854  12.0053
##
## Coefficients:
##                                Estimate Std. Error t value
## (Intercept)                   3.242080   0.554888   5.843
## conf_days_log                   1.425482   0.339582   4.198
## black                         -0.468773   0.056206  -8.340
## hispanic                       0.102997   0.013180   7.815
## asian                          0.103570   0.021432   4.832
```

| | | | |
|--|-----------|----------|--------|
| ## nativeam | -1.131570 | 0.192097 | -5.891 |
| ## other.race | -0.141084 | 0.028419 | -4.964 |
| ## male | -0.117672 | 0.038098 | -3.089 |
| ## log(age) | -0.410339 | 0.089074 | -4.607 |
| ## priors | -0.054647 | 0.009467 | -5.772 |
| ## trial_flagTRUE | -2.546628 | 0.538153 | -4.732 |
| ## felony | -4.918142 | 1.033675 | -4.758 |
| ## gross.mis | -3.858495 | 0.926432 | -4.165 |
| ## drug | 2.362282 | 0.494248 | 4.780 |
| ## alcohol.dui | 0.643025 | 0.024047 | 26.740 |
| ## hunt.fish | 2.955535 | 0.722257 | 4.092 |
| ## other.offense | 2.199355 | 0.449890 | 4.889 |
| ## as.factor(filed_county)Anoka County | -0.058847 | 0.182483 | -0.322 |
| ## as.factor(filed_county)Becker County | -0.121441 | 0.105537 | -1.151 |
| ## as.factor(filed_county)Beltrami County | -0.067560 | 0.055547 | -1.216 |
| ## as.factor(filed_county)Benton County | -0.360985 | 0.063647 | -5.672 |
| ## as.factor(filed_county)Big Stone County | 0.773029 | 0.255351 | 3.027 |
| ## as.factor(filed_county)Blue Earth County | 1.197945 | 0.342218 | 3.501 |
| ## as.factor(filed_county)Brown County | 0.830513 | 0.234923 | 3.535 |
| ## as.factor(filed_county)Carlton County | 0.494923 | 0.154370 | 3.206 |
| ## as.factor(filed_county)Carver County | 2.196318 | 0.547690 | 4.010 |
| ## as.factor(filed_county)Cass County | -0.171532 | 0.088193 | -1.945 |
| ## as.factor(filed_county)Chippewa County | 0.668340 | 0.196799 | 3.396 |
| ## as.factor(filed_county)Chisago County | 0.348223 | 0.216211 | 1.611 |
| ## as.factor(filed_county)Clay County | 0.473468 | 0.136240 | 3.475 |
| ## as.factor(filed_county)Clearwater County | -0.136739 | 0.094213 | -1.451 |
| ## as.factor(filed_county)Cook County | 0.409160 | 0.246417 | 1.660 |
| ## as.factor(filed_county)Cottonwood County | 0.647526 | 0.211244 | 3.065 |
| ## as.factor(filed_county)Crow Wing County | -0.179913 | 0.054354 | -3.310 |
| ## as.factor(filed_county)Dakota County | 1.692716 | 0.467771 | 3.619 |
| ## as.factor(filed_county)Dodge County | 1.645630 | 0.572907 | 2.872 |
| ## as.factor(filed_county)Douglas County | 0.217447 | 0.081640 | 2.663 |
| ## as.factor(filed_county)Faribault County | 0.716358 | 0.196967 | 3.637 |
| ## as.factor(filed_county)Fillmore County | 0.245753 | 0.136935 | 1.795 |
| ## as.factor(filed_county)Freeborn County | 0.151745 | 0.140594 | 1.079 |
| ## as.factor(filed_county)Goodhue County | 1.753145 | 0.550538 | 3.184 |
| ## as.factor(filed_county)Hennepin County | 0.195847 | 0.265723 | 0.737 |
| ## as.factor(filed_county)Houston County | -0.349820 | 0.077229 | -4.530 |
| ## as.factor(filed_county)Hubbard County | -0.212761 | 0.068014 | -3.128 |
| ## as.factor(filed_county)Isanti County | 0.147290 | 0.149955 | 0.982 |
| ## as.factor(filed_county)Itasca County | 0.271340 | 0.106903 | 2.538 |
| ## as.factor(filed_county)Jackson County | 1.091800 | 0.304496 | 3.586 |
| ## as.factor(filed_county)Kanabec County | 0.199526 | 0.141424 | 1.411 |
| ## as.factor(filed_county)Kandiyohi County | 0.386279 | 0.149057 | 2.591 |
| ## as.factor(filed_county)Kittson County | 0.823809 | 0.265420 | 3.104 |
| ## as.factor(filed_county)Koochiching County | -0.241488 | 0.147379 | -1.639 |
| ## as.factor(filed_county)Lac qui Parle County | 0.744145 | 0.252195 | 2.951 |
| ## as.factor(filed_county)Lake County | 0.439906 | 0.202369 | 2.174 |

| | | | |
|--|-----------|----------|--------|
| ## as.factor(filed_county)Lake of the Woods County | 0.502164 | 0.247619 | 2.028 |
| ## as.factor(filed_county)Lincoln County | 0.510644 | 0.187989 | 2.716 |
| ## as.factor(filed_county)Lyon County | 0.092642 | 0.075301 | 1.230 |
| ## as.factor(filed_county)Marshall County | 0.260920 | 0.140553 | 1.856 |
| ## as.factor(filed_county)Martin County | -0.194157 | 0.081144 | -2.393 |
| ## as.factor(filed_county)McLeod County | 1.244716 | 0.428653 | 2.904 |
| ## as.factor(filed_county)Meeker County | 0.803364 | 0.214110 | 3.752 |
| ## as.factor(filed_county)Mille Lacs County | 0.421248 | 0.095003 | 4.434 |
| ## as.factor(filed_county)Morrison County | 0.148456 | 0.095159 | 1.560 |
| ## as.factor(filed_county)Mower County | 0.129791 | 0.120262 | 1.079 |
| ## as.factor(filed_county)Murray County | 1.592185 | 0.390093 | 4.082 |
| ## as.factor(filed_county>Nicollet County | 1.210546 | 0.338787 | 3.573 |
| ## as.factor(filed_county>Nobles County | 0.122408 | 0.091415 | 1.339 |
| ## as.factor(filed_county)Norman County | 0.421446 | 0.168664 | 2.499 |
| ## as.factor(filed_county>Olmsted County | 1.510132 | 0.506590 | 2.981 |
| ## as.factor(filed_county>Otter Tail County | 0.539733 | 0.127625 | 4.229 |
| ## as.factor(filed_county>Pennington County | -0.044990 | 0.113987 | -0.395 |
| ## as.factor(filed_county>Pine County | 0.189920 | 0.165563 | 1.147 |
| ## as.factor(filed_county>Pipestone County | 2.170108 | 0.543483 | 3.993 |
| ## as.factor(filed_county>Polk County | -0.264025 | 0.066734 | -3.956 |
| ## as.factor(filed_county>Pope County | 0.806946 | 0.260527 | 3.097 |
| ## as.factor(filed_county>Ramsey County | 0.823699 | 0.212362 | 3.879 |
| ## as.factor(filed_county>Red Lake County | 0.182916 | 0.227980 | 0.802 |
| ## as.factor(filed_county>Redwood County | 0.446790 | 0.121023 | 3.692 |
| ## as.factor(filed_county>Renville County | -0.026450 | 0.197081 | -0.134 |
| ## as.factor(filed_county>Rice County | 0.692353 | 0.178247 | 3.884 |
| ## as.factor(filed_county>Rock County | 1.565031 | 0.417126 | 3.752 |
| ## as.factor(filed_county>Roseau County | 0.624574 | 0.194008 | 3.219 |
| ## as.factor(filed_county>Scott County | 2.190365 | 0.561997 | 3.897 |
| ## as.factor(filed_county>Sherburne County | -0.107902 | 0.079839 | -1.351 |
| ## as.factor(filed_county>Sibley County | 1.665564 | 0.539083 | 3.090 |
| ## as.factor(filed_county>St. Louis County | 0.476176 | 0.181053 | 2.630 |
| ## as.factor(filed_county>Stearns County | 0.143856 | 0.075891 | 1.896 |
| ## as.factor(filed_county>Steele County | 0.504820 | 0.154960 | 3.258 |
| ## as.factor(filed_county>Stevens County | 0.700328 | 0.272219 | 2.573 |
| ## as.factor(filed_county>Swift County | 0.242667 | 0.129908 | 1.868 |
| ## as.factor(filed_county>Todd County | 0.571455 | 0.147065 | 3.886 |
| ## as.factor(filed_county>Traverse County | 0.048239 | 0.228043 | 0.212 |
| ## as.factor(filed_county>Wabasha County | 1.876896 | 0.581332 | 3.229 |
| ## as.factor(filed_county>Wadena County | 0.424568 | 0.134825 | 3.149 |
| ## as.factor(filed_county>Waseca County | 0.215903 | 0.182262 | 1.185 |
| ## as.factor(filed_county>Washington County | 0.048616 | 0.089554 | 0.543 |
| ## as.factor(filed_county>Watsonwan County | 0.474640 | 0.154448 | 3.073 |
| ## as.factor(filed_county>Wilkin County | 0.783397 | 0.262375 | 2.986 |
| ## as.factor(filed_county>Winona County | 1.124239 | 0.367606 | 3.058 |
| ## as.factor(filed_county>Wright County | -0.514363 | 0.062026 | -8.293 |
| ## as.factor(filed_county>Yellow Medicine County | 0.773292 | 0.207563 | 3.726 |
| ## as.factor(sentence_year)2011 | 0.080870 | 0.013699 | 5.903 |

| | | | |
|---|----------|----------|--------|
| ## as.factor(sentence_year)2012 | 0.031344 | 0.009584 | 3.270 |
| ## as.factor(sentence_year)2013 | 0.150059 | 0.016385 | 9.158 |
| ## as.factor(sentence_year)2014 | 0.106224 | 0.010455 | 10.160 |
| ## as.factor(sentence_year)2015 | 0.171860 | 0.009814 | 17.512 |
| ## as.factor(sentence_year)2016 | 0.135304 | 0.028197 | 4.798 |
| ## as.factor(sentence_year)2017 | 0.795445 | 0.081589 | 9.749 |
| ## | Pr(> t) | | |
| ## (Intercept) | 5.14e-09 | *** | |
| ## conf_days_log | 2.70e-05 | *** | |
| ## black | < 2e-16 | *** | |
| ## hispanic | 5.51e-15 | *** | |
| ## asian | 1.35e-06 | *** | |
| ## nativeam | 3.85e-09 | *** | |
| ## other.race | 6.89e-07 | *** | |
| ## male | 0.002011 | ** | |
| ## log(age) | 4.09e-06 | *** | |
| ## priors | 7.82e-09 | *** | |
| ## trial_flagTRUE | 2.22e-06 | *** | |
| ## felony | 1.96e-06 | *** | |
| ## gross.mis | 3.12e-05 | *** | |
| ## drug | 1.76e-06 | *** | |
| ## alcohol.dui | < 2e-16 | *** | |
| ## hunt.fish | 4.28e-05 | *** | |
| ## other.offense | 1.02e-06 | *** | |
| ## as.factor(filed_county)Anoka County | 0.747088 | | |
| ## as.factor(filed_county)Becker County | 0.249857 | | |
| ## as.factor(filed_county)Beltrami County | 0.223886 | | |
| ## as.factor(filed_county)Benton County | 1.41e-08 | *** | |
| ## as.factor(filed_county)Big Stone County | 0.002467 | ** | |
| ## as.factor(filed_county)Blue Earth County | 0.000464 | *** | |
| ## as.factor(filed_county)Brown County | 0.000407 | *** | |
| ## as.factor(filed_county)Carlton County | 0.001346 | ** | |
| ## as.factor(filed_county)Carver County | 6.07e-05 | *** | |
| ## as.factor(filed_county)Cass County | 0.051781 | . | |
| ## as.factor(filed_county)Chippewa County | 0.000684 | *** | |
| ## as.factor(filed_county)Chisago County | 0.107273 | | |
| ## as.factor(filed_county)Clay County | 0.000510 | *** | |
| ## as.factor(filed_county)Clearwater County | 0.146675 | | |
| ## as.factor(filed_county)Cook County | 0.096826 | . | |
| ## as.factor(filed_county)Cottonwood County | 0.002175 | ** | |
| ## as.factor(filed_county)Crow Wing County | 0.000933 | *** | |
| ## as.factor(filed_county)Dakota County | 0.000296 | *** | |
| ## as.factor(filed_county)Dodge County | 0.004073 | ** | |
| ## as.factor(filed_county)Douglas County | 0.007733 | ** | |
| ## as.factor(filed_county)Faribault County | 0.000276 | *** | |
| ## as.factor(filed_county)Fillmore County | 0.072706 | . | |
| ## as.factor(filed_county)Freeborn County | 0.280449 | | |
| ## as.factor(filed_county)Goodhue County | 0.001450 | ** | |

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|--|----------|-----|
| ## as.factor(filed_county)Hennepin County | 0.461101 | |
| ## as.factor(filed_county)Houston County | 5.91e-06 | *** |
| ## as.factor(filed_county)Hubbard County | 0.001759 | ** |
| ## as.factor(filed_county)Isanti County | 0.325989 | |
| ## as.factor(filed_county)Itasca County | 0.011143 | * |
| ## as.factor(filed_county)Jackson County | 0.000336 | *** |
| ## as.factor(filed_county)Kanabec County | 0.158294 | |
| ## as.factor(filed_county)Kandiyohi County | 0.009556 | ** |
| ## as.factor(filed_county)Kittson County | 0.001911 | ** |
| ## as.factor(filed_county)Koochiching County | 0.101307 | |
| ## as.factor(filed_county)Lac qui Parle County | 0.003171 | ** |
| ## as.factor(filed_county)Lake County | 0.029721 | * |
| ## as.factor(filed_county)Lake of the Woods County | 0.042563 | * |
| ## as.factor(filed_county)Lincoln County | 0.006601 | ** |
| ## as.factor(filed_county)Lyon County | 0.218589 | |
| ## as.factor(filed_county)Marshall County | 0.063399 | . |
| ## as.factor(filed_county)Martin County | 0.016723 | * |
| ## as.factor(filed_county)McLeod County | 0.003687 | ** |
| ## as.factor(filed_county)Meeker County | 0.000175 | *** |
| ## as.factor(filed_county)Mille Lacs County | 9.25e-06 | *** |
| ## as.factor(filed_county>Morrison County | 0.118740 | |
| ## as.factor(filed_county>Mower County | 0.280482 | |
| ## as.factor(filed_county>Murray County | 4.47e-05 | *** |
| ## as.factor(filed_county>Nicollet County | 0.000353 | *** |
| ## as.factor(filed_county>Nobles County | 0.180557 | |
| ## as.factor(filed_county)Norman County | 0.012464 | * |
| ## as.factor(filed_county>Olmsted County | 0.002873 | ** |
| ## as.factor(filed_county>Otter Tail County | 2.35e-05 | *** |
| ## as.factor(filed_county>Pennington County | 0.693068 | |
| ## as.factor(filed_county>Pine County | 0.251333 | |
| ## as.factor(filed_county>Pipestone County | 6.53e-05 | *** |
| ## as.factor(filed_county>Polk County | 7.61e-05 | *** |
| ## as.factor(filed_county>Pope County | 0.001953 | ** |
| ## as.factor(filed_county>Ramsey County | 0.000105 | *** |
| ## as.factor(filed_county>Red Lake County | 0.422361 | |
| ## as.factor(filed_county>Redwood County | 0.000223 | *** |
| ## as.factor(filed_county>Renville County | 0.893237 | |
| ## as.factor(filed_county>Rice County | 0.000103 | *** |
| ## as.factor(filed_county>Rock County | 0.000175 | *** |
| ## as.factor(filed_county>Roseau County | 0.001285 | ** |
| ## as.factor(filed_county>Scott County | 9.72e-05 | *** |
| ## as.factor(filed_county>Sherburne County | 0.176539 | |
| ## as.factor(filed_county>Sibley County | 0.002004 | ** |
| ## as.factor(filed_county>St. Louis County | 0.008538 | ** |
| ## as.factor(filed_county>Stearns County | 0.058017 | . |
| ## as.factor(filed_county>Steele County | 0.001123 | ** |
| ## as.factor(filed_county>Stevens County | 0.010092 | * |
| ## as.factor(filed_county>Swift County | 0.061764 | . |

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## as.factor(filed_county)Todd County          0.000102 ***
## as.factor(filed_county)Traverse County       0.832472
## as.factor(filed_county)Wabasha County        0.001244 **
## as.factor(filed_county)Wadena County         0.001638 **
## as.factor(filed_county)Waseca County         0.236185
## as.factor(filed_county)Washington County     0.587221
## as.factor(filed_county)Watsonwan County      0.002118 **
## as.factor(filed_county)Wilkin County         0.002829 **
## as.factor(filed_county)Winona County         0.002226 **
## as.factor(filed_county)Wright County         < 2e-16 ***
## as.factor(filed_county)Yellow Medicine County 0.000195 ***
## as.factor(sentence_year)2011                 3.56e-09 ***
## as.factor(sentence_year)2012                 0.001074 **
## as.factor(sentence_year)2013                 < 2e-16 ***
## as.factor(sentence_year)2014                 < 2e-16 ***
## as.factor(sentence_year)2015                 < 2e-16 ***
## as.factor(sentence_year)2016                 1.60e-06 ***
## as.factor(sentence_year)2017                 < 2e-16 ***
##
## Diagnostic tests:
##
##              df1      df2 statistic  p-value
## Weak instruments      1 1161650      27.22 1.81e-07 ***
## Wu-Hausman           1 1161649      88.94 < 2e-16 ***
## Sargan                0      NA         NA      NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.942 on 1161650 degrees of freedom
## Multiple R-Squared: -2.734, Adjusted R-squared: -2.734
## Wald test: 312.5 on 106 and 1161650 DF, p-value: < 2.2e-16

monsanc.short$missiv <- seq_len(nrow(monsanc.short)) %in% na.action(iv.fe)

#FE OLS
fe.ols <- lm(total_ff_log~conf_days_log+
             black+hispanic+asian+nativeam+other.race+male+log(age)+
             priors+trial_flag+felony+gross.mis+
             drug+alcohol. DUI+hunt.fish+other.offense+
             as.factor(filed_county)+as.factor(sentence_year),
             data = monsanc.short[monsanc.short$missiv==F,])

summary(fe.ols)

##
## Call:
## lm(formula = total_ff_log ~ conf_days_log + black + hispanic +
##     asian + nativeam + other.race + male + log(age) + priors +
##     trial_flag + felony + gross.mis + drug + alcohol. dui + hunt.fish +

```

```
##      other.offense + as.factor(filed_county) + as.factor(sentence_year),
##      data = monsanc.short[monsanc.short$missiv == F, ])
##
## Residuals:
##      Min        1Q    Median        3Q        Max
## -6.6616 -0.3476  0.2425  0.8288  4.1441
##
## Coefficients:
##
##              Estimate Std. Error t value
## (Intercept)      5.7616491   0.0278698  206.735
## conf_days_log    -0.1247993   0.0007958 -156.818
## black            -0.2144492   0.0036150  -59.321
## hispanic          0.0660173   0.0050334   13.116
## asian             0.0369134   0.0075956    4.860
## nativeam         -0.2567965   0.0065972  -38.925
## other.race        -0.0502884   0.0098280   -5.117
## male              0.0539656   0.0029849   18.079
## log(age)          -0.0054805   0.0040461   -1.355
## priors            -0.0114530   0.0001583  -72.356
## trial_flagTRUE    -0.4042633   0.1275305   -3.170
## felony            -0.1994112   0.0058476  -34.101
## gross.mis         0.3706680   0.0052649   70.403
## drug              0.1072461   0.0083129   12.901
## alcohol.dui       0.5522091   0.0065408   84.425
## hunt.fish         -0.3387464   0.0150356  -22.530
## other.offense      0.1462203   0.0059048   24.763
## as.factor(filed_county)Anoka County    -0.8609282   0.0238791  -36.054
## as.factor(filed_county)Becker County     0.2822522   0.0278899   10.120
## as.factor(filed_county)Beltrami County  -0.1354596   0.0259095   -5.228
## as.factor(filed_county)Benton County    -0.3358171   0.0306971  -10.940
## as.factor(filed_county)Big Stone County -0.2490614   0.0594527   -4.189
## as.factor(filed_county)Blue Earth County -0.3457660   0.0255032  -13.558
## as.factor(filed_county)Brown County     -0.1980312   0.0322253   -6.145
## as.factor(filed_county)Carlton County   -0.1589966   0.0278672   -5.706
## as.factor(filed_county)Carver County    -0.2915133   0.0265299  -10.988
## as.factor(filed_county)Cass County      -0.4660209   0.0291159  -16.006
## as.factor(filed_county)Chippewa County  -0.1534431   0.0385106   -3.984
## as.factor(filed_county)Chisago County   -0.6034228   0.0277901  -21.714
## as.factor(filed_county)Clay County      -0.0990147   0.0257837   -3.840
## as.factor(filed_county)Clearwater County -0.1970712   0.0451593   -4.364
## as.factor(filed_county)Cook County      -0.4865666   0.0721738   -6.742
## as.factor(filed_county)Cottonwood County -0.2355325   0.0411065   -5.730
## as.factor(filed_county)Crow Wing County -0.2216637   0.0259388   -8.546
## as.factor(filed_county)Dakota County    -0.4310998   0.0236783  -18.207
## as.factor(filed_county)Dodge County     -0.9470314   0.0365744  -25.893
## as.factor(filed_county)Douglas County   -0.0304198   0.0295164   -1.031
## as.factor(filed_county)Faribault County -0.1096124   0.0376961   -2.908
## as.factor(filed_county)Fillmore County  -0.2775685   0.0362639   -7.654
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|--|------------|-----------|---------|
| ## as.factor(filed_county)Freeborn County | -0.4264765 | 0.0295478 | -14.433 |
| ## as.factor(filed_county)Goodhue County | -0.7481899 | 0.0260618 | -28.708 |
| ## as.factor(filed_county)Hennepin County | -0.9971450 | 0.0233305 | -42.740 |
| ## as.factor(filed_county)Houston County | -0.4914996 | 0.0342363 | -14.356 |
| ## as.factor(filed_county)Hubbard County | -0.2781436 | 0.0321888 | -8.641 |
| ## as.factor(filed_county)Isanti County | -0.4756653 | 0.0301047 | -15.800 |
| ## as.factor(filed_county)Itasca County | -0.1445951 | 0.0270748 | -5.341 |
| ## as.factor(filed_county)Jackson County | -0.2366963 | 0.0434035 | -5.453 |
| ## as.factor(filed_county)Kanabec County | -0.3610117 | 0.0339762 | -10.625 |
| ## as.factor(filed_county)Kandiyohi County | -0.2424261 | 0.0276115 | -8.780 |
| ## as.factor(filed_county)Kittson County | -0.1495014 | 0.0765378 | -1.953 |
| ## as.factor(filed_county)Koochiching County | -0.8081407 | 0.0384698 | -21.007 |
| ## as.factor(filed_county)Lac qui Parle County | -0.2754092 | 0.0567218 | -4.855 |
| ## as.factor(filed_county)Lake County | -0.3934892 | 0.0422844 | -9.306 |
| ## as.factor(filed_county)Lake of the Woods County | -0.5287550 | 0.0491862 | -10.750 |
| ## as.factor(filed_county)Lincoln County | -0.0872699 | 0.0652877 | -1.337 |
| ## as.factor(filed_county)Lyon County | -0.0974141 | 0.0303769 | -3.207 |
| ## as.factor(filed_county)Marshall County | -0.1922795 | 0.0481705 | -3.992 |
| ## as.factor(filed_county)Martin County | -0.4047827 | 0.0323157 | -12.526 |
| ## as.factor(filed_county)McLeod County | -0.6929038 | 0.0290857 | -23.823 |
| ## as.factor(filed_county)Meeker County | -0.1092153 | 0.0371402 | -2.941 |
| ## as.factor(filed_county)Mille Lacs County | 0.0827467 | 0.0287549 | 2.878 |
| ## as.factor(filed_county)Morrison County | -0.1778919 | 0.0304080 | -5.850 |
| ## as.factor(filed_county)Mower County | -0.3514641 | 0.0280225 | -12.542 |
| ## as.factor(filed_county)Murray County | -0.1127167 | 0.0545788 | -2.065 |
| ## as.factor(filed_county>Nicollet County | -0.3101682 | 0.0299213 | -10.366 |
| ## as.factor(filed_county>Nobles County | -0.1635677 | 0.0322321 | -5.075 |
| ## as.factor(filed_county)Norman County | -0.1806187 | 0.0509034 | -3.548 |
| ## as.factor(filed_county>Olmsted County | -0.7909020 | 0.0246475 | -32.089 |
| ## as.factor(filed_county>Otter Tail County | 0.0182858 | 0.0275658 | 0.663 |
| ## as.factor(filed_county>Pennington County | -0.4433768 | 0.0355033 | -12.488 |
| ## as.factor(filed_county>Pine County | -0.5121073 | 0.0297034 | -17.241 |
| ## as.factor(filed_county>Pipestone County | -0.2679500 | 0.0488369 | -5.487 |
| ## as.factor(filed_county>Polk County | -0.1211215 | 0.0285327 | -4.245 |
| ## as.factor(filed_county>Pope County | -0.3141200 | 0.0421316 | -7.456 |
| ## as.factor(filed_county>Ramsey County | -0.1201320 | 0.0234999 | -5.112 |
| ## as.factor(filed_county>Red Lake County | -0.7251048 | 0.0539429 | -13.442 |
| ## as.factor(filed_county>Redwood County | -0.0123347 | 0.0325937 | -0.378 |
| ## as.factor(filed_county>Renville County | -0.8674994 | 0.0338939 | -25.595 |
| ## as.factor(filed_county>Rice County | -0.0800708 | 0.0271509 | -2.949 |
| ## as.factor(filed_county>Rock County | -0.2722541 | 0.0531042 | -5.127 |
| ## as.factor(filed_county>Roseau County | -0.2045811 | 0.0330229 | -6.195 |
| ## as.factor(filed_county>Scott County | -0.3650047 | 0.0243854 | -14.968 |
| ## as.factor(filed_county>Sherburne County | -0.3760487 | 0.0261802 | -14.364 |
| ## as.factor(filed_county>Sibley County | -0.7708698 | 0.0368470 | -20.921 |
| ## as.factor(filed_county>St. Louis County | -0.3187129 | 0.0240329 | -13.262 |
| ## as.factor(filed_county>Stearns County | -0.1162752 | 0.0242674 | -4.791 |
| ## as.factor(filed_county>Steele County | -0.1502082 | 0.0283384 | -5.301 |

| | | | |
|--|--------------|-----------|---------|
| ## as.factor(filed_county)Stevens County | -0.4509576 | 0.0496258 | -9.087 |
| ## as.factor(filed_county)Swift County | -0.1998544 | 0.0418714 | -4.773 |
| ## as.factor(filed_county)Todd County | -0.0171784 | 0.0342446 | -0.502 |
| ## as.factor(filed_county)Traverse County | -0.7461149 | 0.0713619 | -10.455 |
| ## as.factor(filed_county)Wabasha County | -0.7598313 | 0.0320234 | -23.727 |
| ## as.factor(filed_county)Wadena County | -0.0959887 | 0.0348305 | -2.756 |
| ## as.factor(filed_county)Waseca County | -0.5446209 | 0.0357987 | -15.213 |
| ## as.factor(filed_county)Washington County | -0.2906868 | 0.0241871 | -12.018 |
| ## as.factor(filed_county)Watonwan County | -0.1306793 | 0.0383454 | -3.408 |
| ## as.factor(filed_county)Wilkin County | -0.3434184 | 0.0430845 | -7.971 |
| ## as.factor(filed_county)Winona County | -0.5338566 | 0.0274915 | -19.419 |
| ## as.factor(filed_county)Wright County | -0.6622637 | 0.0256065 | -25.863 |
| ## as.factor(filed_county)Yellow Medicine County | -0.1005913 | 0.0388554 | -2.589 |
| ## as.factor(sentence_year)2011 | 0.0357735 | 0.0045951 | 7.785 |
| ## as.factor(sentence_year)2012 | 0.0226554 | 0.0045475 | 4.982 |
| ## as.factor(sentence_year)2013 | 0.0908256 | 0.0048445 | 18.748 |
| ## as.factor(sentence_year)2014 | 0.1251020 | 0.0046485 | 26.912 |
| ## as.factor(sentence_year)2015 | 0.1689004 | 0.0047406 | 35.628 |
| ## as.factor(sentence_year)2016 | 0.2492265 | 0.0063563 | 39.209 |
| ## as.factor(sentence_year)2017 | 0.4386338 | 0.0113352 | 38.697 |
| ## | Pr(> t) | | |
| ## (Intercept) | < 2e-16 *** | | |
| ## conf_days_log | < 2e-16 *** | | |
| ## black | < 2e-16 *** | | |
| ## hispanic | < 2e-16 *** | | |
| ## asian | 1.18e-06 *** | | |
| ## nativeam | < 2e-16 *** | | |
| ## other.race | 3.11e-07 *** | | |
| ## male | < 2e-16 *** | | |
| ## log(age) | 0.175574 | | |
| ## priors | < 2e-16 *** | | |
| ## trial_flagTRUE | 0.001525 ** | | |
| ## felony | < 2e-16 *** | | |
| ## gross.mis | < 2e-16 *** | | |
| ## drug | < 2e-16 *** | | |
| ## alcohol.dui | < 2e-16 *** | | |
| ## hunt.fish | < 2e-16 *** | | |
| ## other.offense | < 2e-16 *** | | |
| ## as.factor(filed_county)Anoka County | < 2e-16 *** | | |
| ## as.factor(filed_county)Becker County | < 2e-16 *** | | |
| ## as.factor(filed_county)Beltrami County | 1.71e-07 *** | | |
| ## as.factor(filed_county)Benton County | < 2e-16 *** | | |
| ## as.factor(filed_county)Big Stone County | 2.80e-05 *** | | |
| ## as.factor(filed_county)Blue Earth County | < 2e-16 *** | | |
| ## as.factor(filed_county)Brown County | 7.99e-10 *** | | |
| ## as.factor(filed_county)Carlton County | 1.16e-08 *** | | |
| ## as.factor(filed_county)Carver County | < 2e-16 *** | | |
| ## as.factor(filed_county)Cass County | < 2e-16 *** | | |

| | |
|--|--------------|
| ## as.factor(filed_county)Chippewa County | 6.76e-05 *** |
| ## as.factor(filed_county)Chisago County | < 2e-16 *** |
| ## as.factor(filed_county)Clay County | 0.000123 *** |
| ## as.factor(filed_county)Clearwater County | 1.28e-05 *** |
| ## as.factor(filed_county)Cook County | 1.57e-11 *** |
| ## as.factor(filed_county)Cottonwood County | 1.01e-08 *** |
| ## as.factor(filed_county)Crow Wing County | < 2e-16 *** |
| ## as.factor(filed_county)Dakota County | < 2e-16 *** |
| ## as.factor(filed_county)Dodge County | < 2e-16 *** |
| ## as.factor(filed_county)Douglas County | 0.302726 |
| ## as.factor(filed_county)Faribault County | 0.003640 ** |
| ## as.factor(filed_county)Fillmore County | 1.95e-14 *** |
| ## as.factor(filed_county)Freeborn County | < 2e-16 *** |
| ## as.factor(filed_county)Goodhue County | < 2e-16 *** |
| ## as.factor(filed_county)Hennepin County | < 2e-16 *** |
| ## as.factor(filed_county)Houston County | < 2e-16 *** |
| ## as.factor(filed_county)Hubbard County | < 2e-16 *** |
| ## as.factor(filed_county)Isanti County | < 2e-16 *** |
| ## as.factor(filed_county)Itasca County | 9.27e-08 *** |
| ## as.factor(filed_county)Jackson County | 4.94e-08 *** |
| ## as.factor(filed_county)Kanabec County | < 2e-16 *** |
| ## as.factor(filed_county)Kandiyohi County | < 2e-16 *** |
| ## as.factor(filed_county)Kittson County | 0.050784 . |
| ## as.factor(filed_county)Koochiching County | < 2e-16 *** |
| ## as.factor(filed_county)Lac qui Parle County | 1.20e-06 *** |
| ## as.factor(filed_county)Lake County | < 2e-16 *** |
| ## as.factor(filed_county)Lake of the Woods County | < 2e-16 *** |
| ## as.factor(filed_county)Lincoln County | 0.181322 |
| ## as.factor(filed_county)Lyon County | 0.001342 ** |
| ## as.factor(filed_county)Marshall County | 6.56e-05 *** |
| ## as.factor(filed_county)Martin County | < 2e-16 *** |
| ## as.factor(filed_county)McLeod County | < 2e-16 *** |
| ## as.factor(filed_county)Meeker County | 0.003276 ** |
| ## as.factor(filed_county)Mille Lacs County | 0.004006 ** |
| ## as.factor(filed_county)Morrison County | 4.91e-09 *** |
| ## as.factor(filed_county)Mower County | < 2e-16 *** |
| ## as.factor(filed_county)Murray County | 0.038903 * |
| ## as.factor(filed_county)Nicollet County | < 2e-16 *** |
| ## as.factor(filed_county)Nobles County | 3.88e-07 *** |
| ## as.factor(filed_county)Norman County | 0.000388 *** |
| ## as.factor(filed_county)Olmsted County | < 2e-16 *** |
| ## as.factor(filed_county)Otter Tail County | 0.507105 |
| ## as.factor(filed_county)Pennington County | < 2e-16 *** |
| ## as.factor(filed_county)Pine County | < 2e-16 *** |
| ## as.factor(filed_county)Pipestone County | 4.10e-08 *** |
| ## as.factor(filed_county)Polk County | 2.19e-05 *** |
| ## as.factor(filed_county)Pope County | 8.95e-14 *** |
| ## as.factor(filed_county)Ramsey County | 3.19e-07 *** |


```
## as.factor(filed_county)Red Lake County          < 2e-16 ***
## as.factor(filed_county)Redwood County           0.705106
## as.factor(filed_county)Renville County          < 2e-16 ***
## as.factor(filed_county)Rice County              0.003187 **
## as.factor(filed_county)Rock County              2.95e-07 ***
## as.factor(filed_county)Roseau County            5.83e-10 ***
## as.factor(filed_county)Scott County             < 2e-16 ***
## as.factor(filed_county)Sherburne County         < 2e-16 ***
## as.factor(filed_county)Sibley County            < 2e-16 ***
## as.factor(filed_county)St. Louis County         < 2e-16 ***
## as.factor(filed_county)Stearns County           1.66e-06 ***
## as.factor(filed_county)Steele County            1.16e-07 ***
## as.factor(filed_county)Stevens County           < 2e-16 ***
## as.factor(filed_county)Swift County             1.81e-06 ***
## as.factor(filed_county)Todd County              0.615921
## as.factor(filed_county)Traverse County          < 2e-16 ***
## as.factor(filed_county)Wabasha County           < 2e-16 ***
## as.factor(filed_county)Wadena County            0.005854 **
## as.factor(filed_county)Waseca County            < 2e-16 ***
## as.factor(filed_county)Washington County        < 2e-16 ***
## as.factor(filed_county)Watsonwan County         0.000655 ***
## as.factor(filed_county)Wilkin County            1.58e-15 ***
## as.factor(filed_county)Winona County            < 2e-16 ***
## as.factor(filed_county)Wright County            < 2e-16 ***
## as.factor(filed_county)Yellow Medicine County   0.009629 **
## as.factor(sentence_year)2011                   6.97e-15 ***
## as.factor(sentence_year)2012                   6.30e-07 ***
## as.factor(sentence_year)2013                   < 2e-16 ***
## as.factor(sentence_year)2014                   < 2e-16 ***
## as.factor(sentence_year)2015                   < 2e-16 ***
## as.factor(sentence_year)2016                   < 2e-16 ***
## as.factor(sentence_year)2017                   < 2e-16 ***
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 1.424 on 1161650 degrees of freedom
## Multiple R-squared:  0.1249, Adjusted R-squared:  0.1249
## F-statistic: 1565 on 106 and 1161650 DF, p-value: < 2.2e-16
```

```
#IV F test
```

```
# First Stage
```

```
first_stage <- lm(conf_days_log~cap_ratio+black+hispanic+asian+nativeam+other.race+male+log(age)
  priors+trial_flag+felony+gross.mis+
  drug+alcohol.dui+hunt.fish+other.offense+
  as.factor(filed_county)+as.factor(sentence_year),
  data=monsanc.short[monsanc.short$missiv==F,])
```

```
waldtest(first_stage, .~-cap_ratio)
```

```

## Wald test
##
## Model 1: conf_days_log ~ cap_ratio + black + hispanic + asian + nativeam +
##   other.race + male + log(age) + priors + trial_flag + felony +
##   gross.mis + drug + alcohol. DUI + hunt.fish + other.offense +
##   as.factor(filed_county) + as.factor(sentence_year)
## Model 2: conf_days_log ~ black + hispanic + asian + nativeam + other.race +
##   male + log(age) + priors + trial_flag + felony + gross.mis +
##   drug + alcohol. DUI + hunt.fish + other.offense + as.factor(filed_county) +
##   as.factor(sentence_year)
##   Res.Df Df      F    Pr(>F)
## 1 1161650
## 2 1161651 -1 27.222 1.814e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```