Technical Appendix

CK

22/11/2018

```
# Import ATUS Summary file
ATUS.SUM <- import('atussum_0317.csv', setclass = "tibble")
# Import ATUS CPS File
ATUS.CPS <- import('atuscps_0317.csv', setclass = "tibble")
# Import ATUS Respondant file
ATUS.RES <- import('atusresp_0317.csv', setclass = "tibble")
# Create a diary date column
Diary.Date <- select(ATUS.RES, TUCASEID, TUDIARYDATE)
ATUS.SUM <- left_join(ATUS.SUM, Diary.Date, by = 'TUCASEID')
ATUS.SUM$TUDIARYDATE <- format(as.Date(as.character(ATUS.SUM$TUDIARYDATE), "%Y%m%d"), "%Y%m")
# Add months as a column as a derivative of the TUCASEID variable
ATUS.SUM$month <- as.numeric(substr(ATUS.SUM$TUCASEID, 5, 6))
# Filter CPS down to just relevant variables. GEDSTFIPS is state, GEDIV is division and GEREG is region
ATUS.CPS.States <- select(ATUS.CPS, TUCASEID, GESTFIPS, GEDIV, GEREG)
# Create variables to be added to a data frame with relevant gender activities
Working <- ATUS.SUM[, grep("^t05", names(ATUS.SUM))]
House.Maintenance <- ATUS.SUM[, grep("^t0204", names(ATUS.SUM))]
Vehicle.Maintenance <- ATUS.SUM[, grep("^t0207", names(ATUS.SUM))]
Housework <- ATUS.SUM[, grep("^t0201", names(ATUS.SUM))]
Food.Prep <- ATUS.SUM[, grep("^t0202", names(ATUS.SUM))] + ATUS.SUM$t070101 + ATUS.SUM$t070103
Childcare <- ATUS.SUM[, grep("^t03", names(ATUS.SUM))]
```

```
# Create a data frame from relevant variables within ATUS Summary
# Childnum there for future use
Gender.Roles.Data <- select(ATUS.SUM, TUCASEID, TESEX, TEAGE, TUFNWGTP, TUYEAR, TRCHILDNUM, month, TUDI
# Join this dataset with the CPS states info by unique id number of particiapnt
# Add in relevant categories
Gender.Roles.Data$Working <- rowSums(Working)
Gender.Roles.Data$House.Maintenance <- rowSums(House.Maintenance)
Gender.Roles.Data$Vehicle.Maintenance <- rowSums(Vehicle.Maintenance)
Gender.Roles.Data$Housework <- rowSums(Housework)
Gender.Roles.Data$Food.Prep <- rowSums(Food.Prep)
Gender.Roles.Data$Childcare <- rowSums(select(Childcare, t030101:t030399))
# Join this dataset with the CPS states info by unique id number of particiapnt
Gender.Roles.Data <- left_join(Gender.Roles.Data, ATUS.CPS.States, by = 'TUCASEID')
Gender.Roles.Data <- filter(Gender.Roles.Data)
Gender.Roles.Data$TESEX[Gender.Roles.Data$TESEX == 1] <- "M"
Gender.Roles.Data$TESEX[Gender.Roles.Data$TESEX == 2] <- "F"
```

```
for (variable in c("Working", "House.Maintenance", "Vehicle.Maintenance", "Housework", "Food.Prep", "Ch
    Gender.Roles.Data[,paste0('weighted.', variable)] <- 0
    for (sex in c("M", "F")) {
        for (year in unique(Gender.Roles.Data$TUYEAR)) {
            for (month in unique(Gender.Roles.Data$month)) {
                Filtered.Data <- filter(Gender.Roles.Data, TESEX == sex, TUYEAR == year, month == month
                bottom.sum <- sum(Filtered.Data$TUFNWGTP)
                top.sum <- sum(Filtered.Data$TUFNWGTP * Filtered.Data[,variable])
                weighted.values <- top.sum / bottom.sum
```

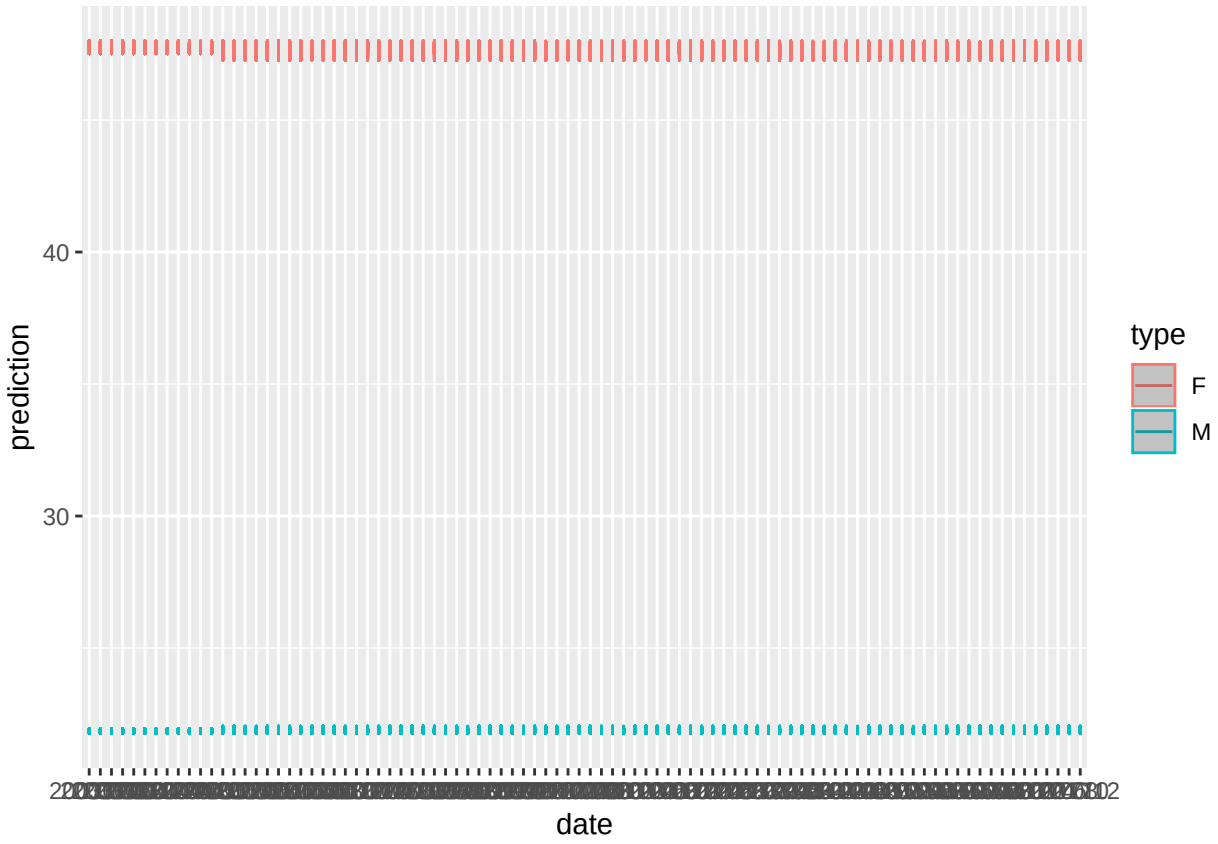
```
                Gender.Roles.Data[Gender.Roles.Data$TESEX == sex & Gender.Roles.Data$TUYEAR == year & G
            }
        }
    }
}
Gender.Roles.Train <- filter(Gender.Roles.Data, month %% 2 == 0)
Gender.Roles.Validate <- filter(Gender.Roles.Data, month %% 2 != 0)
```

```
# Start building models for the data
n <- nrow(Gender.Roles.Train)
model1 <- glm(weighted.Childcare ~ ns(TUDIARYDATE), data = Gender.Roles.Train, family = quasi(link = "l
model2 <- update(model1, . ~ . + TESEX)
model3 <- update(model1, . ~ -1 + TESEX + TESEX:ns(TEAGE, knots = 20*(1:4)))
# Use same method as in lab 5 to plot them
male.prediction.childcare <- predict.glm(model3, newdata = filter(Gender.Roles.Train, TESEX == 'M'), se

female.prediction.childcare <- predict.glm(model3, newdata = filter(Gender.Roles.Train, TESEX == 'F'), s

df <- data.frame(age = c(filter(Gender.Roles.Train, TESEX == 'M')$TEAGE, filter(Gender.Roles.Train, TES
                 prediction = c(male.prediction.childcare$fit, female.prediction.childcare$fit),
                 date = c(filter(Gender.Roles.Train, TESEX == 'M')$TUDIARYDATE, filter(Gender.Roles.Tra
                 prediction_error = c(1.96*male.prediction.childcare$se.fit, 1.96*female.prediction.chi
                 type = c(filter(Gender.Roles.Train, TESEX == 'M')$TESEX, filter(Gender.Roles.Train, TE

model3_plot <- ggplot(df, aes(x=date, y=prediction, colour=type))  + geom_line() +
  geom_ribbon(aes(ymin = prediction - prediction_error, ymax = prediction + prediction_error), alpha = 
model3_plot
```


prediction
40
30
date
type
F
M