Regressions Part 1

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```
### PREFERRED MODELS

#glm5c

#glm6b
```

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 3.4.3
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(sampleSelection)
```

```
## Warning: package 'sampleSelection' was built under R version 3.4.4
```

```
## Loading required package: maxLik
```

```
## Warning: package 'maxLik' was built under R version 3.4.4
```

```
## Loading required package: miscTools
```

```
## Warning: package 'miscTools' was built under R version 3.4.4
```

```
##
## Please cite the 'maxLik' package as:
## Henningsen, Arne and Toomet, Ott (2011). maxLik: A package for maximum likelihood estimation in R. C
##
## If you have questions, suggestions, or comments regarding the 'maxLik' package, please use a forum o
## https://r-forge.r-project.org/projects/maxlik/
```

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 3.4.3
```

```
library(plm)
```

```
## Warning: package 'plm' was built under R version 3.4.4
```

```
## Loading required package: Formula
```

```
##
## Attaching package: 'plm'
```

```
## The following objects are masked from 'package:dplyr':
##
```

```
##     between, lag, lead
```

```
library(tidyr)
```

```
## Warning: package 'tidyr' was built under R version 3.4.3
```

```
rm(list=ls())
```

```
#load data
clean <- read.csv("C:/Users/cheno/Desktop/IFLS_all/DATA/R datasets/clean_4_10.csv")

clean$employed <- ifelse(as.numeric(clean$employed) == 1, 1, 0)
clean$jl <- ifelse(clean$jl_year == "0", "0", "1")
clean$age_sq <- (clean$age)^2
clean$age_sq_H <- (clean$age_H)^2
clean$jl_year <- as.factor(clean$jl_year)
clean$sc_code <- as.factor(clean$sc_code)
clean$wave <- as.factor(clean$wave)


#subset to variables of interest
r1 <- clean %>%
            select(employed, employed_H, jl, age, age_H, age_sq, age_sq_H, dl06, dl06_H, dependents, wo
```

```
#first regression

glm1a <- glm(employed ~ . , family = binomial, data = r1)
summary(glm1a)
```

```
##
## Call:
## glm(formula = employed ~ ., family = binomial, data = r1)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.1850  -0.9238   0.4705   0.8423   3.3206
##
## Coefficients:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)            -3.626e+00  2.810e-01 -12.902  < 2e-16 ***
## employed_H2:Unemployed -1.329e-01  8.998e-02  -1.477 0.139736
## jl1                     1.009e-01  9.160e-02   1.102 0.270536
## age                     2.021e-01  1.715e-02  11.782  < 2e-16 ***
## age_H                   2.592e-02  1.688e-02   1.535 0.124680
## age_sq                 -2.338e-03  1.957e-04 -11.944  < 2e-16 ***
## age_sq_H               -2.683e-04  1.721e-04  -1.559 0.119051
## dl062:elementary       -3.509e-01  1.053e-01  -3.334 0.000857 ***
## dl063:juniorH          -4.128e-01  1.162e-01  -3.552 0.000382 ***
## dl064:seniorH          -4.469e-01  1.201e-01  -3.721 0.000199 ***
## dl065:higher            6.112e-01  1.421e-01   4.300 1.71e-05 ***
## dl06_H2:elementary     -1.921e-01  1.262e-01  -1.522 0.127909
## dl06_H3:juniorH        -4.052e-01  1.356e-01  -2.989 0.002802 **
## dl06_H4:seniorH        -4.071e-01  1.355e-01  -3.005 0.002655 **
## dl06_H5:higher         -4.727e-01  1.493e-01  -3.166 0.001544 **
## dependents             -1.578e-01  2.278e-02  -6.928 4.28e-12 ***
## working_dependents      9.423e-01  2.676e-01   3.521 0.000430 ***
```

```
## other_HHM              -4.533e-01  1.342e-02 -33.788  < 2e-16 ***
## other_working           1.008e+00  2.489e-02  40.513  < 2e-16 ***
## sc_code13              -1.568e-01  1.269e-01  -1.236 0.216344
## sc_code14              -1.034e+00  2.662e-01  -3.882 0.000104 ***
## sc_code15              -1.102e+01  1.358e+02  -0.081 0.935321
## sc_code16              -2.557e-01  1.213e-01  -2.108 0.034992 *
## sc_code18              -4.657e-01  1.218e-01  -3.823 0.000132 ***
## sc_code19              -9.739e-01  2.691e-01  -3.620 0.000295 ***
## sc_code21              -7.796e-01  7.528e-01  -1.036 0.300381
## sc_code31              -7.592e-01  1.164e-01  -6.521 6.96e-11 ***
## sc_code32              -7.565e-01  9.793e-02  -7.725 1.12e-14 ***
## sc_code33              -1.080e-01  1.018e-01  -1.060 0.288956
## sc_code34               5.619e-02  1.219e-01   0.461 0.644922
## sc_code35              -2.841e-01  9.830e-02  -2.890 0.003850 **
## sc_code36              -7.477e-01  1.329e-01  -5.625 1.85e-08 ***
## sc_code51               3.201e-01  1.261e-01   2.539 0.011118 *
## sc_code52              -5.161e-02  1.162e-01  -0.444 0.656973
## sc_code62              -2.406e-01  5.846e-01  -0.411 0.680713
## sc_code63              -2.132e-01  1.219e-01  -1.749 0.080273 .
## sc_code64              -4.233e-01  4.356e-01  -0.972 0.331151
## sc_code73              -6.863e-01  1.226e-01  -5.598 2.16e-08 ***
## sc_code76              -9.538e-01  4.517e-01  -2.112 0.034724 *
## wave5                   6.978e-02  4.327e-02   1.613 0.106801
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18393  on 13853  degrees of freedom
## Residual deviance: 14656  on 13814  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14736
##
## Number of Fisher Scoring iterations: 10
```

```
glm1b <- glm(employed ~ . - age_H - age_sq_H, family = binomial, data = r1)
summary(glm1b)
```

```
##
## Call:
## glm(formula = employed ~ . - age_H - age_sq_H, family = binomial,
##     data = r1)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.1833  -0.9258   0.4713   0.8429   3.3040
##
## Coefficients:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -3.470e+00  2.612e-01 -13.285  < 2e-16 ***
## employed_H2:Unemployed -1.509e-01  8.843e-02  -1.706 0.087921 .
## jl1                       9.802e-02  9.149e-02   1.071 0.283991
## age                       2.226e-01  1.066e-02  20.875  < 2e-16 ***
## age_sq                   -2.571e-03  1.265e-04 -20.327  < 2e-16 ***
## dl062:elementary         -3.462e-01  1.051e-01  -3.294 0.000987 ***
```

```
## dl063:juniorH          -4.064e-01  1.159e-01  -3.505 0.000456 ***
## dl064:seniorH          -4.471e-01  1.196e-01  -3.738 0.000185 ***
## dl065:higher            6.062e-01  1.410e-01   4.299 1.71e-05 ***
## dl06_H2:elementary     -1.900e-01  1.261e-01  -1.506 0.132028
## dl06_H3:juniorH        -4.034e-01  1.354e-01  -2.979 0.002891 **
## dl06_H4:seniorH        -4.017e-01  1.353e-01  -2.968 0.002996 **
## dl06_H5:higher         -4.629e-01  1.491e-01  -3.104 0.001909 **
## dependents             -1.559e-01  2.273e-02  -6.856 7.06e-12 ***
## working_dependents      9.441e-01  2.676e-01   3.528 0.000419 ***
## other_HHM              -4.526e-01  1.338e-02 -33.819  < 2e-16 ***
## other_working           1.007e+00  2.488e-02  40.495  < 2e-16 ***
## sc_code13              -1.515e-01  1.267e-01  -1.196 0.231694
## sc_code14              -1.035e+00  2.662e-01  -3.886 0.000102 ***
## sc_code15              -1.109e+01  1.367e+02  -0.081 0.935339
## sc_code16              -2.544e-01  1.212e-01  -2.099 0.035813 *
## sc_code18              -4.648e-01  1.217e-01  -3.819 0.000134 ***
## sc_code19              -9.773e-01  2.690e-01  -3.633 0.000280 ***
## sc_code21              -7.749e-01  7.511e-01  -1.032 0.302261
## sc_code31              -7.548e-01  1.164e-01  -6.487 8.73e-11 ***
## sc_code32              -7.546e-01  9.781e-02  -7.715 1.21e-14 ***
## sc_code33              -1.061e-01  1.016e-01  -1.043 0.296731
## sc_code34               5.852e-02  1.218e-01   0.480 0.630934
## sc_code35              -2.809e-01  9.805e-02  -2.864 0.004178 **
## sc_code36              -7.463e-01  1.328e-01  -5.618 1.93e-08 ***
## sc_code51               3.203e-01  1.261e-01   2.541 0.011053 *
## sc_code52              -5.311e-02  1.161e-01  -0.457 0.647431
## sc_code62              -2.298e-01  5.851e-01  -0.393 0.694461
## sc_code63              -2.112e-01  1.217e-01  -1.735 0.082665 .
## sc_code64              -4.319e-01  4.359e-01  -0.991 0.321757
## sc_code73              -6.849e-01  1.225e-01  -5.590 2.27e-08 ***
## sc_code76              -9.559e-01  4.509e-01  -2.120 0.034021 *
## wave5                   7.190e-02  4.321e-02   1.664 0.096157 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18393  on 13853  degrees of freedom
## Residual deviance: 14658  on 13816  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14734
##
## Number of Fisher Scoring iterations: 10
```

```
#subset to variables of interest - use jl_year rather than jl
r2 <- clean %>%
            select(employed, employed_H, jl_year, age, age_H, age_sq, age_sq_H, dl06, dl06_H, dependents

glm2a <- glm(employed ~ . , family = binomial, data = r2)
summary(glm2a)
```

```
##
## Call:
## glm(formula = employed ~ ., family = binomial, data = r2)
##
```

```
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.1856  -0.9239   0.4706   0.8418   3.3214
##
## Coefficients:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -3.621e+00  2.811e-01 -12.880  < 2e-16 ***
## employed_H2:Unemployed -1.341e-01  9.001e-02  -1.490 0.136153
## jl_year1                 7.406e-02  1.597e-01   0.464 0.642823
## jl_year2                 2.217e-01  1.782e-01   1.244 0.213399
## jl_year3                -5.635e-02  2.123e-01  -0.265 0.790657
## jl_year4                 3.565e-01  2.259e-01   1.579 0.114440
## jl_year5                -2.378e-01  2.729e-01  -0.871 0.383652
## age                      2.026e-01  1.716e-02  11.805  < 2e-16 ***
## age_H                    2.530e-02  1.689e-02   1.498 0.134059
## age_sq                  -2.343e-03  1.958e-04 -11.965  < 2e-16 ***
## age_sq_H                -2.624e-04  1.722e-04  -1.524 0.127614
## dl062:elementary        -3.514e-01  1.053e-01  -3.338 0.000844 ***
## dl063:juniorH           -4.117e-01  1.163e-01  -3.541 0.000398 ***
## dl064:seniorH           -4.465e-01  1.202e-01  -3.716 0.000202 ***
## dl065:higher             6.120e-01  1.422e-01   4.304 1.68e-05 ***
## dl06_H2:elementary      -1.916e-01  1.262e-01  -1.518 0.128963
## dl06_H3:juniorH         -4.062e-01  1.356e-01  -2.996 0.002738 **
## dl06_H4:seniorH         -4.060e-01  1.355e-01  -2.997 0.002730 **
## dl06_H5:higher          -4.722e-01  1.493e-01  -3.163 0.001563 **
## dependents              -1.576e-01  2.279e-02  -6.915 4.68e-12 ***
## working_dependents       9.422e-01  2.677e-01   3.520 0.000432 ***
## other_HHM               -4.536e-01  1.342e-02 -33.797  < 2e-16 ***
## other_working            1.009e+00  2.490e-02  40.525  < 2e-16 ***
## sc_code13               -1.607e-01  1.269e-01  -1.266 0.205488
## sc_code14               -1.036e+00  2.663e-01  -3.889 0.000101 ***
## sc_code15               -1.102e+01  1.358e+02  -0.081 0.935305
## sc_code16               -2.587e-01  1.214e-01  -2.131 0.033052 *
## sc_code18               -4.698e-01  1.219e-01  -3.855 0.000116 ***
## sc_code19               -9.739e-01  2.697e-01  -3.612 0.000304 ***
## sc_code21               -7.798e-01  7.534e-01  -1.035 0.300675
## sc_code31               -7.647e-01  1.165e-01  -6.562 5.33e-11 ***
## sc_code32               -7.582e-01  9.798e-02  -7.738 1.01e-14 ***
## sc_code33               -1.113e-01  1.019e-01  -1.092 0.274958
## sc_code34                5.401e-02  1.220e-01   0.443 0.657917
## sc_code35               -2.854e-01  9.835e-02  -2.902 0.003702 **
## sc_code36               -7.494e-01  1.330e-01  -5.635 1.75e-08 ***
## sc_code51                3.178e-01  1.261e-01   2.520 0.011751 *
## sc_code52               -5.238e-02  1.162e-01  -0.451 0.652265
## sc_code62               -2.239e-01  5.831e-01  -0.384 0.700943
## sc_code63               -2.149e-01  1.219e-01  -1.763 0.077928 .
## sc_code64               -4.370e-01  4.367e-01  -1.001 0.317014
## sc_code73               -6.881e-01  1.226e-01  -5.610 2.02e-08 ***
## sc_code76               -9.546e-01  4.518e-01  -2.113 0.034630 *
## wave5                    6.988e-02  4.328e-02   1.614 0.106432
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
```

```
##
##     Null deviance: 18393  on 13853  degrees of freedom
## Residual deviance: 14652  on 13810  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14740
##
## Number of Fisher Scoring iterations: 10
```

```
glm2b <- glm(employed ~ . - age_H - age_sq_H, family = binomial, data = r2)
summary(glm2b)
```

```
##
## Call:
## glm(formula = employed ~ . - age_H - age_sq_H, family = binomial,
##     data = r2)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.1839  -0.9251   0.4715   0.8424   3.3053
##
## Coefficients:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -3.468e+00  2.613e-01 -13.276  < 2e-16 ***
## employed_H2:Unemployed -1.519e-01  8.846e-02  -1.717 0.085894 .
## jl_year1                 7.343e-02  1.597e-01   0.460 0.645760
## jl_year2                 2.176e-01  1.781e-01   1.222 0.221652
## jl_year3                -6.353e-02  2.121e-01  -0.300 0.764529
## jl_year4                 3.590e-01  2.259e-01   1.589 0.111996
## jl_year5                -2.449e-01  2.729e-01  -0.897 0.369686
## age                      2.226e-01  1.067e-02  20.869  < 2e-16 ***
## age_sq                  -2.571e-03  1.265e-04 -20.323  < 2e-16 ***
## dl062:elementary        -3.468e-01  1.051e-01  -3.300 0.000968 ***
## dl063:juniorH           -4.054e-01  1.160e-01  -3.495 0.000474 ***
## dl064:seniorH           -4.465e-01  1.196e-01  -3.733 0.000189 ***
## dl065:higher             6.073e-01  1.410e-01   4.306 1.67e-05 ***
## dl06_H2:elementary      -1.895e-01  1.262e-01  -1.502 0.133089
## dl06_H3:juniorH         -4.044e-01  1.354e-01  -2.986 0.002827 **
## dl06_H4:seniorH         -4.007e-01  1.354e-01  -2.960 0.003076 **
## dl06_H5:higher          -4.626e-01  1.491e-01  -3.102 0.001922 **
## dependents              -1.557e-01  2.274e-02  -6.845 7.64e-12 ***
## working_dependents       9.440e-01  2.677e-01   3.527 0.000421 ***
## other_HHM               -4.529e-01  1.339e-02 -33.830  < 2e-16 ***
## other_working            1.008e+00  2.488e-02  40.509  < 2e-16 ***
## sc_code13               -1.557e-01  1.268e-01  -1.228 0.219528
## sc_code14               -1.037e+00  2.663e-01  -3.893 9.91e-05 ***
## sc_code15               -1.109e+01  1.367e+02  -0.081 0.935326
## sc_code16               -2.576e-01  1.213e-01  -2.123 0.033736 *
## sc_code18               -4.690e-01  1.218e-01  -3.851 0.000117 ***
## sc_code19               -9.775e-01  2.696e-01  -3.625 0.000289 ***
## sc_code21               -7.756e-01  7.518e-01  -1.032 0.302256
## sc_code31               -7.606e-01  1.165e-01  -6.530 6.59e-11 ***
## sc_code32               -7.565e-01  9.786e-02  -7.730 1.07e-14 ***
## sc_code33               -1.095e-01  1.017e-01  -1.077 0.281553
## sc_code34                5.617e-02  1.218e-01   0.461 0.644794
## sc_code35               -2.824e-01  9.810e-02  -2.878 0.003998 **
```

```
## sc_code36              -7.481e-01  1.329e-01  -5.628 1.82e-08 ***
## sc_code51               3.180e-01  1.261e-01   2.521 0.011707 *
## sc_code52              -5.394e-02  1.162e-01  -0.464 0.642460
## sc_code62              -2.133e-01  5.835e-01  -0.365 0.714771
## sc_code63              -2.130e-01  1.217e-01  -1.750 0.080053 .
## sc_code64              -4.459e-01  4.371e-01  -1.020 0.307655
## sc_code73              -6.869e-01  1.226e-01  -5.603 2.11e-08 ***
## sc_code76              -9.569e-01  4.511e-01  -2.121 0.033903 *
## wave5                   7.194e-02  4.323e-02   1.664 0.096070 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18393  on 13853  degrees of freedom
## Residual deviance: 14654  on 13812  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14738
##
## Number of Fisher Scoring iterations: 10
```

```r
#second regression

#limit job loss to firing/displacement
clean$jl_2 <- ifelse(clean$jl == "1" & as.numeric(clean$tk46m_H) %in% c(1, 2, 5), 1, 0)

#subset to variables of interest
r3 <- clean %>%
            select(employed, employed_H, jl_2, age, age_H, age_sq, age_sq_H, dl06, dl06_H, dependents, v

glm3a <- glm(employed ~ . , family = binomial, data = r3)
summary(glm3a)
```

```
##
## Call:
## glm(formula = employed ~ ., family = binomial, data = r3)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.1858  -0.9236   0.4704   0.8424   3.3194
##
## Coefficients:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)            -3.610e+00  2.808e-01 -12.860  < 2e-16 ***
## employed_H2:Unemployed -1.342e-01  8.996e-02  -1.492 0.135774
## jl_2                    2.776e-01  1.670e-01   1.663 0.096365 .
## age                     2.016e-01  1.716e-02  11.749  < 2e-16 ***
## age_H                   2.585e-02  1.688e-02   1.531 0.125658
## age_sq                 -2.333e-03  1.957e-04 -11.920  < 2e-16 ***
## age_sq_H               -2.678e-04  1.721e-04  -1.556 0.119728
## dl062:elementary       -3.513e-01  1.053e-01  -3.337 0.000846 ***
## dl063:juniorH          -4.143e-01  1.162e-01  -3.564 0.000366 ***
## dl064:seniorH          -4.486e-01  1.202e-01  -3.733 0.000189 ***
## dl065:higher            6.117e-01  1.421e-01   4.303 1.68e-05 ***
## dl06_H2:elementary     -1.926e-01  1.262e-01  -1.526 0.126945
```

```
## dl06_H3:juniorH        -4.047e-01  1.356e-01  -2.986 0.002831 **
## dl06_H4:seniorH        -4.074e-01  1.354e-01  -3.008 0.002631 **
## dl06_H5:higher         -4.705e-01  1.493e-01  -3.152 0.001621 **
## dependents             -1.582e-01  2.277e-02  -6.949 3.67e-12 ***
## working_dependents      9.426e-01  2.676e-01   3.522 0.000429 ***
## other_HHM              -4.531e-01  1.341e-02 -33.778  < 2e-16 ***
## other_working           1.008e+00  2.489e-02  40.513  < 2e-16 ***
## sc_code13              -1.554e-01  1.269e-01  -1.225 0.220749
## sc_code14              -1.037e+00  2.666e-01  -3.889 0.000101 ***
## sc_code15              -1.102e+01  1.357e+02  -0.081 0.935294
## sc_code16              -2.584e-01  1.213e-01  -2.131 0.033106 *
## sc_code18              -4.675e-01  1.218e-01  -3.837 0.000124 ***
## sc_code19              -9.829e-01  2.694e-01  -3.649 0.000263 ***
## sc_code21              -7.712e-01  7.550e-01  -1.021 0.307048
## sc_code31              -7.574e-01  1.164e-01  -6.509 7.57e-11 ***
## sc_code32              -7.580e-01  9.796e-02  -7.737 1.02e-14 ***
## sc_code33              -1.068e-01  1.019e-01  -1.049 0.294265
## sc_code34               5.633e-02  1.220e-01   0.462 0.644178
## sc_code35              -2.846e-01  9.832e-02  -2.895 0.003791 **
## sc_code36              -7.508e-01  1.330e-01  -5.646 1.65e-08 ***
## sc_code51               3.203e-01  1.261e-01   2.541 0.011068 *
## sc_code52              -5.205e-02  1.162e-01  -0.448 0.654226
## sc_code62              -2.149e-01  5.855e-01  -0.367 0.713537
## sc_code63              -2.105e-01  1.218e-01  -1.728 0.084073 .
## sc_code64              -4.308e-01  4.361e-01  -0.988 0.323234
## sc_code73              -6.855e-01  1.226e-01  -5.591 2.25e-08 ***
## sc_code76              -9.517e-01  4.521e-01  -2.105 0.035273 *
## wave5                   7.245e-02  4.328e-02   1.674 0.094117 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18393  on 13853  degrees of freedom
## Residual deviance: 14654  on 13814  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14734
##
## Number of Fisher Scoring iterations: 10
```

```
glm3b <- glm(employed ~ . - age_H - age_sq_H, family = binomial, data = r3)
summary(glm3b)
```

```
##
## Call:
## glm(formula = employed ~ . - age_H - age_sq_H, family = binomial,
##     data = r3)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.1841  -0.9240   0.4712   0.8426   3.3030
##
## Coefficients:
##                          Estimate Std. Error z value Pr(>|z|)
## (Intercept)            -3.455e+00  2.610e-01 -13.236  < 2e-16 ***
```

```
## employed_H2:Unemployed -1.522e-01  8.841e-02  -1.722 0.085063 .
## jl_2                     2.748e-01  1.669e-01   1.646 0.099771 .
## age                      2.220e-01  1.066e-02  20.824  < 2e-16 ***
## age_sq                  -2.566e-03  1.265e-04 -20.287  < 2e-16 ***
## dl062:elementary        -3.466e-01  1.051e-01  -3.298 0.000974 ***
## dl063:juniorH           -4.078e-01  1.160e-01  -3.517 0.000436 ***
## dl064:seniorH           -4.487e-01  1.196e-01  -3.751 0.000176 ***
## dl065:higher             6.068e-01  1.410e-01   4.303 1.68e-05 ***
## dl06_H2:elementary      -1.905e-01  1.261e-01  -1.510 0.131046
## dl06_H3:juniorH         -4.030e-01  1.354e-01  -2.976 0.002919 **
## dl06_H4:seniorH         -4.021e-01  1.353e-01  -2.971 0.002966 **
## dl06_H5:higher          -4.608e-01  1.491e-01  -3.090 0.001998 **
## dependents              -1.563e-01  2.272e-02  -6.877 6.10e-12 ***
## working_dependents       9.444e-01  2.676e-01   3.529 0.000417 ***
## other_HHM               -4.525e-01  1.338e-02 -33.810  < 2e-16 ***
## other_working            1.007e+00  2.487e-02  40.496  < 2e-16 ***
## sc_code13               -1.501e-01  1.267e-01  -1.185 0.236141
## sc_code14               -1.038e+00  2.665e-01  -3.893 9.91e-05 ***
## sc_code15               -1.109e+01  1.367e+02  -0.081 0.935316
## sc_code16               -2.572e-01  1.212e-01  -2.121 0.033907 *
## sc_code18               -4.665e-01  1.217e-01  -3.833 0.000127 ***
## sc_code19               -9.864e-01  2.693e-01  -3.663 0.000250 ***
## sc_code21               -7.667e-01  7.533e-01  -1.018 0.308791
## sc_code31               -7.531e-01  1.163e-01  -6.476 9.45e-11 ***
## sc_code32               -7.561e-01  9.784e-02  -7.728 1.09e-14 ***
## sc_code33               -1.050e-01  1.017e-01  -1.032 0.301861
## sc_code34                5.861e-02  1.218e-01   0.481 0.630422
## sc_code35               -2.814e-01  9.807e-02  -2.870 0.004109 **
## sc_code36               -7.495e-01  1.329e-01  -5.638 1.72e-08 ***
## sc_code51                3.205e-01  1.261e-01   2.542 0.011013 *
## sc_code52               -5.355e-02  1.161e-01  -0.461 0.644733
## sc_code62               -2.049e-01  5.859e-01  -0.350 0.726578
## sc_code63               -2.086e-01  1.217e-01  -1.715 0.086371 .
## sc_code64               -4.396e-01  4.365e-01  -1.007 0.313867
## sc_code73               -6.842e-01  1.225e-01  -5.583 2.36e-08 ***
## sc_code76               -9.539e-01  4.513e-01  -2.114 0.034549 *
## wave5                    7.450e-02  4.322e-02   1.724 0.084780 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18393  on 13853  degrees of freedom
## Residual deviance: 14657  on 13816  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14733
##
## Number of Fisher Scoring iterations: 10
```

```
glm3c <- glm(employed ~ . - age_H - age_sq_H - sc_code, family = binomial, data = r3)
summary(glm3c)
```

```
##
## Call:
## glm(formula = employed ~ . - age_H - age_sq_H - sc_code, family = binomial,
```

```
##     data = r3)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.2239  -0.9559   0.4934   0.8641   3.3945
##
## Coefficients:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -3.8008008  0.2414835 -15.739  < 2e-16 ***
## employed_H2:Unemployed -0.2093015  0.0876811  -2.387 0.016983 *
## jl_2                    0.2005726  0.1651100   1.215 0.224449
## age                     0.2203098  0.0105321  20.918  < 2e-16 ***
## age_sq                 -0.0025175  0.0001252 -20.116  < 2e-16 ***
## dl062:elementary       -0.4414785  0.1033602  -4.271 1.94e-05 ***
## dl063:juniorH          -0.4858873  0.1138384  -4.268 1.97e-05 ***
## dl064:seniorH          -0.5056076  0.1167697  -4.330 1.49e-05 ***
## dl065:higher            0.5186151  0.1381177   3.755 0.000173 ***
## dl06_H2:elementary     -0.1074033  0.1241602  -0.865 0.387018
## dl06_H3:juniorH        -0.3143694  0.1332318  -2.360 0.018296 *
## dl06_H4:seniorH        -0.3334633  0.1330518  -2.506 0.012201 *
## dl06_H5:higher         -0.3638757  0.1466008  -2.482 0.013062 *
## dependents             -0.1509499  0.0220550  -6.844 7.69e-12 ***
## working_dependents      0.9526032  0.2625082   3.629 0.000285 ***
## other_HHM              -0.4678367  0.0132447 -35.323  < 2e-16 ***
## other_working           1.0373017  0.0247231  41.957  < 2e-16 ***
## wave5                   0.0667858  0.0426293   1.567 0.117194
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18393  on 13853  degrees of freedom
## Residual deviance: 14918  on 13836  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14954
##
## Number of Fisher Scoring iterations: 5
```

```
glm3d <- glm(employed ~ . - age_H - age_sq_H - sc_code - wave, family = binomial, data = r3)
summary(glm3d)
```

```
##
## Call:
## glm(formula = employed ~ . - age_H - age_sq_H - sc_code - wave,
##     family = binomial, data = r3)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.2178  -0.9576   0.4927   0.8642   3.3883
##
## Coefficients:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -3.8618703  0.2384957 -16.193  < 2e-16 ***
## employed_H2:Unemployed -0.2065739  0.0876754  -2.356 0.018467 *
## jl_2                    0.1947626  0.1649439   1.181 0.237690
```

```
## age                      0.2232079  0.0103783  21.507  < 2e-16 ***
## age_sq                  -0.0025392  0.0001245 -20.397  < 2e-16 ***
## dl062:elementary        -0.4359583  0.1033266  -4.219 2.45e-05 ***
## dl063:juniorH           -0.4733438  0.1135751  -4.168 3.08e-05 ***
## dl064:seniorH           -0.4949607  0.1165868  -4.245 2.18e-05 ***
## dl065:higher             0.5280944  0.1380019   3.827 0.000130 ***
## dl06_H2:elementary      -0.1032058  0.1241587  -0.831 0.405837
## dl06_H3:juniorH         -0.3069798  0.1331691  -2.305 0.021156 *
## dl06_H4:seniorH         -0.3275683  0.1330156  -2.463 0.013792 *
## dl06_H5:higher          -0.3593028  0.1465957  -2.451 0.014247 *
## dependents              -0.1482160  0.0219853  -6.742 1.57e-11 ***
## working_dependents       0.9488124  0.2626322   3.613 0.000303 ***
## other_HHM               -0.4679827  0.0132459 -35.330  < 2e-16 ***
## other_working            1.0375392  0.0247259  41.962  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18393  on 13853  degrees of freedom
## Residual deviance: 14920  on 13837  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14954
##
## Number of Fisher Scoring iterations: 5
```

```
#limit jl_year based on firings
clean$jl_year_fired <- ifelse(clean$jl_year != "0" & !(as.numeric(clean$tk46m_H) %in% c(1, 2, 5)), 0, as
clean$jl_year_fired <- as.factor(clean$jl_year_fired)

r4 <- clean %>%
            select(employed, employed_H, jl_year_fired, age, age_H, age_sq, age_sq_H, dl06, dl06_H, dep

glm4a <- glm(employed ~ . , family = binomial, data = r4)
summary(glm4a)
```

```
##
## Call:
## glm(formula = employed ~ ., family = binomial, data = r4)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.1858  -0.9232   0.4705   0.8423   3.3190
##
## Coefficients:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -3.607e+00  2.809e-01 -12.842  < 2e-16 ***
## employed_H2:Unemployed -1.379e-01  9.000e-02  -1.533 0.125393
## jl_year_fired1           3.949e-01  2.844e-01   1.389 0.164955
## jl_year_fired2           1.982e-01  3.410e-01   0.581 0.560976
## jl_year_fired3           1.007e-01  3.850e-01   0.262 0.793583
## jl_year_fired4           7.214e-01  4.641e-01   1.554 0.120104
## jl_year_fired5          -1.969e-01  5.134e-01  -0.384 0.701337
## age                      2.020e-01  1.716e-02  11.766  < 2e-16 ***
## age_H                    2.535e-02  1.688e-02   1.501 0.133280
```

```
## age_sq                -2.336e-03  1.958e-04 -11.932  < 2e-16 ***
## age_sq_H              -2.634e-04  1.722e-04  -1.530 0.126102
## dl062:elementary      -3.508e-01  1.053e-01  -3.332 0.000862 ***
## dl063:juniorH         -4.134e-01  1.163e-01  -3.555 0.000378 ***
## dl064:seniorH         -4.482e-01  1.202e-01  -3.729 0.000192 ***
## dl065:higher           6.125e-01  1.422e-01   4.308 1.64e-05 ***
## dl06_H2:elementary    -1.930e-01  1.262e-01  -1.529 0.126153
## dl06_H3:juniorH       -4.038e-01  1.356e-01  -2.978 0.002899 **
## dl06_H4:seniorH       -4.077e-01  1.355e-01  -3.009 0.002618 **
## dl06_H5:higher        -4.704e-01  1.493e-01  -3.152 0.001624 **
## dependents            -1.582e-01  2.278e-02  -6.946 3.75e-12 ***
## working_dependents     9.427e-01  2.676e-01   3.522 0.000428 ***
## other_HHM             -4.530e-01  1.341e-02 -33.774  < 2e-16 ***
## other_working          1.008e+00  2.489e-02  40.512  < 2e-16 ***
## sc_code13             -1.546e-01  1.269e-01  -1.219 0.222954
## sc_code14             -1.036e+00  2.667e-01  -3.884 0.000103 ***
## sc_code15             -1.102e+01  1.357e+02  -0.081 0.935281
## sc_code16             -2.616e-01  1.214e-01  -2.155 0.031176 *
## sc_code18             -4.657e-01  1.219e-01  -3.821 0.000133 ***
## sc_code19             -9.897e-01  2.697e-01  -3.670 0.000243 ***
## sc_code21             -7.715e-01  7.550e-01  -1.022 0.306877
## sc_code31             -7.576e-01  1.164e-01  -6.510 7.53e-11 ***
## sc_code32             -7.590e-01  9.801e-02  -7.745 9.59e-15 ***
## sc_code33             -1.074e-01  1.019e-01  -1.055 0.291585
## sc_code34              5.446e-02  1.220e-01   0.447 0.655224
## sc_code35             -2.839e-01  9.834e-02  -2.887 0.003886 **
## sc_code36             -7.503e-01  1.331e-01  -5.639 1.71e-08 ***
## sc_code51              3.194e-01  1.261e-01   2.533 0.011320 *
## sc_code52             -5.284e-02  1.162e-01  -0.455 0.649387
## sc_code62             -2.146e-01  5.855e-01  -0.367 0.713967
## sc_code63             -2.110e-01  1.219e-01  -1.731 0.083477 .
## sc_code64             -4.390e-01  4.371e-01  -1.004 0.315206
## sc_code73             -6.868e-01  1.226e-01  -5.600 2.14e-08 ***
## sc_code76             -9.517e-01  4.521e-01  -2.105 0.035277 *
## wave5                  7.238e-02  4.329e-02   1.672 0.094553 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18393  on 13853  degrees of freedom
## Residual deviance: 14652  on 13810  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14740
##
## Number of Fisher Scoring iterations: 10
```

```
glm4b <- glm(employed ~ . - age_H - age_sq_H, family = binomial, data = r4)
summary(glm4b)
```

```
##
## Call:
## glm(formula = employed ~ . - age_H - age_sq_H, family = binomial,
##     data = r4)
##
```

```
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.1842  -0.9236   0.4712   0.8429   3.3031
##
## Coefficients:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -3.455e+00  2.612e-01 -13.229  < 2e-16 ***
## employed_H2:Unemployed -1.559e-01  8.845e-02  -1.763 0.077942 .
## jl_year_fired1           3.950e-01  2.844e-01   1.389 0.164912
## jl_year_fired2           1.910e-01  3.410e-01   0.560 0.575431
## jl_year_fired3           9.705e-02  3.845e-01   0.252 0.800732
## jl_year_fired4           7.278e-01  4.647e-01   1.566 0.117327
## jl_year_fired5          -2.079e-01  5.136e-01  -0.405 0.685710
## age                      2.220e-01  1.066e-02  20.813  < 2e-16 ***
## age_sq                  -2.565e-03  1.265e-04 -20.276  < 2e-16 ***
## dl062:elementary        -3.461e-01  1.051e-01  -3.293 0.000993 ***
## dl063:juniorH           -4.070e-01  1.160e-01  -3.508 0.000451 ***
## dl064:seniorH           -4.482e-01  1.197e-01  -3.745 0.000180 ***
## dl065:higher             6.079e-01  1.410e-01   4.311 1.63e-05 ***
## dl06_H2:elementary      -1.909e-01  1.262e-01  -1.513 0.130258
## dl06_H3:juniorH         -4.019e-01  1.354e-01  -2.968 0.002996 **
## dl06_H4:seniorH         -4.024e-01  1.353e-01  -2.973 0.002949 **
## dl06_H5:higher          -4.609e-01  1.491e-01  -3.091 0.001994 **
## dependents              -1.563e-01  2.273e-02  -6.875 6.18e-12 ***
## working_dependents       9.445e-01  2.676e-01   3.529 0.000417 ***
## other_HHM               -4.524e-01  1.338e-02 -33.807  < 2e-16 ***
## other_working            1.007e+00  2.488e-02  40.495  < 2e-16 ***
## sc_code13               -1.496e-01  1.268e-01  -1.180 0.237994
## sc_code14               -1.037e+00  2.667e-01  -3.888 0.000101 ***
## sc_code15               -1.109e+01  1.366e+02  -0.081 0.935306
## sc_code16               -2.604e-01  1.213e-01  -2.146 0.031853 *
## sc_code18               -4.648e-01  1.218e-01  -3.817 0.000135 ***
## sc_code19               -9.932e-01  2.696e-01  -3.684 0.000230 ***
## sc_code21               -7.672e-01  7.534e-01  -1.018 0.308521
## sc_code31               -7.534e-01  1.163e-01  -6.478 9.32e-11 ***
## sc_code32               -7.574e-01  9.789e-02  -7.737 1.02e-14 ***
## sc_code33               -1.057e-01  1.017e-01  -1.040 0.298459
## sc_code34                5.660e-02  1.218e-01   0.465 0.642249
## sc_code35               -2.809e-01  9.809e-02  -2.863 0.004190 **
## sc_code36               -7.491e-01  1.330e-01  -5.633 1.77e-08 ***
## sc_code51                3.196e-01  1.261e-01   2.534 0.011270 *
## sc_code52               -5.439e-02  1.162e-01  -0.468 0.639608
## sc_code62               -2.049e-01  5.860e-01  -0.350 0.726577
## sc_code63               -2.093e-01  1.217e-01  -1.719 0.085560 .
## sc_code64               -4.480e-01  4.375e-01  -1.024 0.305876
## sc_code73               -6.856e-01  1.226e-01  -5.593 2.24e-08 ***
## sc_code76               -9.540e-01  4.513e-01  -2.114 0.034538 *
## wave5                    7.436e-02  4.324e-02   1.720 0.085471 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18393  on 13853  degrees of freedom
```

```
## Residual deviance: 14654  on 13812  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14738
##
## Number of Fisher Scoring iterations: 10
```

```
#eliminate unpaid family workers from employed

clean$employed2 <- ifelse(clean$employed == 1 & as.numeric(clean$tk24a) == 6, 0, clean$employed)
clean$employed2_H <- ifelse(as.numeric(clean$employed_H) == 1 & as.numeric(clean$tk24a_H) == 6, 0, as.nu

r5 <- clean %>%
            select(employed2, employed2_H, jl_2, age, age_H, age_sq, age_sq_H, dl06, dl06_H, dependents

glm5a <- glm(employed2 ~ . , family = binomial, data = r5)
summary(glm5a)
```

```
##
## Call:
## glm(formula = employed2 ~ ., family = binomial, data = r5)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.4241  -0.9653  -0.5932   1.0823   2.8257
##
## Coefficients:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)        -4.795e+00  2.866e-01 -16.732  < 2e-16 ***
## employed2_H         9.928e-02  7.027e-02   1.413 0.157711
## jl_2                5.684e-01  1.561e-01   3.641 0.000271 ***
## age                 2.291e-01  1.727e-02  13.269  < 2e-16 ***
## age_H              -4.747e-02  1.620e-02  -2.931 0.003383 **
## age_sq             -2.573e-03  1.948e-04 -13.207  < 2e-16 ***
## age_sq_H            3.873e-04  1.613e-04   2.400 0.016384 *
## dl062:elementary    1.608e-01  8.804e-02   1.826 0.067812 .
## dl063:juniorH       1.938e-01  1.000e-01   1.938 0.052658 .
## dl064:seniorH       2.987e-01  1.043e-01   2.864 0.004181 **
## dl065:higher        1.542e+00  1.242e-01  12.422  < 2e-16 ***
## dl06_H2:elementary  1.169e-01  1.057e-01   1.106 0.268838
## dl06_H3:juniorH     7.543e-02  1.160e-01   0.650 0.515432
## dl06_H4:seniorH     1.120e-01  1.160e-01   0.965 0.334362
## dl06_H5:higher      2.170e-01  1.299e-01   1.671 0.094757 .
## dependents         -1.298e-01  2.148e-02  -6.043 1.51e-09 ***
## working_dependents  1.449e-01  1.488e-01   0.974 0.330015
## other_HHM          -2.557e-01  1.186e-02 -21.563  < 2e-16 ***
## other_working       5.462e-01  1.977e-02  27.632  < 2e-16 ***
## sc_code13           4.031e-01  1.159e-01   3.476 0.000508 ***
## sc_code14          -4.223e-01  2.707e-01  -1.560 0.118838
## sc_code15          -1.047e+01  1.383e+02  -0.076 0.939647
## sc_code16          -4.569e-01  1.167e-01  -3.915 9.05e-05 ***
## sc_code18          -5.065e-01  1.171e-01  -4.327 1.51e-05 ***
## sc_code19          -1.673e-01  2.630e-01  -0.636 0.524664
## sc_code21           4.177e-01  7.414e-01   0.563 0.573172
## sc_code31           2.982e-01  1.086e-01   2.746 0.006025 **
## sc_code32           4.728e-02  9.104e-02   0.519 0.603561
```

```
## sc_code33           4.311e-01  9.171e-02   4.701 2.58e-06 ***
## sc_code34           4.930e-01  1.078e-01   4.573 4.80e-06 ***
## sc_code35           2.875e-01  8.983e-02   3.201 0.001369 **
## sc_code36           3.292e-01  1.244e-01   2.647 0.008124 **
## sc_code51           7.809e-01  1.081e-01   7.224 5.06e-13 ***
## sc_code52          -1.060e-02  1.066e-01  -0.099 0.920794
## sc_code62           7.394e-01  5.493e-01   1.346 0.178258
## sc_code63          -2.069e-01  1.130e-01  -1.830 0.067200 .
## sc_code64           3.698e-01  4.225e-01   0.875 0.381467
## sc_code73          -7.525e-02  1.166e-01  -0.646 0.518574
## sc_code76           1.767e-01  4.328e-01   0.408 0.683095
## wave5               4.113e-01  3.975e-02  10.348  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18939  on 13813  degrees of freedom
## Residual deviance: 16592  on 13774  degrees of freedom
##   (700 observations deleted due to missingness)
## AIC: 16672
##
## Number of Fisher Scoring iterations: 10
```

```
glm5b <- glm(employed2 ~ . - dl06_H, family = binomial, data = r5)
summary(glm5b)
```

```
##
## Call:
## glm(formula = employed2 ~ . - dl06_H, family = binomial, data = r5)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.4170  -0.9671  -0.5933   1.0844   2.7958
##
## Coefficients:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)        -4.764e+00  2.752e-01 -17.310  < 2e-16 ***
## employed2_H         1.009e-01  7.022e-02   1.437 0.150668
## jl_2                5.662e-01  1.560e-01   3.630 0.000283 ***
## age                 2.285e-01  1.726e-02  13.237  < 2e-16 ***
## age_H              -4.537e-02  1.615e-02  -2.808 0.004979 **
## age_sq             -2.568e-03  1.948e-04 -13.185  < 2e-16 ***
## age_sq_H            3.701e-04  1.611e-04   2.298 0.021554 *
## dl062:elementary    1.916e-01  8.325e-02   2.301 0.021377 *
## dl063:juniorH       2.277e-01  9.226e-02   2.468 0.013599 *
## dl064:seniorH       3.497e-01  9.208e-02   3.798 0.000146 ***
## dl065:higher        1.639e+00  1.064e-01  15.403  < 2e-16 ***
## dependents         -1.293e-01  2.147e-02  -6.020 1.75e-09 ***
## working_dependents  1.391e-01  1.487e-01   0.936 0.349497
## other_HHM          -2.547e-01  1.183e-02 -21.535  < 2e-16 ***
## other_working       5.442e-01  1.969e-02  27.635  < 2e-16 ***
## sc_code13           4.014e-01  1.159e-01   3.464 0.000532 ***
## sc_code14          -4.173e-01  2.706e-01  -1.542 0.123042
## sc_code15          -1.050e+01  1.383e+02  -0.076 0.939502
```

```
## sc_code16          -4.515e-01  1.166e-01  -3.874 0.000107 ***
## sc_code18          -5.061e-01  1.170e-01  -4.325 1.52e-05 ***
## sc_code19          -1.572e-01  2.626e-01  -0.599 0.549387
## sc_code21           4.147e-01  7.418e-01   0.559 0.576153
## sc_code31           3.026e-01  1.085e-01   2.789 0.005282 **
## sc_code32           5.237e-02  9.095e-02   0.576 0.564726
## sc_code33           4.365e-01  9.156e-02   4.767 1.87e-06 ***
## sc_code34           5.014e-01  1.077e-01   4.656 3.22e-06 ***
## sc_code35           2.879e-01  8.974e-02   3.208 0.001335 **
## sc_code36           3.322e-01  1.243e-01   2.673 0.007522 **
## sc_code51           7.929e-01  1.079e-01   7.350 1.99e-13 ***
## sc_code52          -1.444e-03  1.063e-01  -0.014 0.989168
## sc_code62           7.448e-01  5.497e-01   1.355 0.175419
## sc_code63          -2.009e-01  1.129e-01  -1.779 0.075194 .
## sc_code64           3.679e-01  4.219e-01   0.872 0.383257
## sc_code73          -7.736e-02  1.162e-01  -0.666 0.505489
## sc_code76           1.805e-01  4.323e-01   0.418 0.676266
## wave5               4.101e-01  3.969e-02  10.334  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18939  on 13813  degrees of freedom
## Residual deviance: 16596  on 13778  degrees of freedom
##   (700 observations deleted due to missingness)
## AIC: 16668
##
## Number of Fisher Scoring iterations: 10
```

```
#husband's education is not significant, remove from model
anova(glm5b, glm5a, test = "LRT")
```

```
## Analysis of Deviance Table
##
## Model 1: employed2 ~ (employed2_H + jl_2 + age + age_H + age_sq + age_sq_H +
##     dl06 + dl06_H + dependents + working_dependents + other_HHM +
##     other_working + sc_code + wave) - dl06_H
## Model 2: employed2 ~ employed2_H + jl_2 + age + age_H + age_sq + age_sq_H +
##     dl06 + dl06_H + dependents + working_dependents + other_HHM +
##     other_working + sc_code + wave
##   Resid. Df Resid. Dev Df Deviance Pr(>Chi)
## 1     13778      16596
## 2     13774      16592  4    4.207   0.3787
```

```
glm5c <- glm(employed2 ~ . - dl06_H -employed2_H, family = binomial, data = r5)
summary(glm5c)
```

```
##
## Call:
## glm(formula = employed2 ~ . - dl06_H - employed2_H, family = binomial,
##     data = r5)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
```

```
## -3.4028  -0.9668  -0.5931   1.0842   2.8154
##
## Coefficients:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)        -4.637e+00  2.604e-01 -17.810  < 2e-16 ***
## jl_2                5.682e-01  1.560e-01   3.642 0.000270 ***
## age                 2.278e-01  1.726e-02  13.201  < 2e-16 ***
## age_H              -4.650e-02  1.614e-02  -2.881 0.003960 **
## age_sq             -2.558e-03  1.947e-04 -13.140  < 2e-16 ***
## age_sq_H            3.870e-04  1.607e-04   2.409 0.016013 *
## dl062:elementary    1.950e-01  8.321e-02   2.344 0.019103 *
## dl063:juniorH       2.333e-01  9.218e-02   2.531 0.011365 *
## dl064:seniorH       3.553e-01  9.200e-02   3.862 0.000113 ***
## dl065:higher        1.646e+00  1.063e-01  15.482  < 2e-16 ***
## dependents         -1.292e-01  2.147e-02  -6.018 1.77e-09 ***
## working_dependents  1.387e-01  1.486e-01   0.933 0.350770
## other_HHM          -2.527e-01  1.174e-02 -21.528  < 2e-16 ***
## other_working       5.398e-01  1.945e-02  27.762  < 2e-16 ***
## sc_code13           4.019e-01  1.159e-01   3.469 0.000522 ***
## sc_code14          -4.184e-01  2.706e-01  -1.546 0.122015
## sc_code15          -1.048e+01  1.381e+02  -0.076 0.939515
## sc_code16          -4.526e-01  1.166e-01  -3.883 0.000103 ***
## sc_code18          -5.061e-01  1.170e-01  -4.326 1.52e-05 ***
## sc_code19          -1.610e-01  2.626e-01  -0.613 0.539716
## sc_code21           4.139e-01  7.419e-01   0.558 0.576913
## sc_code31           3.055e-01  1.085e-01   2.817 0.004847 **
## sc_code32           5.539e-02  9.093e-02   0.609 0.542380
## sc_code33           4.358e-01  9.155e-02   4.761 1.93e-06 ***
## sc_code34           5.009e-01  1.077e-01   4.652 3.29e-06 ***
## sc_code35           2.872e-01  8.974e-02   3.200 0.001375 **
## sc_code36           3.344e-01  1.242e-01   2.691 0.007114 **
## sc_code51           7.936e-01  1.079e-01   7.358 1.87e-13 ***
## sc_code52          -1.527e-03  1.063e-01  -0.014 0.988547
## sc_code62           7.584e-01  5.498e-01   1.379 0.167786
## sc_code63          -2.005e-01  1.129e-01  -1.776 0.075803 .
## sc_code64           3.679e-01  4.219e-01   0.872 0.383174
## sc_code73          -7.413e-02  1.161e-01  -0.638 0.523269
## sc_code76           1.997e-01  4.320e-01   0.462 0.643880
## wave5               4.115e-01  3.967e-02  10.374  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18939  on 13813  degrees of freedom
## Residual deviance: 16598  on 13779  degrees of freedom
##   (700 observations deleted due to missingness)
## AIC: 16668
##
## Number of Fisher Scoring iterations: 10
```

```
glm5d <- glm(employed2 ~ . - dl06_H -employed2_H - sc_code, family = binomial, data = r5)
summary(glm5d)
```

```
##
```

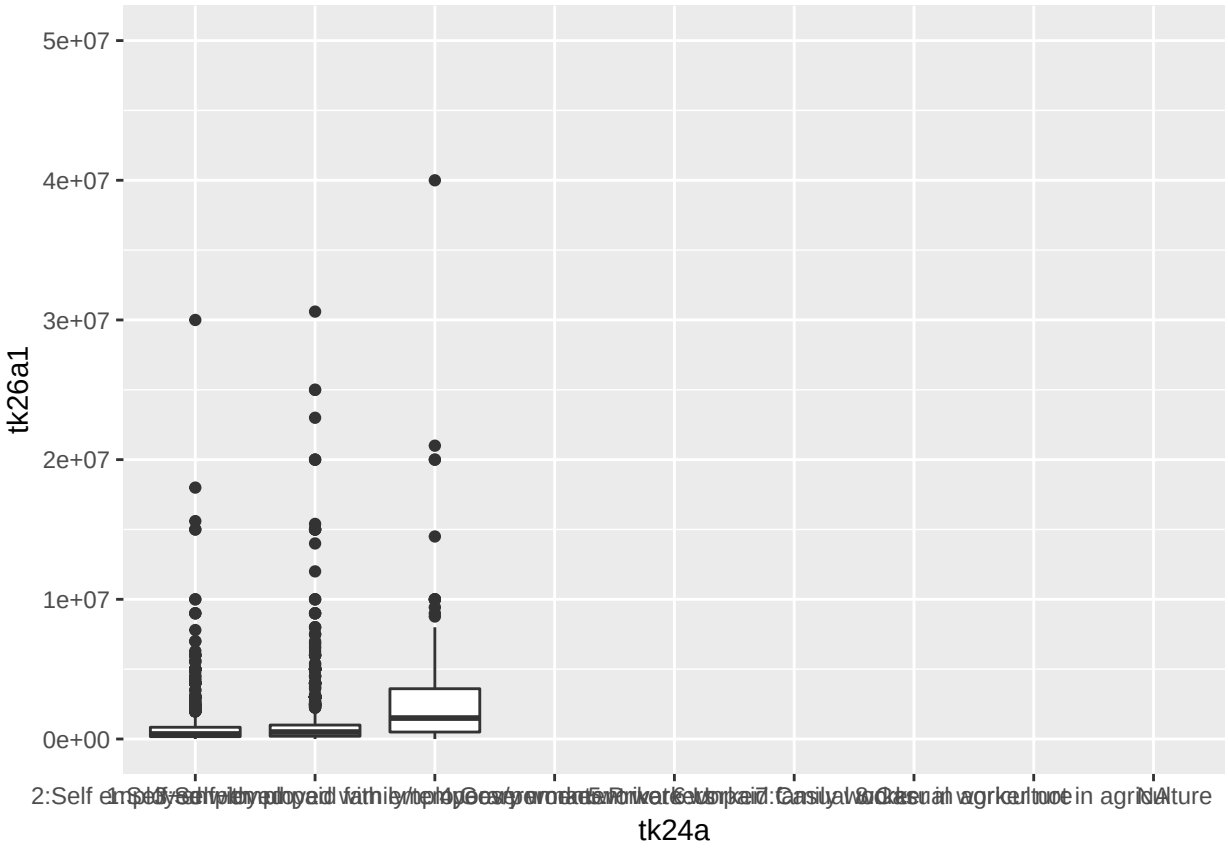
```
## Call:
## glm(formula = employed2 ~ . - dl06_H - employed2_H - sc_code,
##     family = binomial, data = r5)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.5619  -0.9785  -0.6377   1.1162   2.8704
##
## Coefficients:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)        -4.5418434  0.2433830 -18.661  < 2e-16 ***
## jl_2                0.5373099  0.1536125   3.498 0.000469 ***
## age                 0.2266724  0.0170904  13.263  < 2e-16 ***
## age_H              -0.0404930  0.0159414  -2.540 0.011082 *
## age_sq             -0.0025214  0.0001930 -13.066  < 2e-16 ***
## age_sq_H            0.0003239  0.0001589   2.038 0.041503 *
## dl062:elementary    0.1500149  0.0813866   1.843 0.065294 .
## dl063:juniorH       0.2024389  0.0899557   2.250 0.024422 *
## dl064:seniorH       0.3447333  0.0889442   3.876 0.000106 ***
## dl065:higher        1.6419672  0.1038661  15.808  < 2e-16 ***
## dependents         -0.1458254  0.0209312  -6.967 3.24e-12 ***
## working_dependents  0.1562648  0.1470971   1.062 0.288089
## other_HHM          -0.2576283  0.0114936 -22.415  < 2e-16 ***
## other_working       0.5434822  0.0190802  28.484  < 2e-16 ***
## wave5               0.3829280  0.0390793   9.799  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18939  on 13813  degrees of freedom
## Residual deviance: 16892  on 13799  degrees of freedom
##   (700 observations deleted due to missingness)
## AIC: 16922
##
## Number of Fisher Scoring iterations: 4
```

```
#region is significant, keep in model
anova(glm5d, glm5c, test = "LRT")
```

```
## Analysis of Deviance Table
##
## Model 1: employed2 ~ (employed2_H + jl_2 + age + age_H + age_sq + age_sq_H +
##     dl06 + dl06_H + dependents + working_dependents + other_HHM +
##     other_working + sc_code + wave) - dl06_H - employed2_H -
##     sc_code
## Model 2: employed2 ~ (employed2_H + jl_2 + age + age_H + age_sq + age_sq_H +
##     dl06 + dl06_H + dependents + working_dependents + other_HHM +
##     other_working + sc_code + wave) - dl06_H - employed2_H
##   Resid. Df Resid. Dev Df Deviance  Pr(>Chi)
## 1     13799      16892
## 2     13779      16598 20   293.56 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

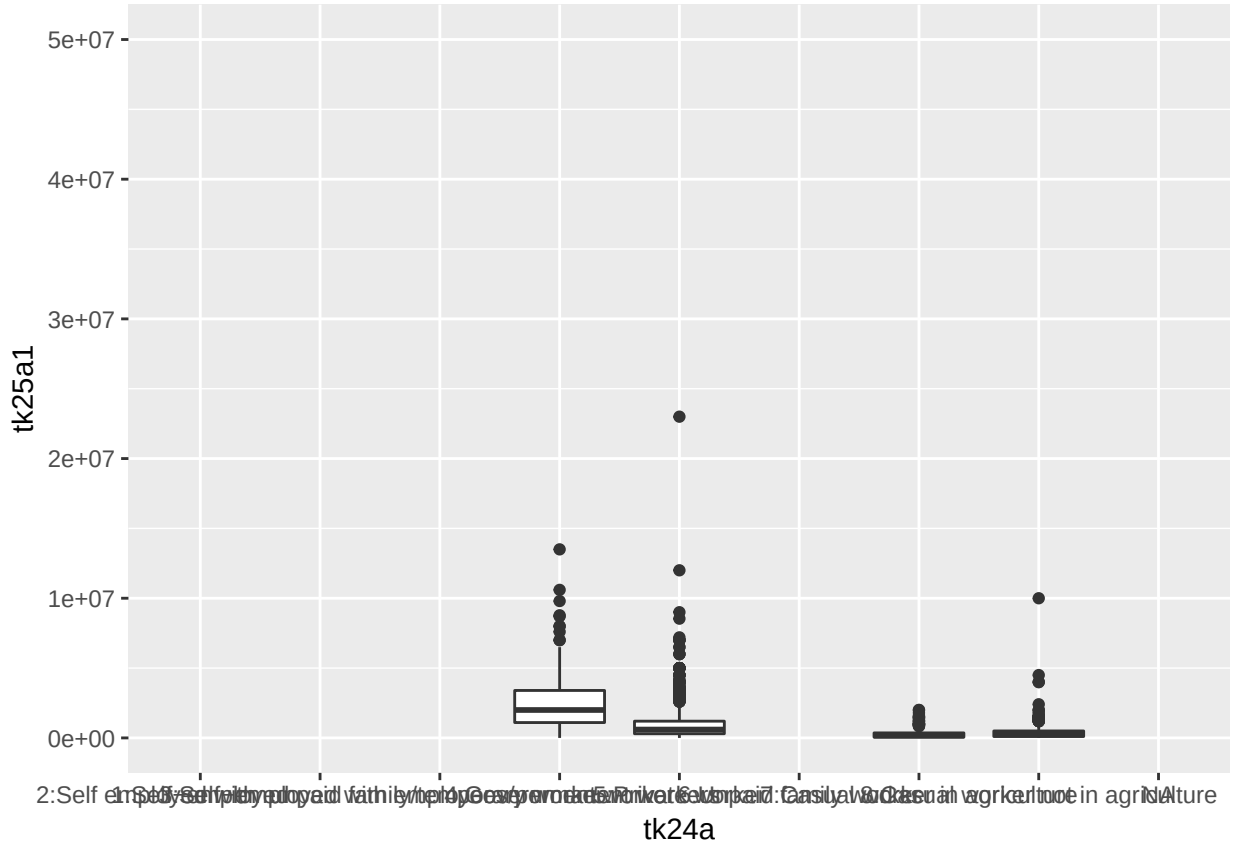
```
#include recoded industry variable

ggplot(clean, aes(x= tk24a, y = tk26a1)) +
      geom_boxplot()+
      ylim(0, 50000000)
```

```
## Warning: Removed 11391 rows containing non-finite values (stat_boxplot).
```




```
ggplot(clean, aes(x= tk24a, y = tk25a1)) +
      geom_boxplot()+
      ylim(0, 50000000)
```

```
## Warning: Removed 11354 rows containing non-finite values (stat_boxplot).
```




```
#new job cat
cats <- c("2:self-employed", "2:self-employed", "3:informal business", "4:government", "5:private", "1:u

clean$job_cat_H <- c()

for(i in 1:nrow(clean)){
    if(clean$employed_H[i] == 0){
          clean$job_cat_H[i] <- "1:unemployed"
    }
    else {
          clean$job_cat_H[i] <- cats[as.numeric(clean$tk24a_H[i])]
    }
}

clean$job_cat <- c()

for(i in 1:nrow(clean)){
    if(clean$employed[i] == 0){
          clean$job_cat[i] <- "1:unemployed"
    }
    else {
          clean$job_cat[i] <- cats[as.numeric(clean$tk24a[i])]
    }
}

clean$job_cat <- as.factor(clean$job_cat)
```

```r
clean$job_cat_H <- as.factor(clean$job_cat_H)

r6 <- clean %>%
            select(employed2, job_cat_H, jl_2, age, age_H, age_sq, age_sq_H, dl06, dl06_H, dependents, w

glm6a <- glm(employed2 ~ . , family = binomial, data = r6)
summary(glm6a)
```

```
##
## Call:
## glm(formula = employed2 ~ ., family = binomial, data = r6)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.4914  -0.9472  -0.5527   1.0314   2.8463
##
## Coefficients:
##                                Estimate Std. Error z value Pr(>|z|)
## (Intercept)                  -4.310e+00  3.209e-01 -13.431  < 2e-16 ***
## job_cat_H2:self-employed     -1.272e+00  1.379e-01  -9.221  < 2e-16 ***
## job_cat_H3:informal business -1.376e+00  1.816e-01  -7.580 3.44e-14 ***
## job_cat_H4:government        -5.949e-01  1.559e-01  -3.815 0.000136 ***
## job_cat_H5:private           -5.470e-01  1.401e-01  -3.904 9.45e-05 ***
## job_cat_H6:casual            -5.085e-01  1.466e-01  -3.469 0.000522 ***
## jl_2                          4.705e-01  1.629e-01   2.887 0.003886 **
## age                           2.247e-01  1.887e-02  11.907  < 2e-16 ***
## age_H                        -2.328e-02  1.783e-02  -1.305 0.191752
## age_sq                       -2.491e-03  2.189e-04 -11.380  < 2e-16 ***
## age_sq_H                      1.592e-04  1.827e-04   0.871 0.383655
## dl062:elementary              2.058e-01  9.431e-02   2.182 0.029098 *
## dl063:juniorH                 2.372e-01  1.068e-01   2.222 0.026294 *
## dl064:seniorH                 3.135e-01  1.112e-01   2.820 0.004797 **
## dl065:higher                  1.563e+00  1.318e-01  11.855  < 2e-16 ***
## dl06_H2:elementary            6.632e-02  1.117e-01   0.593 0.552848
## dl06_H3:juniorH               3.872e-02  1.225e-01   0.316 0.752024
## dl06_H4:seniorH               4.437e-02  1.230e-01   0.361 0.718238
## dl06_H5:higher                9.527e-02  1.405e-01   0.678 0.497725
## dependents                   -1.330e-01  2.238e-02  -5.943 2.80e-09 ***
## working_dependents            1.536e-01  1.523e-01   1.009 0.313173
## other_HHM                    -2.838e-01  1.274e-02 -22.275  < 2e-16 ***
## other_working                 6.014e-01  2.137e-02  28.146  < 2e-16 ***
## sc_code13                     4.022e-01  1.204e-01   3.342 0.000833 ***
## sc_code14                    -4.610e-01  2.720e-01  -1.695 0.090085 .
## sc_code15                    -1.000e+01  1.195e+02  -0.084 0.933261
## sc_code16                    -4.877e-01  1.208e-01  -4.036 5.43e-05 ***
## sc_code18                    -5.176e-01  1.211e-01  -4.275 1.91e-05 ***
## sc_code19                    -3.619e-01  2.777e-01  -1.303 0.192566
## sc_code21                     1.452e-01  7.324e-01   0.198 0.842862
## sc_code31                     1.360e-01  1.147e-01   1.185 0.235864
## sc_code32                    -4.928e-02  9.499e-02  -0.519 0.603904
## sc_code33                     3.770e-01  9.530e-02   3.956 7.64e-05 ***
## sc_code34                     4.032e-01  1.127e-01   3.578 0.000346 ***
## sc_code35                     2.025e-01  9.335e-02   2.169 0.030076 *
## sc_code36                     2.035e-01  1.291e-01   1.577 0.114833
```

```
## sc_code51                     6.864e-01  1.124e-01   6.106 1.02e-09 ***
## sc_code52                    -4.460e-02  1.109e-01  -0.402 0.687669
## sc_code62                     7.023e-01  6.342e-01   1.107 0.268127
## sc_code63                    -2.400e-01  1.176e-01  -2.040 0.041312 *
## sc_code64                     3.231e-01  4.268e-01   0.757 0.449050
## sc_code73                    -1.225e-02  1.223e-01  -0.100 0.920210
## sc_code76                     1.422e-01  4.758e-01   0.299 0.764957
## wave5                         3.987e-01  4.172e-02   9.557  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 17814  on 12986  degrees of freedom
## Residual deviance: 15244  on 12943  degrees of freedom
##   (1527 observations deleted due to missingness)
## AIC: 15332
##
## Number of Fisher Scoring iterations: 9
```

```
glm6b <- glm(employed2 ~ . - dl06_H, family = binomial, data = r6)
summary(glm6b)
```

```
##
## Call:
## glm(formula = employed2 ~ . - dl06_H, family = binomial, data = r6)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.4945  -0.9472  -0.5530   1.0319   2.8346
##
## Coefficients:
##                                Estimate Std. Error z value Pr(>|z|)
## (Intercept)                  -4.283e+00  3.092e-01 -13.850  < 2e-16 ***
## job_cat_H2:self-employed     -1.272e+00  1.379e-01  -9.227  < 2e-16 ***
## job_cat_H3:informal business -1.375e+00  1.815e-01  -7.574 3.62e-14 ***
## job_cat_H4:government        -5.823e-01  1.540e-01  -3.781 0.000156 ***
## job_cat_H5:private           -5.467e-01  1.401e-01  -3.903 9.51e-05 ***
## job_cat_H6:casual            -5.076e-01  1.463e-01  -3.468 0.000524 ***
## jl_2                          4.696e-01  1.628e-01   2.883 0.003935 **
## age                           2.244e-01  1.887e-02  11.895  < 2e-16 ***
## age_H                        -2.262e-02  1.780e-02  -1.270 0.203946
## age_sq                       -2.488e-03  2.188e-04 -11.369  < 2e-16 ***
## age_sq_H                      1.539e-04  1.825e-04   0.843 0.399146
## dl062:elementary              2.205e-01  8.930e-02   2.469 0.013548 *
## dl063:juniorH                 2.472e-01  9.924e-02   2.491 0.012728 *
## dl064:seniorH                 3.252e-01  9.997e-02   3.252 0.001144 **
## dl065:higher                  1.592e+00  1.166e-01  13.650  < 2e-16 ***
## dependents                   -1.327e-01  2.237e-02  -5.931 3.00e-09 ***
## working_dependents            1.518e-01  1.522e-01   0.997 0.318547
## other_HHM                    -2.836e-01  1.273e-02 -22.281  < 2e-16 ***
## other_working                 6.010e-01  2.132e-02  28.184  < 2e-16 ***
## sc_code13                     4.027e-01  1.203e-01   3.348 0.000815 ***
## sc_code14                    -4.594e-01  2.719e-01  -1.690 0.091031 .
## sc_code15                    -1.001e+01  1.195e+02  -0.084 0.933200
```

```
## sc_code16                   -4.842e-01  1.207e-01  -4.011 6.04e-05 ***
## sc_code18                   -5.160e-01  1.210e-01  -4.265 2.00e-05 ***
## sc_code19                   -3.598e-01  2.773e-01  -1.298 0.194456
## sc_code21                    1.446e-01  7.326e-01   0.197 0.843558
## sc_code31                    1.366e-01  1.146e-01   1.192 0.233391
## sc_code32                   -4.707e-02  9.491e-02  -0.496 0.619894
## sc_code33                    3.809e-01  9.513e-02   4.004 6.22e-05 ***
## sc_code34                    4.066e-01  1.126e-01   3.612 0.000303 ***
## sc_code35                    2.030e-01  9.325e-02   2.177 0.029501 *
## sc_code36                    2.048e-01  1.290e-01   1.587 0.112459
## sc_code51                    6.907e-01  1.122e-01   6.154 7.57e-10 ***
## sc_code52                   -4.170e-02  1.108e-01  -0.376 0.706571
## sc_code62                    7.040e-01  6.334e-01   1.112 0.266323
## sc_code63                   -2.367e-01  1.175e-01  -2.015 0.043940 *
## sc_code64                    3.226e-01  4.265e-01   0.756 0.449404
## sc_code73                   -1.359e-02  1.219e-01  -0.111 0.911233
## sc_code76                    1.432e-01  4.753e-01   0.301 0.763247
## wave5                        3.986e-01  4.166e-02   9.567  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 17814  on 12986  degrees of freedom
## Residual deviance: 15245  on 12947  degrees of freedom
##   (1527 observations deleted due to missingness)
## AIC: 15325
##
## Number of Fisher Scoring iterations: 9
```

```
#husband's education is not significant
anova(glm6b, glm6a, test = "LRT")
```

```
## Analysis of Deviance Table
##
## Model 1: employed2 ~ (job_cat_H + jl_2 + age + age_H + age_sq + age_sq_H +
##     dl06 + dl06_H + dependents + working_dependents + other_HHM +
##     other_working + sc_code + wave) - dl06_H
## Model 2: employed2 ~ job_cat_H + jl_2 + age + age_H + age_sq + age_sq_H +
##     dl06 + dl06_H + dependents + working_dependents + other_HHM +
##     other_working + sc_code + wave
##   Resid. Df Resid. Dev Df Deviance Pr(>Chi)
## 1     12947      15245
## 2     12943      15244  4  0.93906   0.9189
```

```
glm6c <- glm(employed2 ~ . - dl06_H - sc_code, family = binomial, data = r6)
summary(glm6c)
```

```
##
## Call:
## glm(formula = employed2 ~ . - dl06_H - sc_code, family = binomial,
##     data = r6)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
```

```
## -3.6644  -0.9617  -0.5845   1.0536   2.6572
##
## Coefficients:
##                                Estimate Std. Error z value Pr(>|z|)
## (Intercept)                  -4.2946327  0.2929401 -14.660  < 2e-16 ***
## job_cat_H2:self-employed     -1.2934264  0.1358277  -9.523  < 2e-16 ***
## job_cat_H3:informal business -1.3218556  0.1794376  -7.367 1.75e-13 ***
## job_cat_H4:government        -0.5911051  0.1516707  -3.897 9.73e-05 ***
## job_cat_H5:private           -0.5300503  0.1379525  -3.842 0.000122 ***
## job_cat_H6:casual            -0.4746153  0.1441376  -3.293 0.000992 ***
## jl_2                          0.4264239  0.1607139   2.653 0.007971 **
## age                           0.2254401  0.0186953  12.059  < 2e-16 ***
## age_H                        -0.0173650  0.0175594  -0.989 0.322696
## age_sq                       -0.0024773  0.0002170 -11.418  < 2e-16 ***
## age_sq_H                      0.0001019  0.0001801   0.566 0.571440
## dl062:elementary              0.1722805  0.0875526   1.968 0.049098 *
## dl063:juniorH                 0.2083477  0.0970099   2.148 0.031738 *
## dl064:seniorH                 0.3089422  0.0968233   3.191 0.001419 **
## dl065:higher                  1.5785572  0.1138859  13.861  < 2e-16 ***
## dependents                   -0.1435988  0.0218396  -6.575 4.86e-11 ***
## working_dependents            0.1655697  0.1511849   1.095 0.273452
## other_HHM                    -0.2889929  0.0124962 -23.126  < 2e-16 ***
## other_working                 0.6092672  0.0210181  28.988  < 2e-16 ***
## wave5                         0.3677409  0.0410775   8.952  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 17814  on 12986  degrees of freedom
## Residual deviance: 15483  on 12967  degrees of freedom
##   (1527 observations deleted due to missingness)
## AIC: 15523
##
## Number of Fisher Scoring iterations: 4
```

```
# region still significant
anova(glm6c, glm6b, test = "LRT")
```

```
## Analysis of Deviance Table
##
## Model 1: employed2 ~ (job_cat_H + jl_2 + age + age_H + age_sq + age_sq_H +
##     dl06 + dl06_H + dependents + working_dependents + other_HHM +
##     other_working + sc_code + wave) - dl06_H - sc_code
## Model 2: employed2 ~ (job_cat_H + jl_2 + age + age_H + age_sq + age_sq_H +
##     dl06 + dl06_H + dependents + working_dependents + other_HHM +
##     other_working + sc_code + wave) - dl06_H
##   Resid. Df Resid. Dev Df Deviance  Pr(>Chi)
## 1     12967      15483
## 2     12947      15245 20   237.76 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
r7 <- clean %>%
            select(employed2, job_cat_H, jl_year_fired, age, age_H, age_sq, age_sq_H, dl06, dl06_H, dep
```

```r
glm7a <- glm(employed2 ~ . , family = binomial, data = r7)
summary(glm7a)
```

```
##
## Call:
## glm(formula = employed2 ~ ., family = binomial, data = r7)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.4902  -0.9470  -0.5523   1.0312   2.8463
##
## Coefficients:
##                                Estimate Std. Error z value Pr(>|z|)
## (Intercept)                   -4.308e+00  3.212e-01 -13.415  < 2e-16 ***
## job_cat_H2:self-employed      -1.274e+00  1.381e-01  -9.230  < 2e-16 ***
## job_cat_H3:informal business -1.380e+00  1.817e-01  -7.592 3.15e-14 ***
## job_cat_H4:government         -5.969e-01  1.560e-01  -3.825 0.000131 ***
## job_cat_H5:private            -5.503e-01  1.403e-01  -3.923 8.74e-05 ***
## job_cat_H6:casual             -5.115e-01  1.467e-01  -3.487 0.000489 ***
## jl_year_fired1                 6.244e-01  2.829e-01   2.207 0.027306 *
## jl_year_fired2                 4.850e-01  3.289e-01   1.474 0.140362
## jl_year_fired3                 3.637e-01  3.801e-01   0.957 0.338671
## jl_year_fired4                 6.438e-01  4.202e-01   1.532 0.125510
## jl_year_fired5                -1.641e-01  5.333e-01  -0.308 0.758373
## age                            2.251e-01  1.888e-02  11.922  < 2e-16 ***
## age_H                         -2.363e-02  1.784e-02  -1.324 0.185342
## age_sq                        -2.495e-03  2.190e-04 -11.393  < 2e-16 ***
## age_sq_H                       1.623e-04  1.827e-04   0.888 0.374528
## dl062:elementary               2.063e-01  9.433e-02   2.187 0.028740 *
## dl063:juniorH                  2.385e-01  1.068e-01   2.233 0.025518 *
## dl064:seniorH                  3.142e-01  1.112e-01   2.826 0.004713 **
## dl065:higher                   1.564e+00  1.318e-01  11.861  < 2e-16 ***
## dl06_H2:elementary             6.595e-02  1.118e-01   0.590 0.555089
## dl06_H3:juniorH                3.910e-02  1.225e-01   0.319 0.749656
## dl06_H4:seniorH                4.369e-02  1.230e-01   0.355 0.722390
## dl06_H5:higher                 9.434e-02  1.405e-01   0.671 0.501934
## dependents                    -1.326e-01  2.239e-02  -5.924 3.15e-09 ***
## working_dependents             1.531e-01  1.523e-01   1.005 0.314767
## other_HHM                     -2.838e-01  1.274e-02 -22.268  < 2e-16 ***
## other_working                  6.013e-01  2.137e-02  28.141  < 2e-16 ***
## sc_code13                      4.030e-01  1.204e-01   3.348 0.000815 ***
## sc_code14                     -4.616e-01  2.722e-01  -1.696 0.089936 .
## sc_code15                     -1.001e+01  1.195e+02  -0.084 0.933256
## sc_code16                     -4.899e-01  1.209e-01  -4.051 5.09e-05 ***
## sc_code18                     -5.164e-01  1.211e-01  -4.264 2.00e-05 ***
## sc_code19                     -3.676e-01  2.779e-01  -1.323 0.185932
## sc_code21                      1.458e-01  7.325e-01   0.199 0.842232
## sc_code31                      1.367e-01  1.147e-01   1.192 0.233277
## sc_code32                     -4.895e-02  9.501e-02  -0.515 0.606443
## sc_code33                      3.772e-01  9.532e-02   3.957 7.59e-05 ***
## sc_code34                      4.025e-01  1.127e-01   3.572 0.000355 ***
## sc_code35                      2.033e-01  9.336e-02   2.178 0.029405 *
## sc_code36                      2.050e-01  1.291e-01   1.588 0.112353
```

```
## sc_code51                    6.853e-01  1.124e-01   6.095 1.09e-09 ***
## sc_code52                   -4.428e-02  1.109e-01  -0.399 0.689799
## sc_code62                    7.031e-01  6.342e-01   1.109 0.267543
## sc_code63                   -2.407e-01  1.176e-01  -2.046 0.040760 *
## sc_code64                    3.128e-01  4.278e-01   0.731 0.464760
## sc_code73                   -1.369e-02  1.223e-01  -0.112 0.910900
## sc_code76                    1.421e-01  4.758e-01   0.299 0.765237
## wave5                        3.979e-01  4.174e-02   9.533  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 17814  on 12986  degrees of freedom
## Residual deviance: 15242  on 12939  degrees of freedom
##   (1527 observations deleted due to missingness)
## AIC: 15338
##
## Number of Fisher Scoring iterations: 9
```

```
#add fixed effects?
clean$pidlink <- as.factor(clean$pidlink)

r8 <- clean %>%
            select(employed2, job_cat_H, jl_2, age, age_H, age_sq, age_sq_H, dl06, dl06_H, dependents, w

#glm8a <- glm(employed2 ~ . , family = binomial, data = r8)
#summary(glm8a)

#remove NA
r9 <- r8 %>%
      na.omit() %>%
      group_by(pidlink) %>%
      mutate(repeats = n()) %>%
      filter(repeats == 2) %>%
      select(- repeats)
```

```
## Warning: package 'bindrcpp' was built under R version 3.4.3
```

```
fe1 <- pdata.frame(r8, index=c("pidlink"), drop.index=TRUE, row.names=TRUE)

fe_mod_1 <- plm(formula = employed2 ~ job_cat_H + jl_2 + age + age_H + age_sq + age_sq_H + dl06 + dl06_H

#removed sc_code, makes sense, as regions is captured by HH fe
fe_mod_2 <- plm(formula = employed2 ~ job_cat_H + jl_2 + age + age_H + age_sq + age_sq_H + dl06 + dl06_H

#removed dl06_H
fe_mod_3 <- plm(formula = employed2 ~ job_cat_H + jl_2 + age + age_H + age_sq + age_sq_H + dl06 + depend

summary(fe_mod_1)
```

```
## Oneway (individual) effect Within Model
##
## Call:
## plm(formula = employed2 ~ job_cat_H + jl_2 + age + age_H + age_sq +
```

```
##     age_sq_H + dl06 + dl06_H + dependents + working_dependents +
##     other_HHM + other_working + sc_code + wave, data = fe1, model = "within")
##
## Unbalanced Panel: n = 7009, T = 1-2, N = 12987
##
## Residuals:
##      Min.   1st Qu.    Median   3rd Qu.      Max.
## -0.753452 -0.095291  0.000000  0.095291  0.753452
##
## Coefficients:
##                                 Estimate  Std. Error  t-value  Pr(>|t|)
## job_cat_H2:self-employed     -1.6574e-01  3.6609e-02  -4.5272 6.093e-06
## job_cat_H3:informal business -2.0366e-01  4.9443e-02  -4.1191 3.856e-05
## job_cat_H4:government        -3.5858e-02  4.9648e-02  -0.7223   0.47017
## job_cat_H5:private           -6.8006e-02  3.8628e-02  -1.7605   0.07837
## job_cat_H6:casual            -8.2471e-02  3.9490e-02  -2.0884   0.03680
## jl_2                          5.9074e-02  4.1095e-02   1.4375   0.15063
## age                           6.7859e-02  1.2760e-02   5.3181 1.087e-07
## age_H                        -2.4564e-02  1.0168e-02  -2.4157   0.01573
## age_sq                       -7.7256e-04  1.0794e-04  -7.1573 9.226e-13
## age_sq_H                      2.6655e-04  9.8942e-05   2.6940   0.00708
## dl062:elementary              1.8297e-02  4.0235e-02   0.4548   0.64930
## dl063:juniorH                 3.4858e-02  5.2991e-02   0.6578   0.51069
## dl064:seniorH                 2.0814e-02  6.3362e-02   0.3285   0.74255
## dl065:higher                  6.9330e-02  8.1337e-02   0.8524   0.39404
## dl06_H2:elementary           -5.0775e-02  4.7280e-02  -1.0739   0.28290
## dl06_H3:juniorH              -4.1803e-02  5.4708e-02  -0.7641   0.44483
## dl06_H4:seniorH               2.4589e-02  6.0803e-02   0.4044   0.68592
## dl06_H5:higher                4.0609e-02  7.2456e-02   0.5605   0.57519
## dependents                   -3.9864e-02  7.7068e-03  -5.1726 2.385e-07
## working_dependents            2.1899e-02  3.9303e-02   0.5572   0.57742
## other_HHM                    -5.7124e-02  4.4361e-03 -12.8770 < 2.2e-16
## other_working                 1.2826e-01  5.9173e-03  21.6760 < 2.2e-16
## sc_code13                    -2.4457e-01  2.5671e-01  -0.9527   0.34079
## sc_code14                     5.6345e-02  1.5992e-01   0.3523   0.72459
## sc_code15                    -5.6771e-01  6.2246e-01  -0.9121   0.36178
## sc_code16                    -5.9374e-01  3.0169e-01  -1.9680   0.04911
## sc_code18                    -6.5583e-01  3.1119e-01  -2.1075   0.03511
## sc_code19                    -2.2359e-02  4.5522e-01  -0.0491   0.96083
## sc_code21                    -2.2482e-01  5.9999e-01  -0.3747   0.70790
## sc_code31                    -2.4357e-01  2.4140e-01  -1.0090   0.31303
## sc_code32                    -4.2464e-01  2.3686e-01  -1.7928   0.07306
## sc_code33                    -1.6757e-01  2.3264e-01  -0.7203   0.47138
## sc_code34                    -3.2345e-01  2.6318e-01  -1.2290   0.21913
## sc_code35                    -3.1170e-01  2.9673e-01  -1.0505   0.29355
## sc_code36                    -3.2809e-01  2.7210e-01  -1.2057   0.22797
## sc_code51                    -1.8854e-01  3.6801e-01  -0.5123   0.60846
## sc_code52                     1.2575e-02  4.4809e-01   0.0281   0.97761
## sc_code62                     1.3947e-01  3.1371e-01   0.4446   0.65664
## sc_code63                    -4.6183e-01  3.2717e-01  -1.4116   0.15812
## sc_code64                     3.5279e-02  4.0485e-01   0.0871   0.93056
## sc_code73                    -2.5539e-01  4.4279e-01  -0.5768   0.56412
## wave5                         6.6902e-02  6.5588e-02   1.0200   0.30775
##
```

```
## job_cat_H2:self-employed     ***
## job_cat_H3:informal business ***
## job_cat_H4:government
## job_cat_H5:private           .
## job_cat_H6:casual            *
## jl_2
## age                          ***
## age_H                        *
## age_sq                       ***
## age_sq_H                     **
## dl062:elementary
## dl063:juniorH
## dl064:seniorH
## dl065:higher
## dl06_H2:elementary
## dl06_H3:juniorH
## dl06_H4:seniorH
## dl06_H5:higher
## dependents                   ***
## working_dependents
## other_HHM                    ***
## other_working                ***
## sc_code13
## sc_code14
## sc_code15
## sc_code16                    *
## sc_code18                    *
## sc_code19
## sc_code21
## sc_code31
## sc_code32                    .
## sc_code33
## sc_code34
## sc_code35
## sc_code36
## sc_code51
## sc_code52
## sc_code62
## sc_code63
## sc_code64
## sc_code73
## wave5
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    984.5
## Residual Sum of Squares: 847.96
## R-Squared:      0.13869
## Adj. R-Squared: -0.88425
## F-statistic: 22.7586 on 42 and 5936 DF, p-value: < 2.22e-16
```

```
summary(fe_mod_2)
```

```
## Oneway (individual) effect Within Model
##
```

```
## Call:
## plm(formula = employed2 ~ job_cat_H + jl_2 + age + age_H + age_sq +
##     age_sq_H + dl06 + dl06_H + dependents + working_dependents +
##     other_HHM + other_working + wave, data = fe1, model = "within")
##
## Unbalanced Panel: n = 7009, T = 1-2, N = 12987
##
## Residuals:
##      Min.   1st Qu.    Median   3rd Qu.      Max.
## -0.753253 -0.094981  0.000000  0.094981  0.753253
##
## Coefficients:
##                                 Estimate  Std. Error  t-value  Pr(>|t|)
## job_cat_H2:self-employed     -1.6706e-01  3.6509e-02  -4.5759 4.837e-06
## job_cat_H3:informal business -2.0412e-01  4.9356e-02  -4.1356 3.589e-05
## job_cat_H4:government        -3.3912e-02  4.9505e-02  -0.6850  0.493360
## job_cat_H5:private           -6.6811e-02  3.8469e-02  -1.7367  0.082486
## job_cat_H6:casual            -8.2717e-02  3.9394e-02  -2.0998  0.035792
## jl_2                          5.8610e-02  4.1083e-02   1.4266  0.153745
## age                           6.7678e-02  1.2730e-02   5.3165 1.096e-07
## age_H                        -2.4225e-02  1.0138e-02  -2.3896  0.016899
## age_sq                       -7.7025e-04  1.0781e-04  -7.1447 1.009e-12
## age_sq_H                      2.6192e-04  9.8783e-05   2.6514  0.008036
## dl062:elementary              1.7777e-02  4.0222e-02   0.4420  0.658520
## dl063:juniorH                 3.3490e-02  5.2925e-02   0.6328  0.526897
## dl064:seniorH                 2.2730e-02  6.3296e-02   0.3591  0.719527
## dl065:higher                  7.0645e-02  8.1221e-02   0.8698  0.384449
## dl06_H2:elementary           -5.0331e-02  4.7278e-02  -1.0646  0.287115
## dl06_H3:juniorH              -4.4930e-02  5.4679e-02  -0.8217  0.411280
## dl06_H4:seniorH               2.0754e-02  6.0733e-02   0.3417  0.732574
## dl06_H5:higher                3.1352e-02  7.2309e-02   0.4336  0.664605
## dependents                   -4.0424e-02  7.6869e-03  -5.2588 1.500e-07
## working_dependents            2.1082e-02  3.9231e-02   0.5374  0.591031
## other_HHM                    -5.7718e-02  4.4115e-03 -13.0836 < 2.2e-16
## other_working                 1.2822e-01  5.9060e-03  21.7108 < 2.2e-16
## wave5                         6.7912e-02  6.5468e-02   1.0373  0.299620
##
## job_cat_H2:self-employed     ***
## job_cat_H3:informal business ***
## job_cat_H4:government
## job_cat_H5:private           .
## job_cat_H6:casual            *
## jl_2
## age                          ***
## age_H                        *
## age_sq                       ***
## age_sq_H                     **
## dl062:elementary
## dl063:juniorH
## dl064:seniorH
## dl065:higher
## dl06_H2:elementary
## dl06_H3:juniorH
## dl06_H4:seniorH
```

```
## dl06_H5:higher
## dependents                    ***
## working_dependents
## other_HHM                     ***
## other_working                 ***
## wave5
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    984.5
## Residual Sum of Squares: 850.64
## R-Squared:      0.13597
## Adj. R-Squared: -0.88418
## F-statistic: 40.7444 on 23 and 5955 DF, p-value: < 2.22e-16
```

```
summary(fe_mod_3)
```

```
## Oneway (individual) effect Within Model
##
## Call:
## plm(formula = employed2 ~ job_cat_H + jl_2 + age + age_H + age_sq +
##     age_sq_H + dl06 + dependents + working_dependents + other_HHM +
##     other_working + wave, data = fe1, model = "within")
##
## Unbalanced Panel: n = 7010, T = 1-2, N = 12993
##
## Residuals:
##      Min.   1st Qu.    Median   3rd Qu.      Max.
## -0.752215 -0.095136  0.000000  0.095136  0.752215
##
## Coefficients:
##                                 Estimate  Std. Error  t-value  Pr(>|t|)
## job_cat_H2:self-employed     -1.6723e-01  3.6520e-02  -4.5790 4.766e-06
## job_cat_H3:informal business -2.0397e-01  4.9309e-02  -4.1365 3.575e-05
## job_cat_H4:government        -2.9249e-02  4.9459e-02  -0.5914  0.554293
## job_cat_H5:private           -6.6242e-02  3.8477e-02  -1.7216  0.085193
## job_cat_H6:casual            -8.1890e-02  3.9393e-02  -2.0788  0.037679
## jl_2                          5.8376e-02  4.1101e-02   1.4203  0.155568
## age                           6.7546e-02  1.2719e-02   5.3104 1.133e-07
## age_H                        -2.4631e-02  1.0113e-02  -2.4357  0.014893
## age_sq                       -7.6730e-04  1.0768e-04  -7.1257 1.158e-12
## age_sq_H                      2.5711e-04  9.8578e-05   2.6082  0.009125
## dl062:elementary              1.4342e-02  3.9944e-02   0.3591  0.719566
## dl063:juniorH                 2.7330e-02  5.2616e-02   0.5194  0.603492
## dl064:seniorH                 2.2872e-02  6.2973e-02   0.3632  0.716467
## dl065:higher                  7.3596e-02  8.0833e-02   0.9105  0.362611
## dependents                   -4.0633e-02  7.6841e-03  -5.2880 1.281e-07
## working_dependents            2.2067e-02  3.9245e-02   0.5623  0.573936
## other_HHM                    -5.7526e-02  4.4107e-03 -13.0424 < 2.2e-16
## other_working                 1.2784e-01  5.9037e-03  21.6548 < 2.2e-16
## wave5                         7.3341e-02  6.5403e-02   1.1214  0.262174
##
## job_cat_H2:self-employed     ***
## job_cat_H3:informal business ***
## job_cat_H4:government
```

```
## job_cat_H5:private           .
## job_cat_H6:casual            *
## jl_2
## age                          ***
## age_H                        *
## age_sq                       ***
## age_sq_H                     **
## dl062:elementary
## dl063:juniorH
## dl064:seniorH
## dl065:higher
## dependents                   ***
## working_dependents
## other_HHM                    ***
## other_working                ***
## wave5
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    985.5
## Residual Sum of Squares: 852.74
## R-Squared:      0.13471
## Adj. R-Squared: -0.88495
## F-statistic: 48.8687 on 19 and 5964 DF, p-value: < 2.22e-16
```

```
#need to test for significance of sc_code, but anova won't work
#anova(fe_mod_2, fe_mod_1, test = "LRT")
```

```
#looking for var the impact participation, but not hours

clean$wage_prof <- ifelse(!(is.na(clean$tk25a1)), clean$tk25a1, ifelse(!(is.na(clean$tk26a1)), clean$tk

#create a subset of wives with wage and hours data
workers <- clean %>%
            filter(employed == 1, (!(is.na(tk25a1)) | !(is.na(tk26a1))) & !(is.na(tk22a)))

h1 <- workers %>%
            select(wage_prof, job_cat, job_cat_H, jl_2, age, age_H, age_sq, age_sq_H, dl06, dl06_H, dep

#first hours regression
hours1a <- glm(tk22a ~ . , data = h1)
summary(hours1a)
```

```
##
## Call:
## glm(formula = tk22a ~ ., data = h1)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -53.731  -16.113   -1.129   12.147   84.109
##
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  2.767e+01  5.340e+00   5.181 2.29e-07 ***
## wage_prof                   -1.554e-08  3.061e-08  -0.508 0.611588
```

```
## job_cat3:informal business    4.885e-01  2.440e+00   0.200 0.841332
## job_cat4:government           -6.361e+00  1.407e+00  -4.521 6.27e-06 ***
## job_cat5:private              -5.149e+00  8.028e-01  -6.414 1.54e-10 ***
## job_cat6:casual               -1.107e+01  1.108e+00  -9.990  < 2e-16 ***
## job_cat_H2:self-employed      -8.820e+00  1.808e+00  -4.879 1.09e-06 ***
## job_cat_H3:informal business -9.428e+00  2.688e+00  -3.508 0.000456 ***
## job_cat_H4:government         -1.155e+01  2.088e+00  -5.531 3.32e-08 ***
## job_cat_H5:private            -9.238e+00  1.856e+00  -4.977 6.65e-07 ***
## job_cat_H6:casual             -1.069e+01  1.986e+00  -5.379 7.78e-08 ***
## jl_2                           5.520e-01  2.310e+00   0.239 0.811143
## age                            6.072e-01  3.267e-01   1.859 0.063101 .
## age_H                          4.362e-01  2.979e-01   1.464 0.143198
## age_sq                        -8.146e-03  3.787e-03  -2.151 0.031507 *
## age_sq_H                      -6.183e-03  3.060e-03  -2.021 0.043360 *
## dl062:elementary               3.026e+00  1.575e+00   1.921 0.054757 .
## dl063:juniorH                  3.368e+00  1.773e+00   1.899 0.057575 .
## dl064:seniorH                  2.797e+00  1.856e+00   1.507 0.131863
## dl065:higher                  -3.298e+00  2.094e+00  -1.575 0.115297
## dl06_H2:elementary             2.004e+00  1.872e+00   1.071 0.284440
## dl06_H3:juniorH                4.612e+00  2.055e+00   2.244 0.024847 *
## dl06_H4:seniorH                5.140e+00  2.053e+00   2.504 0.012310 *
## dl06_H5:higher                 4.174e+00  2.269e+00   1.839 0.065933 .
## dependents                    -4.042e-01  3.572e-01  -1.132 0.257814
## working_dependents             5.153e+00  2.469e+00   2.087 0.036941 *
## other_HHM                     -1.778e-01  1.925e-01  -0.924 0.355566
## other_working                  9.535e-01  3.405e-01   2.800 0.005121 **
## sc_code13                     -1.413e+00  1.899e+00  -0.744 0.456872
## sc_code14                      9.432e+00  5.014e+00   1.881 0.060000 .
## sc_code16                     -6.800e+00  2.117e+00  -3.212 0.001327 **
## sc_code18                      4.236e+00  2.135e+00   1.984 0.047303 *
## sc_code19                      4.125e+00  4.748e+00   0.869 0.384994
## sc_code21                      4.604e+00  1.048e+01   0.439 0.660464
## sc_code31                      5.339e+00  1.856e+00   2.877 0.004026 **
## sc_code32                      2.017e+00  1.575e+00   1.281 0.200378
## sc_code33                      2.349e+00  1.533e+00   1.532 0.125640
## sc_code34                      1.103e+00  1.738e+00   0.635 0.525765
## sc_code35                      3.345e+00  1.538e+00   2.175 0.029667 *
## sc_code36                      2.968e+00  2.157e+00   1.376 0.168814
## sc_code51                     -9.946e-01  1.696e+00  -0.586 0.557639
## sc_code52                      3.601e+00  1.849e+00   1.948 0.051470 .
## sc_code62                      9.715e+00  7.488e+00   1.297 0.194544
## sc_code63                     -3.729e+00  1.985e+00  -1.878 0.060426 .
## sc_code64                      4.457e+00  6.858e+00   0.650 0.515766
## sc_code73                      4.657e-01  2.071e+00   0.225 0.822091
## sc_code76                     -1.719e+00  7.862e+00  -0.219 0.826951
## wave5                         -2.478e-02  6.641e-01  -0.037 0.970235
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for gaussian family taken to be 538.3671)
##
##     Null deviance: 3218022  on 5569  degrees of freedom
## Residual deviance: 2972863  on 5522  degrees of freedom
##   (478 observations deleted due to missingness)
```

```
## AIC: 50884
##
## Number of Fisher Scoring iterations: 2
```

```
hours1b <- glm(tk22a ~ . - job_cat_H -age_H - age_sq_H, data = h1)
summary(hours1b)
```

```
##
## Call:
## glm(formula = tk22a ~ . - job_cat_H - age_H - age_sq_H, data = h1)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -51.18  -16.14   -1.03   12.24   82.64
##
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  2.110e+01  4.852e+00   4.348 1.40e-05 ***
## wage_prof                   -1.720e-08  3.067e-08  -0.561  0.57496
## job_cat3:informal business   2.759e-01  2.419e+00   0.114  0.90920
## job_cat4:government         -7.349e+00  1.373e+00  -5.354 8.97e-08 ***
## job_cat5:private            -5.679e+00  7.808e-01  -7.274 3.99e-13 ***
## job_cat6:casual             -1.184e+01  1.082e+00 -10.946  < 2e-16 ***
## jl_2                         1.214e+00  2.311e+00   0.525  0.59936
## age                          9.082e-01  2.042e-01   4.447 8.89e-06 ***
## age_sq                      -1.314e-02  2.429e-03  -5.408 6.65e-08 ***
## dl062:elementary             3.158e+00  1.578e+00   2.001  0.04544 *
## dl063:juniorH                3.549e+00  1.776e+00   1.998  0.04572 *
## dl064:seniorH                2.938e+00  1.855e+00   1.584  0.11320
## dl065:higher                -2.961e+00  2.088e+00  -1.418  0.15628
## dl06_H2:elementary           2.373e+00  1.873e+00   1.267  0.20534
## dl06_H3:juniorH              5.266e+00  2.051e+00   2.568  0.01025 *
## dl06_H4:seniorH              5.750e+00  2.046e+00   2.810  0.00496 **
## dl06_H5:higher               4.009e+00  2.224e+00   1.803  0.07147 .
## dependents                  -3.792e-01  3.579e-01  -1.059  0.28944
## working_dependents           5.437e+00  2.475e+00   2.197  0.02809 *
## other_HHM                   -1.910e-01  1.926e-01  -0.992  0.32142
## other_working                9.755e-01  3.410e-01   2.861  0.00424 **
## sc_code13                   -1.220e+00  1.900e+00  -0.642  0.52072
## sc_code14                    8.957e+00  5.028e+00   1.781  0.07490 .
## sc_code16                   -6.911e+00  2.122e+00  -3.256  0.00113 **
## sc_code18                    3.999e+00  2.138e+00   1.870  0.06148 .
## sc_code19                    4.724e+00  4.755e+00   0.993  0.32053
## sc_code21                    4.175e+00  1.051e+01   0.397  0.69126
## sc_code31                    5.478e+00  1.857e+00   2.950  0.00319 **
## sc_code32                    2.185e+00  1.576e+00   1.387  0.16552
## sc_code33                    2.250e+00  1.534e+00   1.467  0.14245
## sc_code34                    1.131e+00  1.740e+00   0.650  0.51587
## sc_code35                    3.469e+00  1.536e+00   2.259  0.02394 *
## sc_code36                    3.074e+00  2.160e+00   1.423  0.15470
## sc_code51                   -9.147e-01  1.700e+00  -0.538  0.59052
## sc_code52                    3.515e+00  1.850e+00   1.899  0.05755 .
## sc_code62                    9.613e+00  7.500e+00   1.282  0.20001
## sc_code63                   -3.714e+00  1.986e+00  -1.870  0.06152 .
## sc_code64                    4.074e+00  6.873e+00   0.593  0.55337
```

```
## sc_code73                   6.150e-01  2.075e+00   0.296  0.76694
## sc_code76                  -1.662e+00  7.878e+00  -0.211  0.83289
## wave5                      -1.322e-01  6.616e-01  -0.200  0.84158
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for gaussian family taken to be 541.7237)
##
##     Null deviance: 3218022  on 5569  degrees of freedom
## Residual deviance: 2995190  on 5529  degrees of freedom
##   (478 observations deleted due to missingness)
## AIC: 50912
##
## Number of Fisher Scoring iterations: 2
```

```
h1_data <- clean %>%
                select(employed2, job_cat_H, tk23a2y, jl_2, age, age_H, age_sq, age_sq_H, job_cat, dl06
                drop_na(- c(wage_prof, tk22a, job_cat, tk23a2y))

p1_data <- h1_data %>%
             select(-c(wage_prof, tk22a, job_cat, tk23a2y))

#probit1 based on glm6b
probit1 <- glm(employed2 ~ . , family = binomial (link = "probit"), data = p1_data)
summary(probit1)
```

```
##
## Call:
## glm(formula = employed2 ~ ., family = binomial(link = "probit"),
##     data = p1_data)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -4.1006  -0.9553  -0.5521   1.0425   3.0270
##
## Coefficients:
##                                Estimate Std. Error z value Pr(>|z|)
## (Intercept)                  -2.5196036  0.1824572 -13.809  < 2e-16 ***
## job_cat_H2:self-employed     -0.7665327  0.0819771  -9.351  < 2e-16 ***
## job_cat_H3:informal business -0.8399848  0.1082286  -7.761 8.41e-15 ***
## job_cat_H4:government        -0.3530671  0.0918148  -3.845 0.000120 ***
## job_cat_H5:private           -0.3340974  0.0834488  -4.004 6.24e-05 ***
## job_cat_H6:casual            -0.3088380  0.0873036  -3.538 0.000404 ***
## jl_2                          0.2829136  0.0982697   2.879 0.003990 **
## age                           0.1348212  0.0110902  12.157  < 2e-16 ***
## age_H                        -0.0155070  0.0105927  -1.464 0.143214
## age_sq                       -0.0014888  0.0001284 -11.597  < 2e-16 ***
## age_sq_H                      0.0001151  0.0001086   1.060 0.289263
## dl062:elementary              0.1197979  0.0536309   2.234 0.025500 *
## dl063:juniorH                 0.1373520  0.0596135   2.304 0.021220 *
## dl064:seniorH                 0.1840210  0.0601037   3.062 0.002201 **
## dl065:higher                  0.9626107  0.0695167  13.847  < 2e-16 ***
## dependents                   -0.0803792  0.0134017  -5.998 2.00e-09 ***
## working_dependents            0.1073051  0.0929523   1.154 0.248332
## other_HHM                    -0.1648520  0.0074452 -22.142  < 2e-16 ***
```

```
## other_working                0.3485851  0.0124214  28.063  < 2e-16 ***
## sc_code13                    0.2420717  0.0727673   3.327 0.000879 ***
## sc_code14                   -0.2727571  0.1600684  -1.704 0.088380 .
## sc_code15                   -3.8367303 36.5734123  -0.105 0.916451
## sc_code16                   -0.2947309  0.0718939  -4.100 4.14e-05 ***
## sc_code18                   -0.3050682  0.0720440  -4.234 2.29e-05 ***
## sc_code19                   -0.2228921  0.1651148  -1.350 0.177041
## sc_code21                    0.0892540  0.4443415   0.201 0.840802
## sc_code31                    0.0781499  0.0690748   1.131 0.257895
## sc_code32                   -0.0338988  0.0572342  -0.592 0.553662
## sc_code33                    0.2274816  0.0574974   3.956 7.61e-05 ***
## sc_code34                    0.2432070  0.0679956   3.577 0.000348 ***
## sc_code35                    0.1200638  0.0563460   2.131 0.033103 *
## sc_code36                    0.1122449  0.0780006   1.439 0.150143
## sc_code51                    0.4169987  0.0676610   6.163 7.14e-10 ***
## sc_code52                   -0.0316647  0.0667009  -0.475 0.634981
## sc_code62                    0.3786449  0.3659595   1.035 0.300826
## sc_code63                   -0.1437658  0.0705988  -2.036 0.041712 *
## sc_code64                    0.1892600  0.2602444   0.727 0.467079
## sc_code73                   -0.0141975  0.0730176  -0.194 0.845832
## sc_code76                    0.0665932  0.2872815   0.232 0.816690
## wave5                        0.2413767  0.0250918   9.620  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 17823  on 12992  degrees of freedom
## Residual deviance: 15269  on 12953  degrees of freedom
## AIC: 15349
##
## Number of Fisher Scoring iterations: 9
```

```
h1_data$mills <- invMillsRatio(probit1)$IMR1

heckit1 <- lm(tk22a ~ . - employed2 - job_cat_H - dependents - other_HHM - other_working + mills, data =

summary(heckit1)
```

```
##
## Call:
## lm(formula = tk22a ~ . - employed2 - job_cat_H - dependents -
##     other_HHM - other_working + mills, data = h1_data[h1_data$employed2 ==
##     1, ])
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -51.258 -16.570  -0.985  12.410  81.645
##
## Coefficients:
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 3.516e+01  5.605e+00   6.273 3.80e-10 ***
## tk23a2y                    -4.783e-02  3.760e-02  -1.272  0.20344
## jl_2                        5.578e-01  2.326e+00   0.240  0.81047
## age                         2.836e-01  3.421e-01   0.829  0.40718
```

```
## age_H                       3.285e-01  2.980e-01   1.102  0.27036
## age_sq                     -4.154e-03  3.914e-03  -1.061  0.28860
## age_sq_H                   -4.665e-03  3.056e-03  -1.527  0.12691
## job_cat3:informal business  6.128e-01  2.418e+00   0.253  0.79999
## job_cat4:government        -7.370e+00  1.384e+00  -5.327 1.04e-07 ***
## job_cat5:private           -5.952e+00  7.851e-01  -7.581 3.99e-14 ***
## job_cat6:casual            -1.248e+01  1.079e+00 -11.568  < 2e-16 ***
## dl062:elementary            3.499e+00  1.519e+00   2.304  0.02128 *
## dl063:juniorH               4.617e+00  1.675e+00   2.756  0.00586 **
## dl064:seniorH               4.396e+00  1.688e+00   2.604  0.00924 **
## dl065:higher               -3.546e+00  1.975e+00  -1.795  0.07269 .
## working_dependents          4.856e+00  2.465e+00   1.970  0.04886 *
## sc_code13                  -1.615e+00  1.911e+00  -0.845  0.39813
## sc_code14                   9.202e+00  5.041e+00   1.826  0.06797 .
## sc_code16                  -6.171e+00  2.141e+00  -2.883  0.00396 **
## sc_code18                   4.986e+00  2.153e+00   2.316  0.02060 *
## sc_code19                   5.413e+00  4.762e+00   1.137  0.25569
## sc_code21                   3.270e+00  1.052e+01   0.311  0.75584
## sc_code31                   5.580e+00  1.855e+00   3.008  0.00264 **
## sc_code32                   2.114e+00  1.571e+00   1.345  0.17857
## sc_code33                   1.779e+00  1.547e+00   1.151  0.24996
## sc_code34                   6.322e-01  1.754e+00   0.360  0.71849
## sc_code35                   3.211e+00  1.533e+00   2.094  0.03629 *
## sc_code36                   3.004e+00  2.165e+00   1.388  0.16531
## sc_code51                  -1.828e+00  1.737e+00  -1.052  0.29264
## sc_code52                   3.231e+00  1.844e+00   1.752  0.07981 .
## sc_code62                   8.662e+00  7.517e+00   1.152  0.24927
## sc_code63                  -3.378e+00  1.985e+00  -1.702  0.08879 .
## sc_code64                   4.111e+00  6.881e+00   0.597  0.55028
## sc_code73                   6.503e-01  2.074e+00   0.314  0.75389
## sc_code76                  -1.226e+00  7.889e+00  -0.155  0.87648
## wave5                      -5.626e-01  6.824e-01  -0.824  0.40973
## wage_prof                  -1.383e-08  3.072e-08  -0.450  0.65260
## mills                      -3.904e+00  1.302e+00  -2.997  0.00274 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 23.3 on 5534 degrees of freedom
##   (141 observations deleted due to missingness)
## Multiple R-squared:  0.06652,    Adjusted R-squared:  0.06028
## F-statistic: 10.66 on 37 and 5534 DF,  p-value: < 2.2e-16
```

```
heckit2 <- lm(tk22a ~ . - employed2 - job_cat_H - dependents - other_HHM - other_working - sc_code + mi
summary(heckit2)
```

```
##
## Call:
## lm(formula = tk22a ~ . - employed2 - job_cat_H - dependents -
##     other_HHM - other_working - sc_code + mills, data = h1_data[h1_data$employed2 ==
##     1, ])
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -48.014 -17.087  -0.839  12.504  81.553
##
```

```
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  3.543e+01  5.237e+00   6.765 1.47e-11 ***
## tk23a2y                     -3.850e-02  3.755e-02  -1.025  0.30526
## jl_2                         8.030e-01  2.326e+00   0.345  0.72993
## age                          2.679e-01  3.385e-01   0.792  0.42863
## age_H                        3.682e-01  2.974e-01   1.238  0.21583
## age_sq                      -4.207e-03  3.877e-03  -1.085  0.27783
## age_sq_H                    -4.842e-03  3.055e-03  -1.585  0.11301
## job_cat3:informal business   6.602e-01  2.420e+00   0.273  0.78503
## job_cat4:government         -7.665e+00  1.375e+00  -5.575 2.60e-08 ***
## job_cat5:private            -5.223e+00  7.726e-01  -6.760 1.52e-11 ***
## job_cat6:casual             -1.191e+01  1.078e+00 -11.043  < 2e-16 ***
## dl062:elementary             3.568e+00  1.508e+00   2.366  0.01800 *
## dl063:juniorH                4.839e+00  1.660e+00   2.915  0.00357 **
## dl064:seniorH                4.274e+00  1.658e+00   2.578  0.00995 **
## dl065:higher                -3.468e+00  1.927e+00  -1.800  0.07190 .
## working_dependents           3.779e+00  2.466e+00   1.532  0.12547
## wave5                       -6.504e-01  6.742e-01  -0.965  0.33473
## wage_prof                   -9.810e-09  3.074e-08  -0.319  0.74966
## mills                       -3.792e+00  1.161e+00  -3.267  0.00109 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 23.41 on 5553 degrees of freedom
##   (141 observations deleted due to missingness)
## Multiple R-squared:  0.05446,    Adjusted R-squared:  0.05139
## F-statistic: 17.77 on 18 and 5553 DF,  p-value: < 2.2e-16
```

```
#region is significant, keep in model
anova(heckit2, heckit1, test = "LRT")
```

```
## Analysis of Variance Table
##
## Model 1: tk22a ~ (employed2 + job_cat_H + tk23a2y + jl_2 + age + age_H +
##     age_sq + age_sq_H + job_cat + dl06 + dependents + working_dependents +
##     other_HHM + other_working + sc_code + wave + wage_prof +
##     mills) - employed2 - job_cat_H - dependents - other_HHM -
##     other_working - sc_code + mills
## Model 2: tk22a ~ (employed2 + job_cat_H + tk23a2y + jl_2 + age + age_H +
##     age_sq + age_sq_H + job_cat + dl06 + dependents + working_dependents +
##     other_HHM + other_working + sc_code + wave + wage_prof +
##     mills) - employed2 - job_cat_H - dependents - other_HHM -
##     other_working + mills
##   Res.Df     RSS Df Sum of Sq  Pr(>Chi)
## 1   5553 3044060
## 2   5534 3005225 19     38835 5.144e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#remove age_H
heckit3 <- lm(tk22a ~ . - employed2 - job_cat_H - dependents - other_HHM - other_working - age_H - age_
summary(heckit3)
```

```
##
## Call:
```

```
## lm(formula = tk22a ~ . - employed2 - job_cat_H - dependents -
##     other_HHM - other_working - age_H - age_sq_H + mills, data = h1_data[h1_data$employed2 ==
##     1, ])
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -51.051 -16.465  -0.829  12.332  81.114
##
## Coefficients:
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 3.612e+01  5.495e+00   6.574 5.35e-11 ***
## tk23a2y                    -5.038e-02  3.759e-02  -1.341 0.180136
## jl_2                        6.321e-01  2.326e+00   0.272 0.785791
## age                         5.752e-01  2.143e-01   2.684 0.007303 **
## age_sq                     -8.819e-03  2.482e-03  -3.553 0.000384 ***
## job_cat3:informal business  6.693e-01  2.418e+00   0.277 0.781894
## job_cat4:government        -7.178e+00  1.381e+00  -5.196 2.11e-07 ***
## job_cat5:private           -5.869e+00  7.834e-01  -7.492 7.88e-14 ***
## job_cat6:casual            -1.245e+01  1.079e+00 -11.540  < 2e-16 ***
## dl062:elementary            3.674e+00  1.517e+00   2.421 0.015501 *
## dl063:juniorH               4.893e+00  1.671e+00   2.928 0.003423 **
## dl064:seniorH               4.722e+00  1.682e+00   2.808 0.005009 **
## dl065:higher               -3.214e+00  1.970e+00  -1.631 0.102870
## working_dependents          4.800e+00  2.465e+00   1.947 0.051582 .
## sc_code13                  -1.722e+00  1.907e+00  -0.903 0.366670
## sc_code14                   9.014e+00  5.042e+00   1.788 0.073847 .
## sc_code16                  -6.339e+00  2.140e+00  -2.963 0.003062 **
## sc_code18                   4.793e+00  2.152e+00   2.227 0.025955 *
## sc_code19                   5.232e+00  4.761e+00   1.099 0.271834
## sc_code21                   3.182e+00  1.052e+01   0.303 0.762247
## sc_code31                   5.482e+00  1.854e+00   2.957 0.003120 **
## sc_code32                   1.982e+00  1.570e+00   1.263 0.206707
## sc_code33                   1.602e+00  1.542e+00   1.039 0.298987
## sc_code34                   5.711e-01  1.750e+00   0.326 0.744224
## sc_code35                   3.024e+00  1.528e+00   1.980 0.047791 *
## sc_code36                   2.830e+00  2.162e+00   1.309 0.190499
## sc_code51                  -1.870e+00  1.736e+00  -1.077 0.281545
## sc_code52                   3.096e+00  1.843e+00   1.680 0.092980 .
## sc_code62                   8.547e+00  7.513e+00   1.138 0.255343
## sc_code63                  -3.527e+00  1.983e+00  -1.779 0.075314 .
## sc_code64                   3.843e+00  6.879e+00   0.559 0.576362
## sc_code73                   5.107e-01  2.074e+00   0.246 0.805479
## sc_code76                  -1.550e+00  7.886e+00  -0.197 0.844223
## wave5                      -5.666e-01  6.793e-01  -0.834 0.404251
## wage_prof                  -1.335e-08  3.073e-08  -0.434 0.664040
## mills                      -3.886e+00  1.294e+00  -3.002 0.002696 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 23.31 on 5536 degrees of freedom
##   (141 observations deleted due to missingness)
## Multiple R-squared:  0.06563,    Adjusted R-squared:  0.05973
## F-statistic: 11.11 on 35 and 5536 DF,  p-value: < 2.2e-16
```

```r
#OVERVIEW of RESULTS

#model with job loss coded as a binomial (could consider narrowing the time period to job loss in past
summary(glm1b)
```

```
##
## Call:
## glm(formula = employed ~ . - age_H - age_sq_H, family = binomial,
##     data = r1)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.1833  -0.9258   0.4713   0.8429   3.3040
##
## Coefficients:
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -3.470e+00  2.612e-01 -13.285  < 2e-16 ***
## employed_H2:Unemployed -1.509e-01  8.843e-02  -1.706 0.087921 .
## jl1                      9.802e-02  9.149e-02   1.071 0.283991
## age                      2.226e-01  1.066e-02  20.875  < 2e-16 ***
## age_sq                  -2.571e-03  1.265e-04 -20.327  < 2e-16 ***
## dl062:elementary        -3.462e-01  1.051e-01  -3.294 0.000987 ***
## dl063:juniorH           -4.064e-01  1.159e-01  -3.505 0.000456 ***
## dl064:seniorH           -4.471e-01  1.196e-01  -3.738 0.000185 ***
## dl065:higher             6.062e-01  1.410e-01   4.299 1.71e-05 ***
## dl06_H2:elementary      -1.900e-01  1.261e-01  -1.506 0.132028
## dl06_H3:juniorH         -4.034e-01  1.354e-01  -2.979 0.002891 **
## dl06_H4:seniorH         -4.017e-01  1.353e-01  -2.968 0.002996 **
## dl06_H5:higher          -4.629e-01  1.491e-01  -3.104 0.001909 **
## dependents              -1.559e-01  2.273e-02  -6.856 7.06e-12 ***
## working_dependents       9.441e-01  2.676e-01   3.528 0.000419 ***
## other_HHM               -4.526e-01  1.338e-02 -33.819  < 2e-16 ***
## other_working            1.007e+00  2.488e-02  40.495  < 2e-16 ***
## sc_code13               -1.515e-01  1.267e-01  -1.196 0.231694
## sc_code14               -1.035e+00  2.662e-01  -3.886 0.000102 ***
## sc_code15               -1.109e+01  1.367e+02  -0.081 0.935339
## sc_code16               -2.544e-01  1.212e-01  -2.099 0.035813 *
## sc_code18               -4.648e-01  1.217e-01  -3.819 0.000134 ***
## sc_code19               -9.773e-01  2.690e-01  -3.633 0.000280 ***
## sc_code21               -7.749e-01  7.511e-01  -1.032 0.302261
## sc_code31               -7.548e-01  1.164e-01  -6.487 8.73e-11 ***
## sc_code32               -7.546e-01  9.781e-02  -7.715 1.21e-14 ***
## sc_code33               -1.061e-01  1.016e-01  -1.043 0.296731
## sc_code34                5.852e-02  1.218e-01   0.480 0.630934
## sc_code35               -2.809e-01  9.805e-02  -2.864 0.004178 **
## sc_code36               -7.463e-01  1.328e-01  -5.618 1.93e-08 ***
## sc_code51                3.203e-01  1.261e-01   2.541 0.011053 *
## sc_code52               -5.311e-02  1.161e-01  -0.457 0.647431
## sc_code62               -2.298e-01  5.851e-01  -0.393 0.694461
## sc_code63               -2.112e-01  1.217e-01  -1.735 0.082665 .
## sc_code64               -4.319e-01  4.359e-01  -0.991 0.321757
## sc_code73               -6.849e-01  1.225e-01  -5.590 2.27e-08 ***
## sc_code76               -9.559e-01  4.509e-01  -2.120 0.034021 *
## wave5                    7.190e-02  4.321e-02   1.664 0.096157 .
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18393  on 13853  degrees of freedom
## Residual deviance: 14658  on 13816  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14734
##
## Number of Fisher Scoring iterations: 10
```

```
#model with job loss year
summary(glm2b)
```

```
##
## Call:
## glm(formula = employed ~ . - age_H - age_sq_H, family = binomial,
##     data = r2)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -5.1839  -0.9251   0.4715   0.8424   3.3053
##
## Coefficients:
##                             Estimate Std. Error z value Pr(>|z|)
## (Intercept)               -3.468e+00  2.613e-01 -13.276  < 2e-16 ***
## employed_H2:Unemployed -1.519e-01  8.846e-02  -1.717 0.085894 .
## jl_year1                   7.343e-02  1.597e-01   0.460 0.645760
## jl_year2                   2.176e-01  1.781e-01   1.222 0.221652
## jl_year3                  -6.353e-02  2.121e-01  -0.300 0.764529
## jl_year4                   3.590e-01  2.259e-01   1.589 0.111996
## jl_year5                  -2.449e-01  2.729e-01  -0.897 0.369686
## age                        2.226e-01  1.067e-02  20.869  < 2e-16 ***
## age_sq                    -2.571e-03  1.265e-04 -20.323  < 2e-16 ***
## dl062:elementary          -3.468e-01  1.051e-01  -3.300 0.000968 ***
## dl063:juniorH             -4.054e-01  1.160e-01  -3.495 0.000474 ***
## dl064:seniorH             -4.465e-01  1.196e-01  -3.733 0.000189 ***
## dl065:higher               6.073e-01  1.410e-01   4.306 1.67e-05 ***
## dl06_H2:elementary        -1.895e-01  1.262e-01  -1.502 0.133089
## dl06_H3:juniorH           -4.044e-01  1.354e-01  -2.986 0.002827 **
## dl06_H4:seniorH           -4.007e-01  1.354e-01  -2.960 0.003076 **
## dl06_H5:higher            -4.626e-01  1.491e-01  -3.102 0.001922 **
## dependents                -1.557e-01  2.274e-02  -6.845 7.64e-12 ***
## working_dependents         9.440e-01  2.677e-01   3.527 0.000421 ***
## other_HHM                 -4.529e-01  1.339e-02 -33.830  < 2e-16 ***
## other_working              1.008e+00  2.488e-02  40.509  < 2e-16 ***
## sc_code13                 -1.557e-01  1.268e-01  -1.228 0.219528
## sc_code14                 -1.037e+00  2.663e-01  -3.893 9.91e-05 ***
## sc_code15                 -1.109e+01  1.367e+02  -0.081 0.935326
## sc_code16                 -2.576e-01  1.213e-01  -2.123 0.033736 *
## sc_code18                 -4.690e-01  1.218e-01  -3.851 0.000117 ***
## sc_code19                 -9.775e-01  2.696e-01  -3.625 0.000289 ***
## sc_code21                 -7.756e-01  7.518e-01  -1.032 0.302256
## sc_code31                 -7.606e-01  1.165e-01  -6.530 6.59e-11 ***
```

```
## sc_code32              -7.565e-01  9.786e-02  -7.730 1.07e-14 ***
## sc_code33              -1.095e-01  1.017e-01  -1.077 0.281553
## sc_code34               5.617e-02  1.218e-01   0.461 0.644794
## sc_code35              -2.824e-01  9.810e-02  -2.878 0.003998 **
## sc_code36              -7.481e-01  1.329e-01  -5.628 1.82e-08 ***
## sc_code51               3.180e-01  1.261e-01   2.521 0.011707 *
## sc_code52              -5.394e-02  1.162e-01  -0.464 0.642460
## sc_code62              -2.133e-01  5.835e-01  -0.365 0.714771
## sc_code63              -2.130e-01  1.217e-01  -1.750 0.080053 .
## sc_code64              -4.459e-01  4.371e-01  -1.020 0.307655
## sc_code73              -6.869e-01  1.226e-01  -5.603 2.11e-08 ***
## sc_code76              -9.569e-01  4.511e-01  -2.121 0.033903 *
## wave5                   7.194e-02  4.323e-02   1.664 0.096070 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18393  on 13853  degrees of freedom
## Residual deviance: 14654  on 13812  degrees of freedom
##   (660 observations deleted due to missingness)
## AIC: 14738
##
## Number of Fisher Scoring iterations: 10
```

```
#model with job loss coded as binomial, unpaid family workers reclassified as unemployed
summary(glm5c)
```

```
##
## Call:
## glm(formula = employed2 ~ . - dl06_H - employed2_H, family = binomial,
##     data = r5)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.4028  -0.9668  -0.5931   1.0842   2.8154
##
## Coefficients:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)        -4.637e+00  2.604e-01 -17.810  < 2e-16 ***
## jl_2                5.682e-01  1.560e-01   3.642 0.000270 ***
## age                 2.278e-01  1.726e-02  13.201  < 2e-16 ***
## age_H              -4.650e-02  1.614e-02  -2.881 0.003960 **
## age_sq             -2.558e-03  1.947e-04 -13.140  < 2e-16 ***
## age_sq_H            3.870e-04  1.607e-04   2.409 0.016013 *
## dl062:elementary    1.950e-01  8.321e-02   2.344 0.019103 *
## dl063:juniorH       2.333e-01  9.218e-02   2.531 0.011365 *
## dl064:seniorH       3.553e-01  9.200e-02   3.862 0.000113 ***
## dl065:higher        1.646e+00  1.063e-01  15.482  < 2e-16 ***
## dependents         -1.292e-01  2.147e-02  -6.018 1.77e-09 ***
## working_dependents  1.387e-01  1.486e-01   0.933 0.350770
## other_HHM          -2.527e-01  1.174e-02 -21.528  < 2e-16 ***
## other_working       5.398e-01  1.945e-02  27.762  < 2e-16 ***
## sc_code13           4.019e-01  1.159e-01   3.469 0.000522 ***
## sc_code14          -4.184e-01  2.706e-01  -1.546 0.122015
```

```
## sc_code15          -1.048e+01  1.381e+02  -0.076 0.939515
## sc_code16          -4.526e-01  1.166e-01  -3.883 0.000103 ***
## sc_code18          -5.061e-01  1.170e-01  -4.326 1.52e-05 ***
## sc_code19          -1.610e-01  2.626e-01  -0.613 0.539716
## sc_code21           4.139e-01  7.419e-01   0.558 0.576913
## sc_code31           3.055e-01  1.085e-01   2.817 0.004847 **
## sc_code32           5.539e-02  9.093e-02   0.609 0.542380
## sc_code33           4.358e-01  9.155e-02   4.761 1.93e-06 ***
## sc_code34           5.009e-01  1.077e-01   4.652 3.29e-06 ***
## sc_code35           2.872e-01  8.974e-02   3.200 0.001375 **
## sc_code36           3.344e-01  1.242e-01   2.691 0.007114 **
## sc_code51           7.936e-01  1.079e-01   7.358 1.87e-13 ***
## sc_code52          -1.527e-03  1.063e-01  -0.014 0.988547
## sc_code62           7.584e-01  5.498e-01   1.379 0.167786
## sc_code63          -2.005e-01  1.129e-01  -1.776 0.075803 .
## sc_code64           3.679e-01  4.219e-01   0.872 0.383174
## sc_code73          -7.413e-02  1.161e-01  -0.638 0.523269
## sc_code76           1.997e-01  4.320e-01   0.462 0.643880
## wave5               4.115e-01  3.967e-02  10.374  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 18939  on 13813  degrees of freedom
## Residual deviance: 16598  on 13779  degrees of freedom
##   (700 observations deleted due to missingness)
## AIC: 16668
##
## Number of Fisher Scoring iterations: 10
```

```
#model with job loss years, unpaid family workers reclassified as unemployed
summary(glm6b)
```

```
##
## Call:
## glm(formula = employed2 ~ . - dl06_H, family = binomial, data = r6)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.4945  -0.9472  -0.5530   1.0319   2.8346
##
## Coefficients:
##                                Estimate Std. Error z value Pr(>|z|)
## (Intercept)                  -4.283e+00  3.092e-01 -13.850  < 2e-16 ***
## job_cat_H2:self-employed     -1.272e+00  1.379e-01  -9.227  < 2e-16 ***
## job_cat_H3:informal business -1.375e+00  1.815e-01  -7.574 3.62e-14 ***
## job_cat_H4:government        -5.823e-01  1.540e-01  -3.781 0.000156 ***
## job_cat_H5:private           -5.467e-01  1.401e-01  -3.903 9.51e-05 ***
## job_cat_H6:casual            -5.076e-01  1.463e-01  -3.468 0.000524 ***
## jl_2                          4.696e-01  1.628e-01   2.883 0.003935 **
## age                           2.244e-01  1.887e-02  11.895  < 2e-16 ***
## age_H                        -2.262e-02  1.780e-02  -1.270 0.203946
## age_sq                       -2.488e-03  2.188e-04 -11.369  < 2e-16 ***
## age_sq_H                      1.539e-04  1.825e-04   0.843 0.399146
```

```
## dl062:elementary              2.205e-01  8.930e-02   2.469 0.013548 *
## dl063:juniorH                 2.472e-01  9.924e-02   2.491 0.012728 *
## dl064:seniorH                 3.252e-01  9.997e-02   3.252 0.001144 **
## dl065:higher                  1.592e+00  1.166e-01  13.650  < 2e-16 ***
## dependents                   -1.327e-01  2.237e-02  -5.931 3.00e-09 ***
## working_dependents            1.518e-01  1.522e-01   0.997 0.318547
## other_HHM                    -2.836e-01  1.273e-02 -22.281  < 2e-16 ***
## other_working                 6.010e-01  2.132e-02  28.184  < 2e-16 ***
## sc_code13                     4.027e-01  1.203e-01   3.348 0.000815 ***
## sc_code14                    -4.594e-01  2.719e-01  -1.690 0.091031 .
## sc_code15                    -1.001e+01  1.195e+02  -0.084 0.933200
## sc_code16                    -4.842e-01  1.207e-01  -4.011 6.04e-05 ***
## sc_code18                    -5.160e-01  1.210e-01  -4.265 2.00e-05 ***
## sc_code19                    -3.598e-01  2.773e-01  -1.298 0.194456
## sc_code21                     1.446e-01  7.326e-01   0.197 0.843558
## sc_code31                     1.366e-01  1.146e-01   1.192 0.233391
## sc_code32                    -4.707e-02  9.491e-02  -0.496 0.619894
## sc_code33                     3.809e-01  9.513e-02   4.004 6.22e-05 ***
## sc_code34                     4.066e-01  1.126e-01   3.612 0.000303 ***
## sc_code35                     2.030e-01  9.325e-02   2.177 0.029501 *
## sc_code36                     2.048e-01  1.290e-01   1.587 0.112459
## sc_code51                     6.907e-01  1.122e-01   6.154 7.57e-10 ***
## sc_code52                    -4.170e-02  1.108e-01  -0.376 0.706571
## sc_code62                     7.040e-01  6.334e-01   1.112 0.266323
## sc_code63                    -2.367e-01  1.175e-01  -2.015 0.043940 *
## sc_code64                     3.226e-01  4.265e-01   0.756 0.449404
## sc_code73                    -1.359e-02  1.219e-01  -0.111 0.911233
## sc_code76                     1.432e-01  4.753e-01   0.301 0.763247
## wave5                         3.986e-01  4.166e-02   9.567  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 17814  on 12986  degrees of freedom
## Residual deviance: 15245  on 12947  degrees of freedom
##   (1527 observations deleted due to missingness)
## AIC: 15325
##
## Number of Fisher Scoring iterations: 9
```

```
#model with job loss coded as binomial, unpaid family workers w/ fixed effects
summary(fe_mod_3)
```

```
## Oneway (individual) effect Within Model
##
## Call:
## plm(formula = employed2 ~ job_cat_H + jl_2 + age + age_H + age_sq +
##     age_sq_H + dl06 + dependents + working_dependents + other_HHM +
##     other_working + wave, data = fe1, model = "within")
##
## Unbalanced Panel: n = 7010, T = 1-2, N = 12993
##
## Residuals:
##      Min.   1st Qu.    Median   3rd Qu.      Max.
```

```
## -0.752215 -0.095136  0.000000  0.095136  0.752215
##
## Coefficients:
##                                 Estimate  Std. Error  t-value  Pr(>|t|)
## job_cat_H2:self-employed     -1.6723e-01  3.6520e-02  -4.5790 4.766e-06
## job_cat_H3:informal business -2.0397e-01  4.9309e-02  -4.1365 3.575e-05
## job_cat_H4:government        -2.9249e-02  4.9459e-02  -0.5914  0.554293
## job_cat_H5:private           -6.6242e-02  3.8477e-02  -1.7216  0.085193
## job_cat_H6:casual            -8.1890e-02  3.9393e-02  -2.0788  0.037679
## jl_2                          5.8376e-02  4.1101e-02   1.4203  0.155568
## age                           6.7546e-02  1.2719e-02   5.3104 1.133e-07
## age_H                        -2.4631e-02  1.0113e-02  -2.4357  0.014893
## age_sq                       -7.6730e-04  1.0768e-04  -7.1257 1.158e-12
## age_sq_H                      2.5711e-04  9.8578e-05   2.6082  0.009125
## dl062:elementary              1.4342e-02  3.9944e-02   0.3591  0.719566
## dl063:juniorH                 2.7330e-02  5.2616e-02   0.5194  0.603492
## dl064:seniorH                 2.2872e-02  6.2973e-02   0.3632  0.716467
## dl065:higher                  7.3596e-02  8.0833e-02   0.9105  0.362611
## dependents                   -4.0633e-02  7.6841e-03  -5.2880 1.281e-07
## working_dependents            2.2067e-02  3.9245e-02   0.5623  0.573936
## other_HHM                    -5.7526e-02  4.4107e-03 -13.0424 < 2.2e-16
## other_working                 1.2784e-01  5.9037e-03  21.6548 < 2.2e-16
## wave5                         7.3341e-02  6.5403e-02   1.1214  0.262174
##
## job_cat_H2:self-employed     ***
## job_cat_H3:informal business ***
## job_cat_H4:government
## job_cat_H5:private           .
## job_cat_H6:casual            *
## jl_2
## age                          ***
## age_H                        *
## age_sq                       ***
## age_sq_H                     **
## dl062:elementary
## dl063:juniorH
## dl064:seniorH
## dl065:higher
## dependents                   ***
## working_dependents
## other_HHM                    ***
## other_working                ***
## wave5
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    985.5
## Residual Sum of Squares: 852.74
## R-Squared:      0.13471
## Adj. R-Squared: -0.88495
## F-statistic: 48.8687 on 19 and 5964 DF, p-value: < 2.22e-16
```

```
#probit model for heckman
summary(probit1)
```

```
##
## Call:
## glm(formula = employed2 ~ ., family = binomial(link = "probit"),
##     data = p1_data)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -4.1006  -0.9553  -0.5521   1.0425   3.0270
##
## Coefficients:
##                                Estimate Std. Error z value Pr(>|z|)
## (Intercept)                  -2.5196036  0.1824572 -13.809  < 2e-16 ***
## job_cat_H2:self-employed     -0.7665327  0.0819771  -9.351  < 2e-16 ***
## job_cat_H3:informal business -0.8399848  0.1082286  -7.761 8.41e-15 ***
## job_cat_H4:government        -0.3530671  0.0918148  -3.845 0.000120 ***
## job_cat_H5:private           -0.3340974  0.0834488  -4.004 6.24e-05 ***
## job_cat_H6:casual            -0.3088380  0.0873036  -3.538 0.000404 ***
## jl_2                          0.2829136  0.0982697   2.879 0.003990 **
## age                           0.1348212  0.0110902  12.157  < 2e-16 ***
## age_H                        -0.0155070  0.0105927  -1.464 0.143214
## age_sq                       -0.0014888  0.0001284 -11.597  < 2e-16 ***
## age_sq_H                      0.0001151  0.0001086   1.060 0.289263
## dl062:elementary              0.1197979  0.0536309   2.234 0.025500 *
## dl063:juniorH                 0.1373520  0.0596135   2.304 0.021220 *
## dl064:seniorH                 0.1840210  0.0601037   3.062 0.002201 **
## dl065:higher                  0.9626107  0.0695167  13.847  < 2e-16 ***
## dependents                   -0.0803792  0.0134017  -5.998 2.00e-09 ***
## working_dependents            0.1073051  0.0929523   1.154 0.248332
## other_HHM                    -0.1648520  0.0074452 -22.142  < 2e-16 ***
## other_working                 0.3485851  0.0124214  28.063  < 2e-16 ***
## sc_code13                     0.2420717  0.0727673   3.327 0.000879 ***
## sc_code14                    -0.2727571  0.1600684  -1.704 0.088380 .
## sc_code15                    -3.8367303 36.5734123  -0.105 0.916451
## sc_code16                    -0.2947309  0.0718939  -4.100 4.14e-05 ***
## sc_code18                    -0.3050682  0.0720440  -4.234 2.29e-05 ***
## sc_code19                    -0.2228921  0.1651148  -1.350 0.177041
## sc_code21                     0.0892540  0.4443415   0.201 0.840802
## sc_code31                     0.0781499  0.0690748   1.131 0.257895
## sc_code32                    -0.0338988  0.0572342  -0.592 0.553662
## sc_code33                     0.2274816  0.0574974   3.956 7.61e-05 ***
## sc_code34                     0.2432070  0.0679956   3.577 0.000348 ***
## sc_code35                     0.1200638  0.0563460   2.131 0.033103 *
## sc_code36                     0.1122449  0.0780006   1.439 0.150143
## sc_code51                     0.4169987  0.0676610   6.163 7.14e-10 ***
## sc_code52                    -0.0316647  0.0667009  -0.475 0.634981
## sc_code62                     0.3786449  0.3659595   1.035 0.300826
## sc_code63                    -0.1437658  0.0705988  -2.036 0.041712 *
## sc_code64                     0.1892600  0.2602444   0.727 0.467079
## sc_code73                    -0.0141975  0.0730176  -0.194 0.845832
## sc_code76                     0.0665932  0.2872815   0.232 0.816690
## wave5                         0.2413767  0.0250918   9.620  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 17823  on 12992  degrees of freedom
## Residual deviance: 15269  on 12953  degrees of freedom
## AIC: 15349
##
## Number of Fisher Scoring iterations: 9
```

```
#heckman model
summary(heckit3)
```

```
##
## Call:
## lm(formula = tk22a ~ . - employed2 - job_cat_H - dependents -
##     other_HHM - other_working - age_H - age_sq_H + mills, data = h1_data[h1_data$employed2 ==
##     1, ])
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -51.051 -16.465  -0.829  12.332  81.114
##
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  3.612e+01  5.495e+00   6.574 5.35e-11 ***
## tk23a2y                     -5.038e-02  3.759e-02  -1.341 0.180136
## jl_2                         6.321e-01  2.326e+00   0.272 0.785791
## age                          5.752e-01  2.143e-01   2.684 0.007303 **
## age_sq                      -8.819e-03  2.482e-03  -3.553 0.000384 ***
## job_cat3:informal business   6.693e-01  2.418e+00   0.277 0.781894
## job_cat4:government         -7.178e+00  1.381e+00  -5.196 2.11e-07 ***
## job_cat5:private            -5.869e+00  7.834e-01  -7.492 7.88e-14 ***
## job_cat6:casual             -1.245e+01  1.079e+00 -11.540  < 2e-16 ***
## dl062:elementary             3.674e+00  1.517e+00   2.421 0.015501 *
## dl063:juniorH                4.893e+00  1.671e+00   2.928 0.003423 **
## dl064:seniorH                4.722e+00  1.682e+00   2.808 0.005009 **
## dl065:higher                -3.214e+00  1.970e+00  -1.631 0.102870
## working_dependents           4.800e+00  2.465e+00   1.947 0.051582 .
## sc_code13                   -1.722e+00  1.907e+00  -0.903 0.366670
## sc_code14                    9.014e+00  5.042e+00   1.788 0.073847 .
## sc_code16                   -6.339e+00  2.140e+00  -2.963 0.003062 **
## sc_code18                    4.793e+00  2.152e+00   2.227 0.025955 *
## sc_code19                    5.232e+00  4.761e+00   1.099 0.271834
## sc_code21                    3.182e+00  1.052e+01   0.303 0.762247
## sc_code31                    5.482e+00  1.854e+00   2.957 0.003120 **
## sc_code32                    1.982e+00  1.570e+00   1.263 0.206707
## sc_code33                    1.602e+00  1.542e+00   1.039 0.298987
## sc_code34                    5.711e-01  1.750e+00   0.326 0.744224
## sc_code35                    3.024e+00  1.528e+00   1.980 0.047791 *
## sc_code36                    2.830e+00  2.162e+00   1.309 0.190499
## sc_code51                   -1.870e+00  1.736e+00  -1.077 0.281545
## sc_code52                    3.096e+00  1.843e+00   1.680 0.092980 .
## sc_code62                    8.547e+00  7.513e+00   1.138 0.255343
## sc_code63                   -3.527e+00  1.983e+00  -1.779 0.075314 .
## sc_code64                    3.843e+00  6.879e+00   0.559 0.576362
## sc_code73                    5.107e-01  2.074e+00   0.246 0.805479
```

```
## sc_code76                  -1.550e+00  7.886e+00  -0.197 0.844223
## wave5                      -5.666e-01  6.793e-01  -0.834 0.404251
## wage_prof                  -1.335e-08  3.073e-08  -0.434 0.664040
## mills                      -3.886e+00  1.294e+00  -3.002 0.002696 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 23.31 on 5536 degrees of freedom
##   (141 observations deleted due to missingness)
## Multiple R-squared:  0.06563,    Adjusted R-squared:  0.05973
## F-statistic: 11.11 on 35 and 5536 DF,  p-value: < 2.2e-16
```