SES PRIMR Correlation

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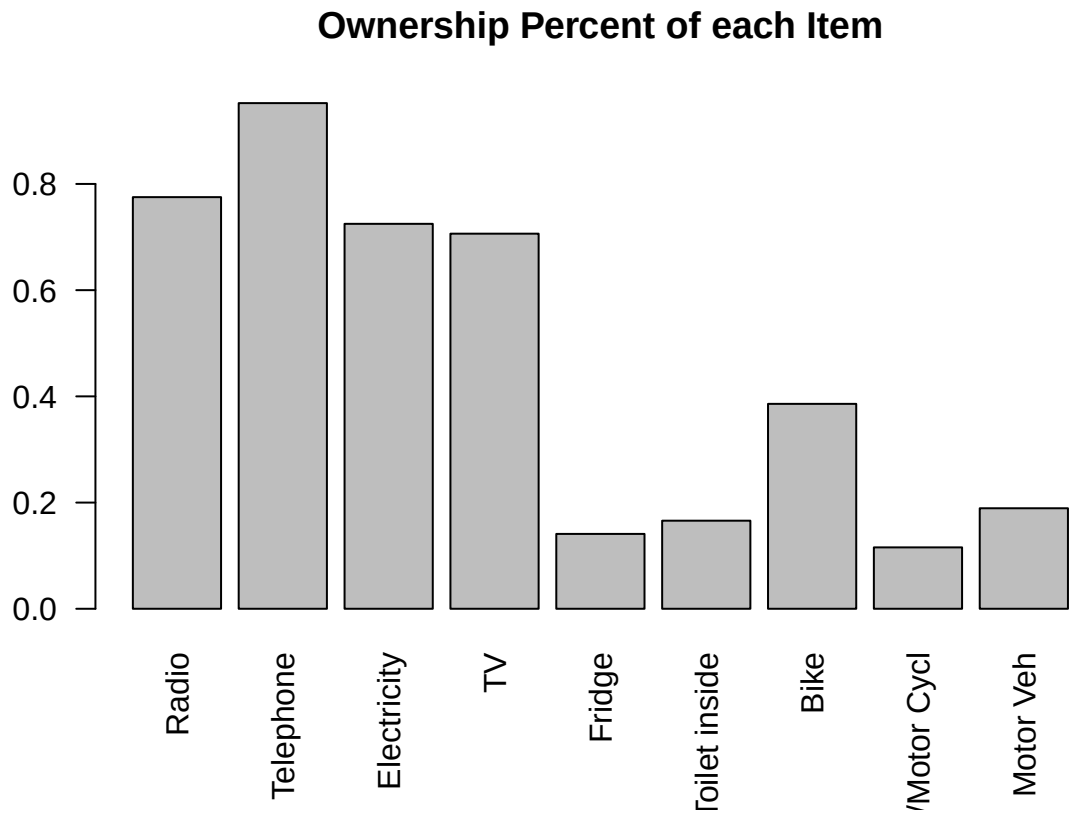
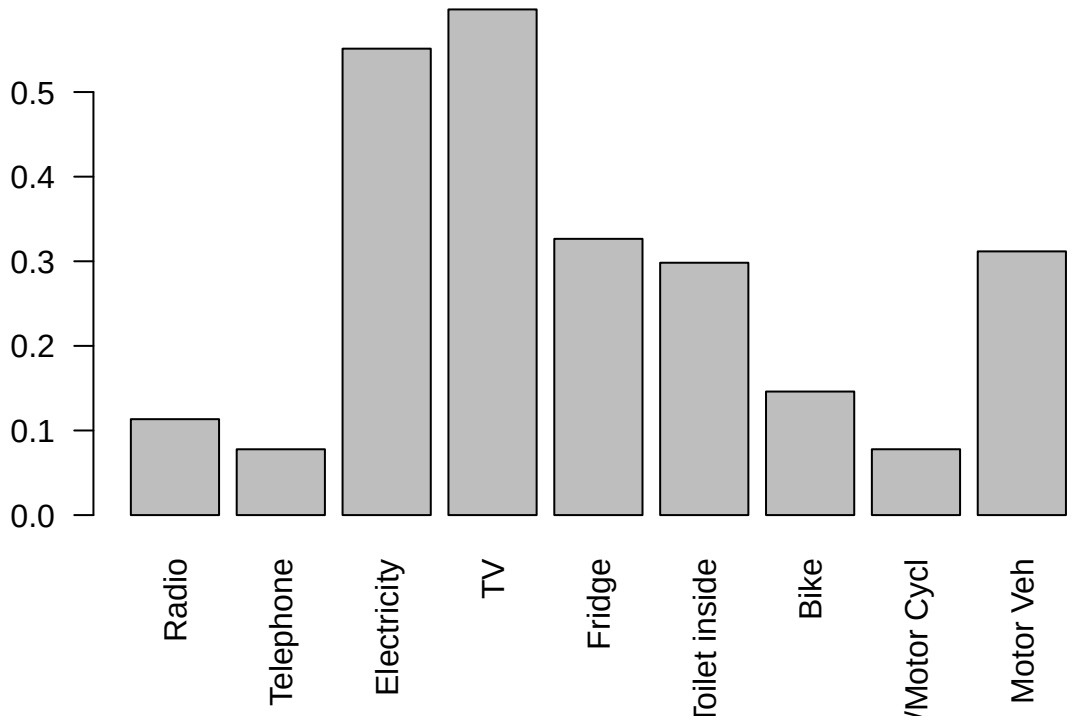
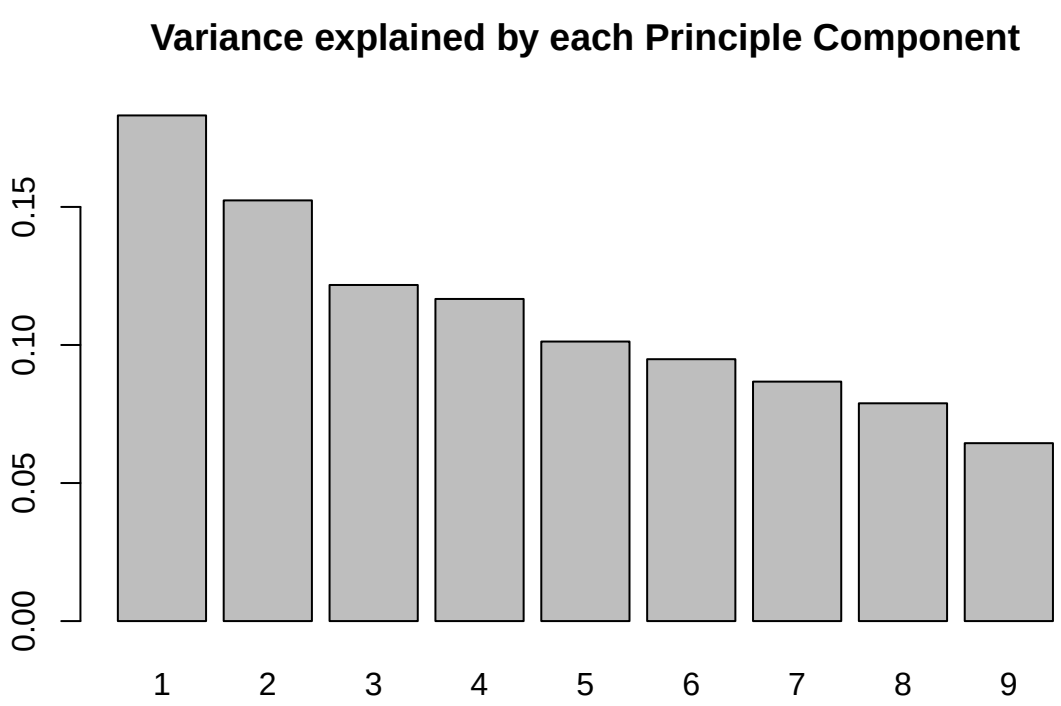
Coherence and Summary Statistics

First we will describe the percentage of the population which claims ownership of each asset.




Item weights for First Principle Component
0.5
0.4
0.3
0.2
0.1
0.0
Radio
Telephone
Electricity
TV
Fridge
Toilet inside
Bike
Motor Cycl
Motor Veh



Second we are interested in the time-related coherence of the data. That is, we are curious how many of the students answered ownership questions consistently from baseline to endline. On average each student changed their response to 2.44 of the 9 questions from baseline to endline. Approximately 93% of students changed at least one ownership question answer from baseline to endline, with 63% of these claiming that they no longer had possessions that they claimed to previously own.

```
sum(dataTemporal[paste0(SESfeat,".base")]!=dataTemporal[paste0(SESfeat,".end")])/nrow(dataTemporal)
```

```
## [1] 2.448293
```

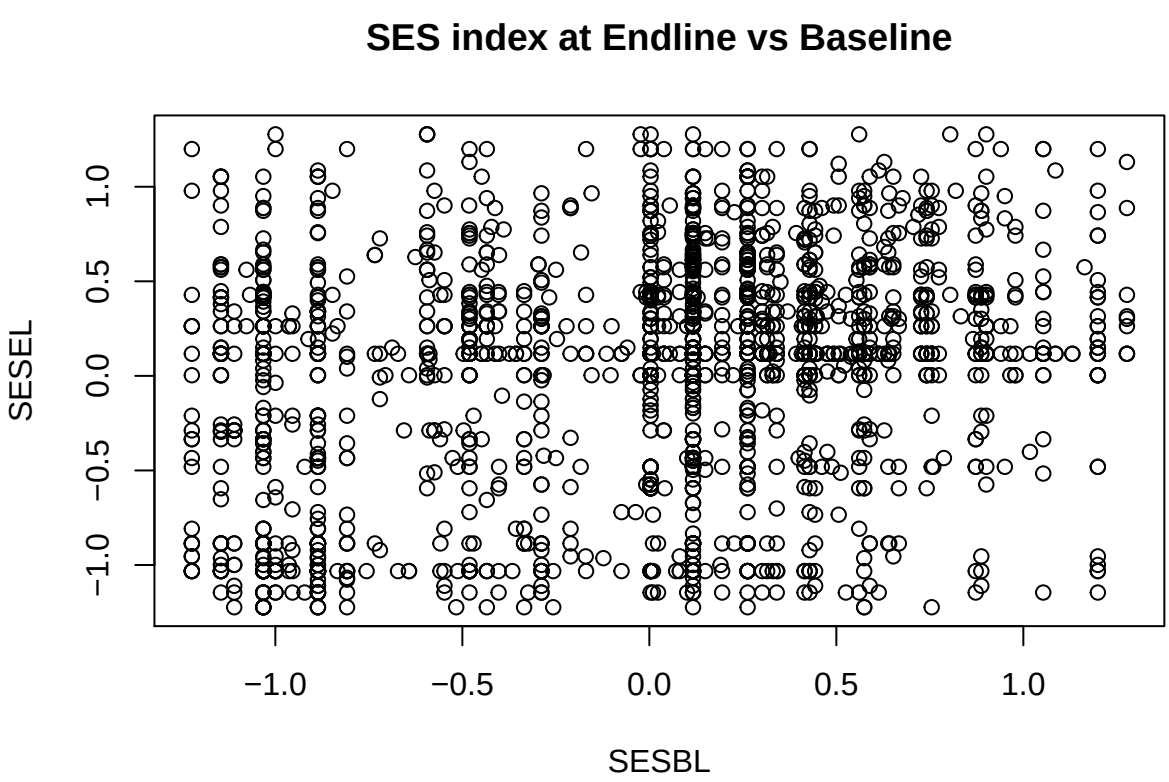
```
sum(rowSums(dataTemporal[paste0(SESfeat,".base")]!=dataTemporal[paste0(SESfeat,".end")])>0)/nrow(dataTe
```

```
## [1] 93.02439
```

```
sum(rowSums(dataTemporal[paste0(SESfeat,".base")]>dataTemporal[paste0(SESfeat,".end")])>0)/nrow(dataTem
```

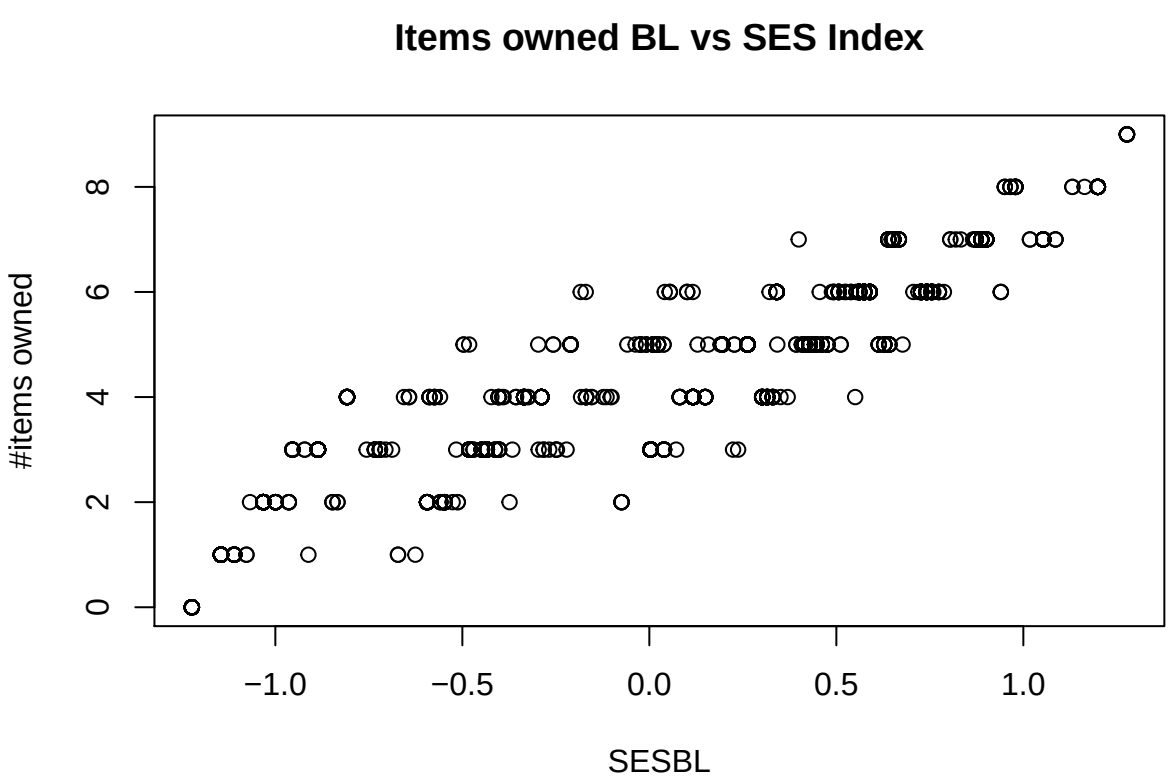
```
## [1] 62.92683
```

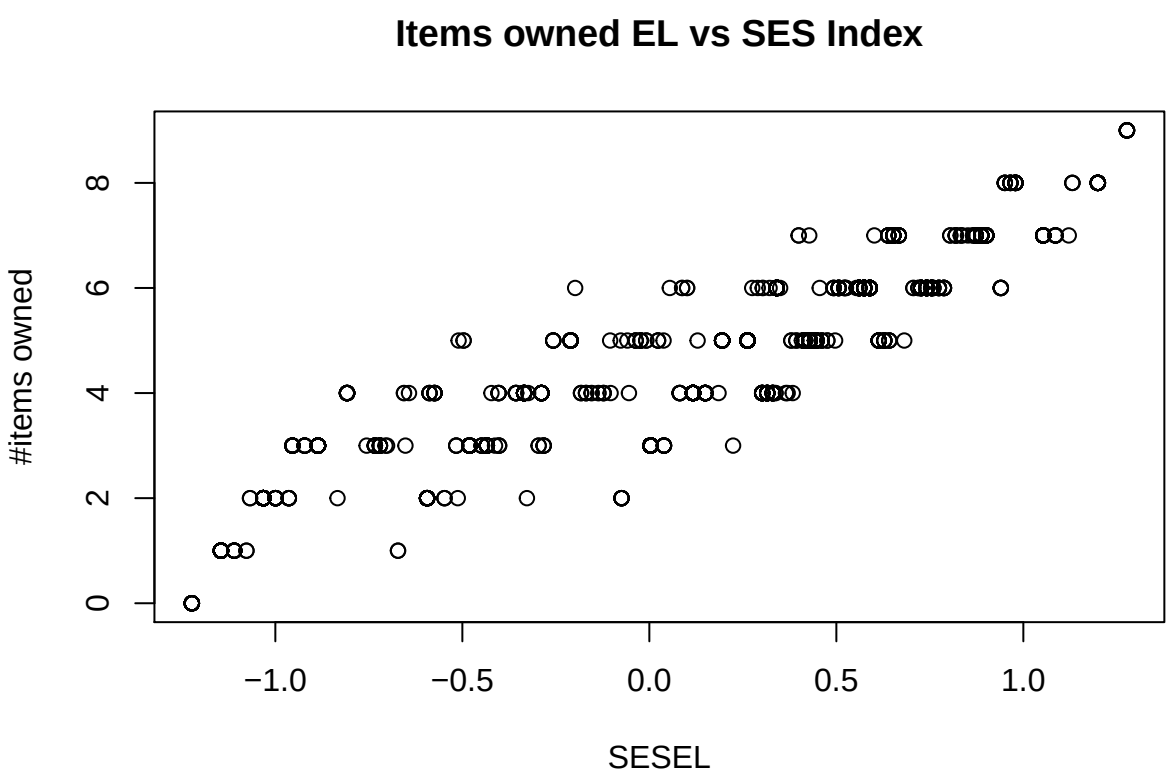
The above fact is a good indicator of the difficulty inherent in inferring based on this SES data.



Confusion matrix of quartiles based on Baseline/Endline SES Questions.

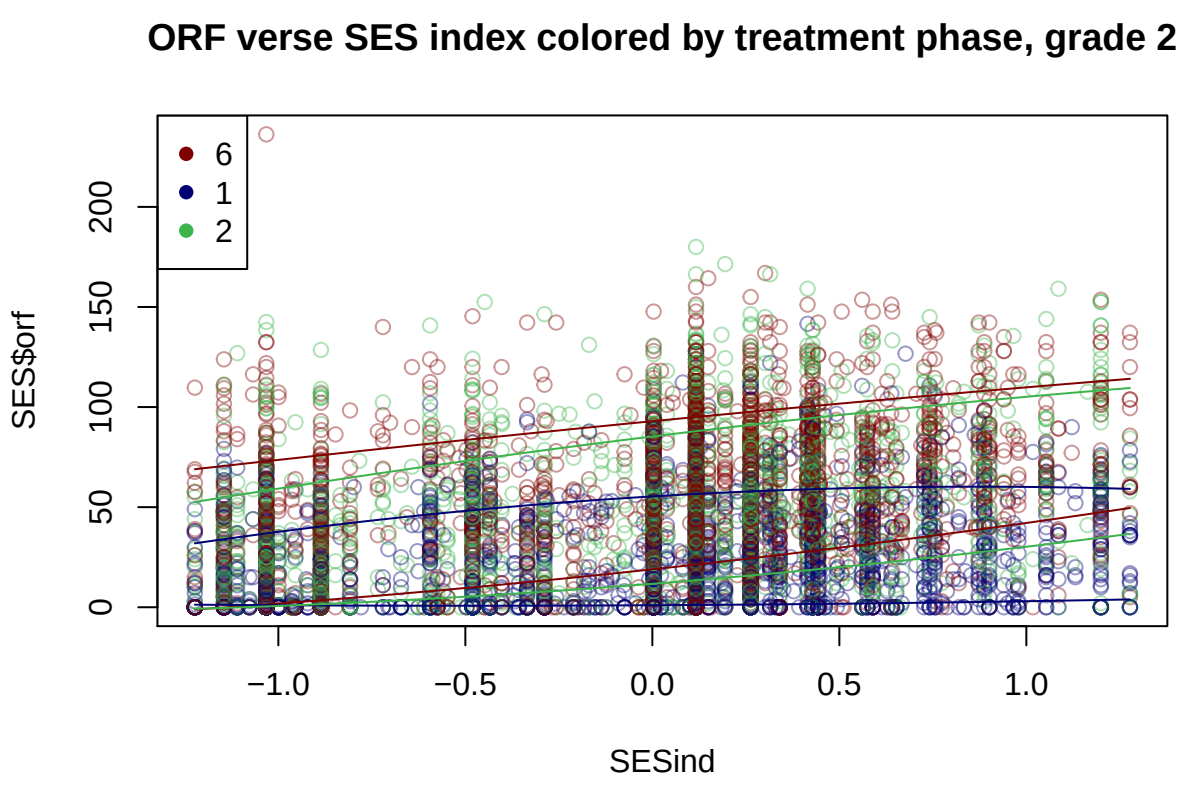
```
##         Endline
## Basline   1   2   3   4
##       1 209  69 112  84
##       2  29  52 154  94
##       3   0   0 250 179
##       4   0   0  28 154
```


Items owned BL vs SES Index
#items owned
0
2
4
6
8
−1.0
−0.5
0.0
0.5
1.0
SESBL



Stratified by Grade

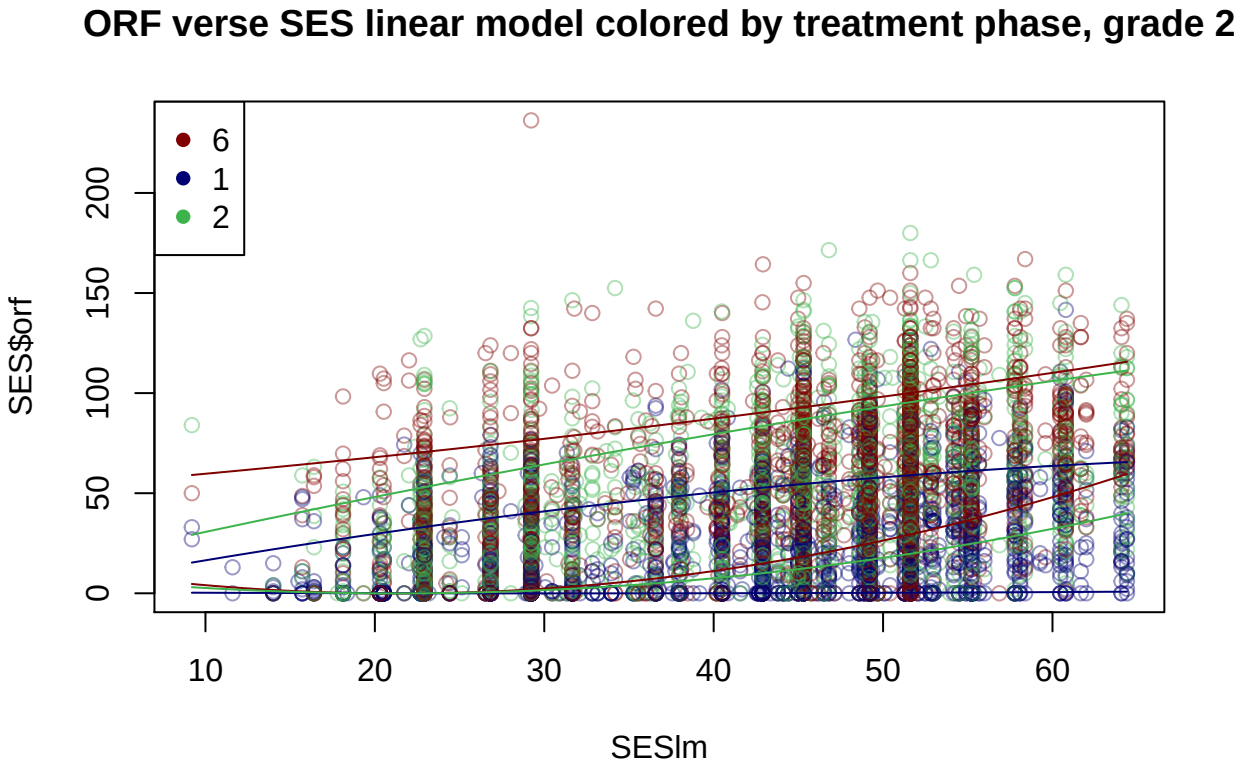
The first model we investigate stratifies the dataset by grade, acknowledging that within each age group Oral Reading Fluency (ORF) may be differently correlated with social economic status. For each grade level we extract the first principle component of the normalize (i.e. 0 mean, variance 1 transformed) asset ownership binary variables. This first principle component is used as a linear weighting scheme to produce a SES index. We plot the ORFof students verse this SSE index, colored by treatment phase. Additionally we attempt to model ORF with a logistic regression of asset ownership variables and measure the correlation of our indices with ORF within each treatment phase and grade pairing.




```
## [1] "Treat phase 6 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a  3.03355  2.46125    1.23252  0.21789
## b 20.13909  1.57622   12.77682  0.00000
## c 18.93031  1.58083   11.97494  0.00000
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -1.20555  3.20910   -0.37567  0.70720
## b 18.12885  2.19137    8.27283  0.00000
```

```
## c 92.93475  1.20802   76.93172  0.00000
## [1] "Treat phase 1 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a  1.00000  0.16183    6.17949  0.00000
## b  1.00000  0.22121    4.52058  0.00001
## c  1.00000  0.05593   17.88027  0.00000
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -6.48262  2.14008   -3.02915  0.00248
## b 11.22710  1.79015    6.27161  0.00000
## c 55.36624  1.23850   44.70424  0.00000
## [1] "Treat phase 2 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a  3.71835  2.75305    1.35063  0.17696
## b 14.78285  2.44883    6.03671  0.00000
## c 11.72096  1.21205    9.67035  0.00000
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -3.12432  2.82066   -1.10766  0.26814
## b 22.94165  2.36559    9.69808  0.00000
```

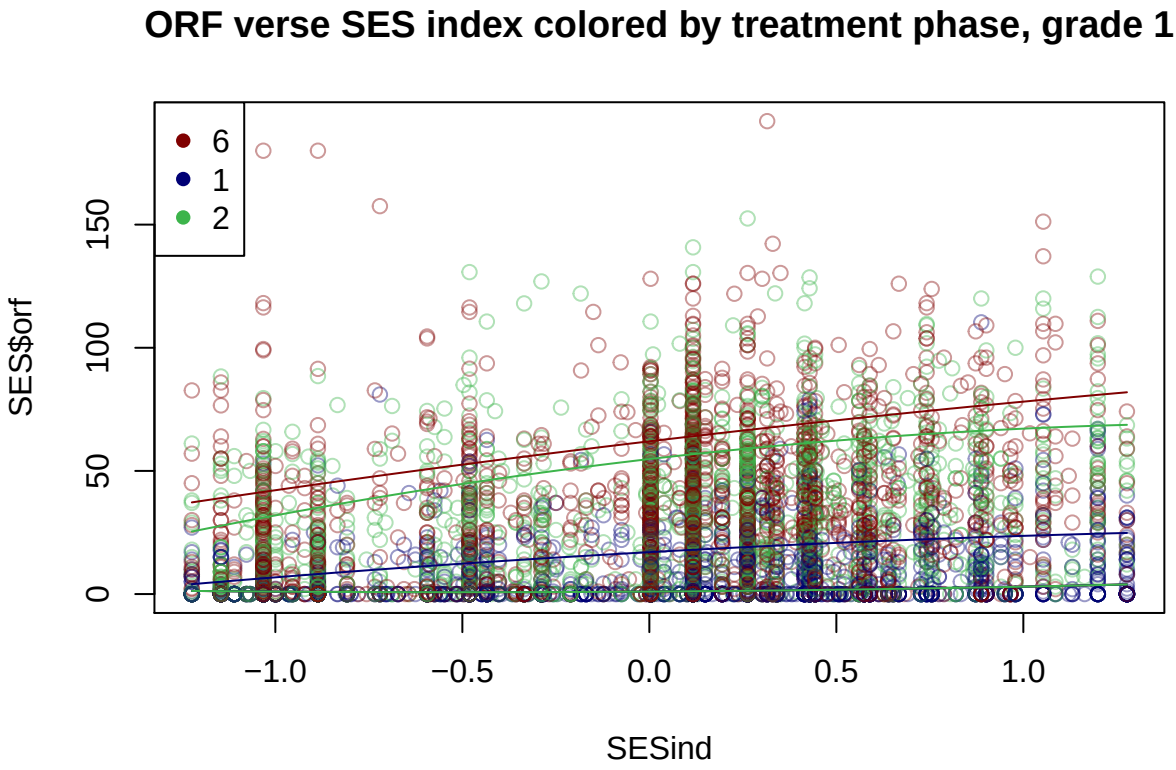
```
## c 85.31745  1.61725   52.75459  0.00000
```




```
## [1] "Treat phase 6 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a  0.03218  0.00446    7.21919  0.00000
## b -1.37340  0.33675   -4.07837  0.00005
## c 14.56635  5.34316    2.72617  0.00646
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
```

```
## a  0.00452  0.01013    0.44667  0.65516
## b  0.69145  0.79131    0.87381  0.38232
## c 52.35698 14.36293    3.64529  0.00027
## [1] "Treat phase 1 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a  0.00074  0.00039    1.91591  0.05551
## b -0.04504  0.02260   -1.99251  0.04644
## c  0.64138  0.30722    2.08772  0.03694
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -0.00932  0.00681   -1.36908  0.17112
## b  1.59593  0.60696    2.62939  0.00861
## c  1.44440 13.16907    0.10968  0.91267
## [1] "Treat phase 2 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a  0.02148  0.00351    6.11799  0.00000
## b -0.91173  0.25324   -3.60032  0.00033
## c  9.61482  3.87523    2.48110  0.01318
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
```

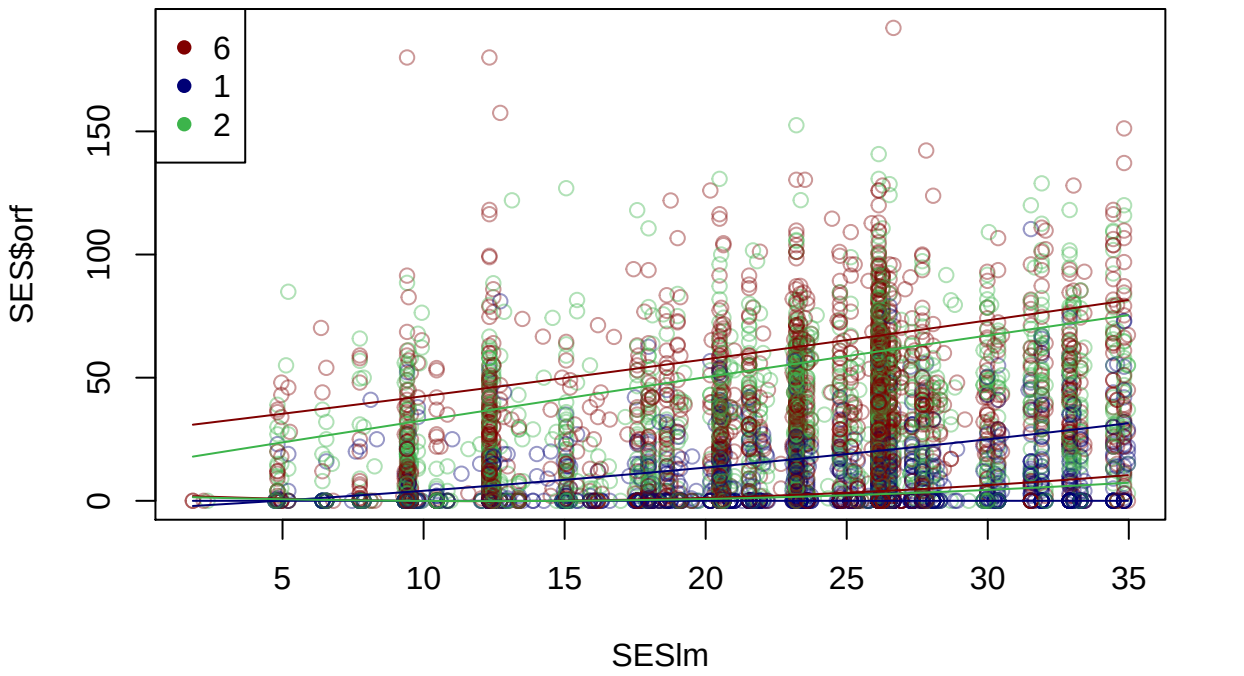
```
## a -0.00593  0.00963   -0.61608  0.53791
## b  1.92309  0.77431    2.48361  0.01309
## c 12.02438 14.59339    0.82396  0.41006
```




```
## [1] "Treat phase 6 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value   Std. Error t value Pr(>|t|)
## a 1.00000 0.60988    1.63966 0.10123
## b 1.00000 0.94607    1.05701 0.29063
## c 1.00000 0.36156    2.76578 0.00573
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
```

```
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -1.87065  3.19528   -0.58544  0.55831
## b 17.98254  2.45755    7.31728  0.00000
## c 62.00741  1.28391   48.29568  0.00000
## [1] "Treat phase 1 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value      Std. Error t value    Pr(>|t|)
## a          1          0  452730183          0
## b          1          0  510732355          0
## c          1          0 3867352945          0
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -1.80992  1.77741   -1.01829  0.30866
## b  8.41886  1.30193    6.46645  0.00000
## c 17.01117  1.29268   13.15960  0.00000
## [1] "Treat phase 2 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value   Std. Error t value Pr(>|t|)
## a 1.00000 0.76796    1.30215 0.19301
## b 1.00000 1.14457    0.87369 0.38239
## c 1.00000 0.37316    2.67982 0.00742
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
```

```
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -5.26430  2.85867   -1.84152  0.06569
## b 17.61160  2.20357    7.99232  0.00000
## c 54.80353  1.53005   35.81811  0.00000
```

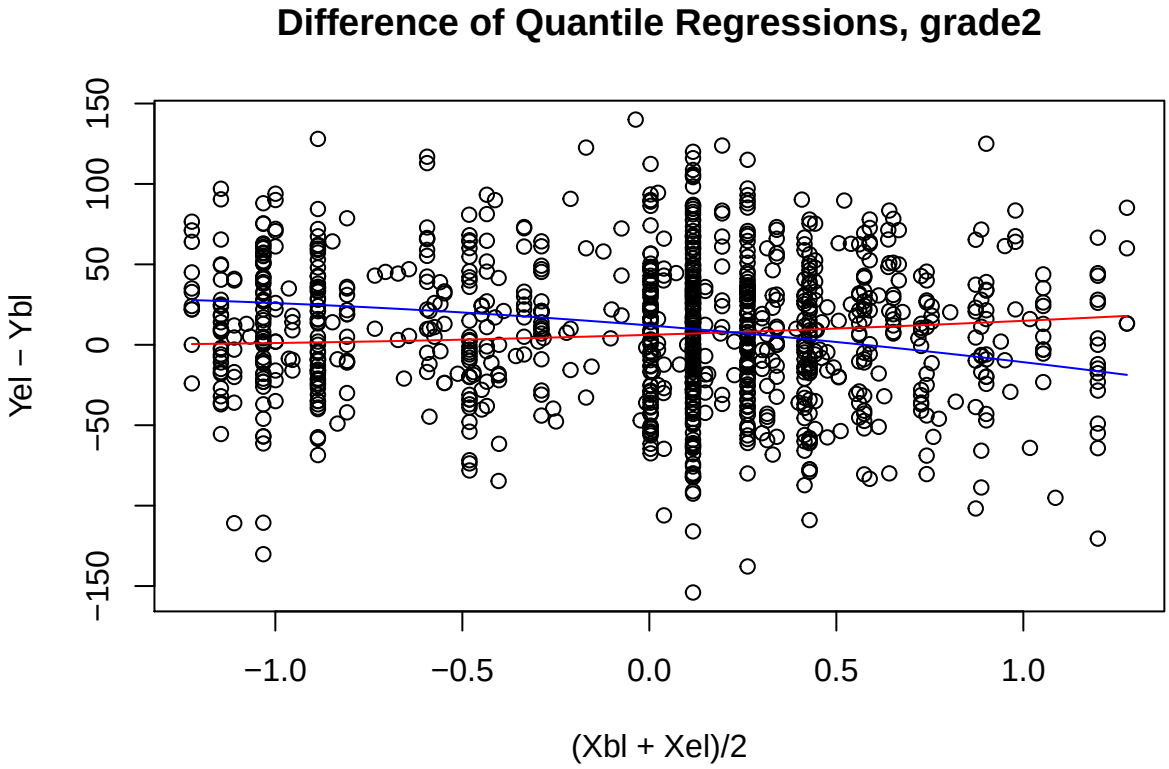


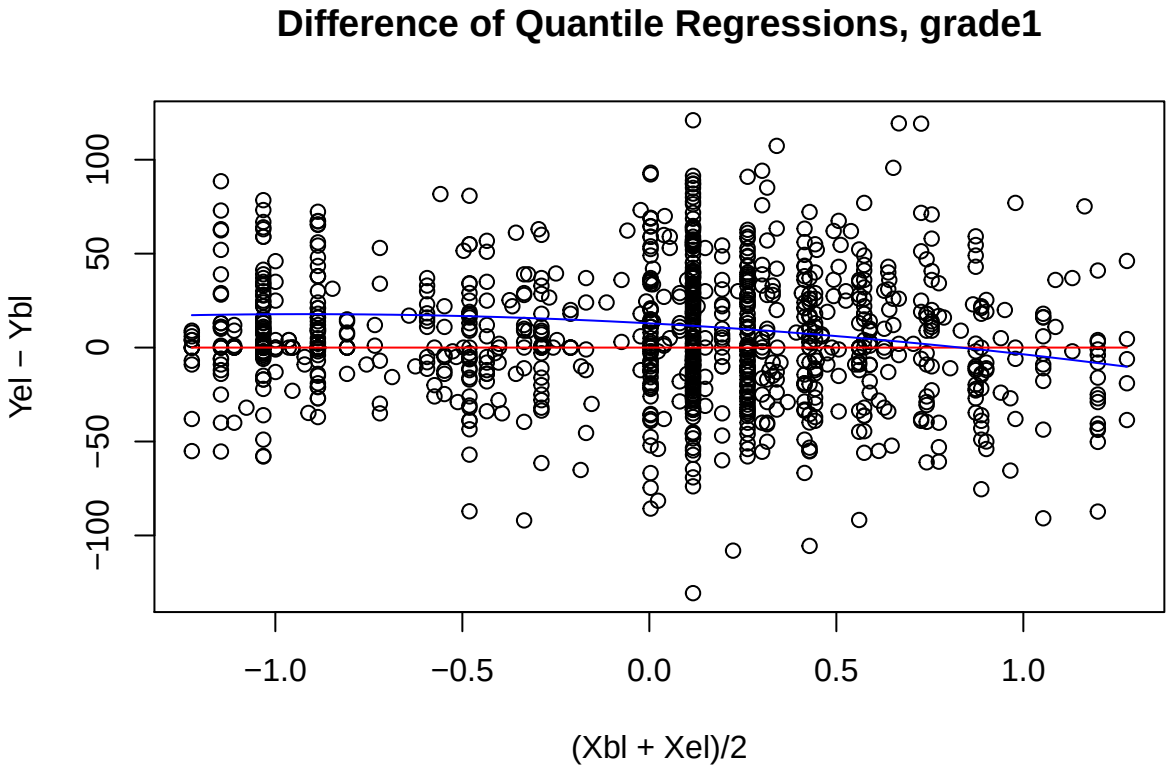

```
## [1] "Treat phase 6 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a  0.01985  0.00556    3.56943  0.00037
## b -0.47289  0.15815   -2.99005  0.00282
## c  2.69220  1.02996    2.61388  0.00902
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
```

```
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a  0.00439  0.02082    0.21058  0.83324
## b  1.36358  0.84850    1.60704  0.10820
## c 28.41651  8.41261    3.37785  0.00074
## [1] "Treat phase 1 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value      Std. Error t value    Pr(>|t|)
## a          0          0 -124956298          0
## b          0          0  131077307          0
## c          0          0  321790734          0
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a  0.01036  0.01150    0.90132  0.36752
## b  0.63152  0.37154    1.69976  0.08932
## c -3.28464  2.32701   -1.41153  0.15824
## [1] "Treat phase 2 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a  0.01442  0.00608    2.37137  0.01781
## b -0.35285  0.15979   -2.20820  0.02734
## c  2.04384  0.98144    2.08250  0.03742
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
```

```
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -0.00281  0.01871   -0.15011  0.88069
## b  1.83469  0.74141    2.47460  0.01342
## c 14.61846  7.26810    2.01132  0.04442
```

Quantile Regression differences from Baseline to endline



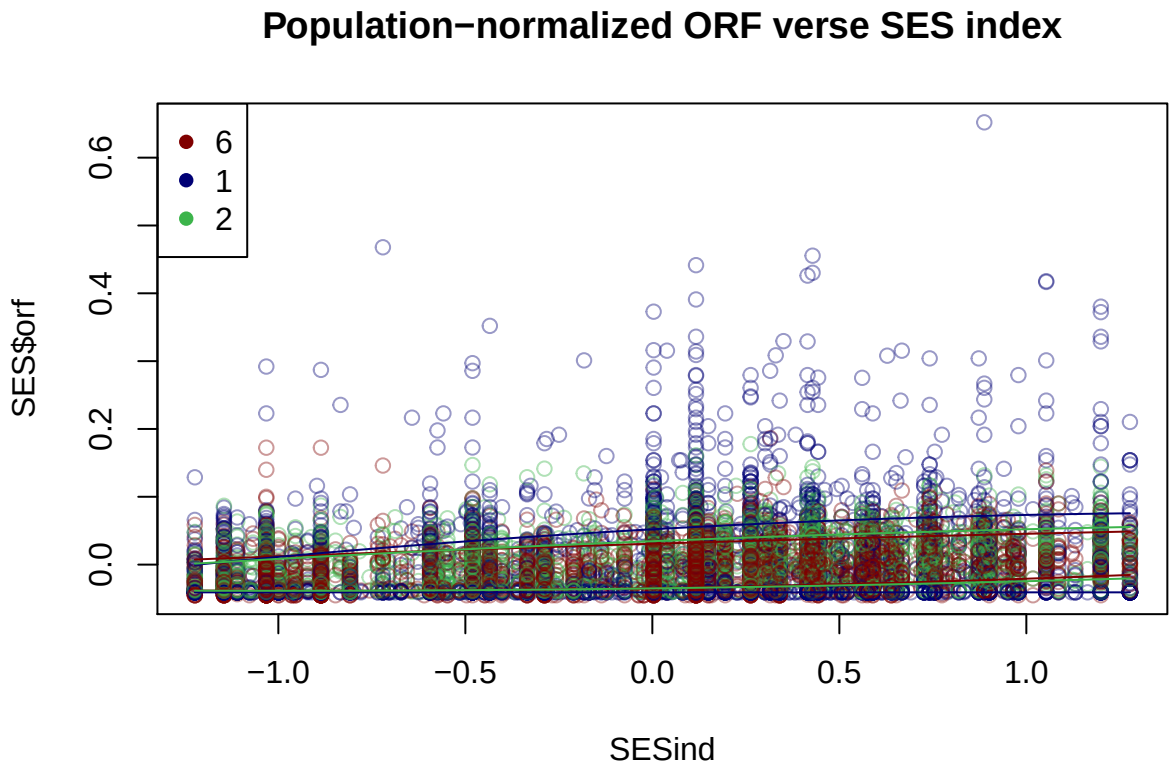


SES index verse Population-normalized ORF

An alternative manner of considering oral reading fluency as it is affected by factors of grade and social economic status is to adjust oral reading frequency within each grade by normalizing and attempting to explain this normalized correlation using with SES data.

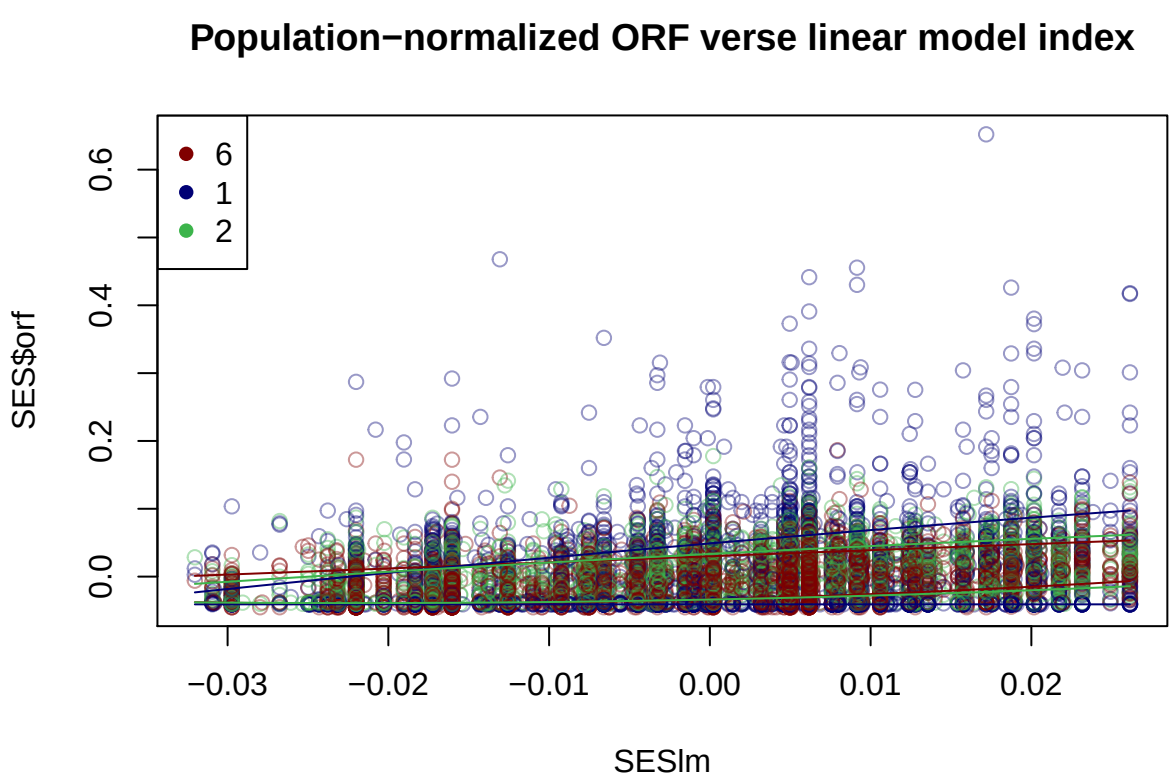
```
## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter

## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter

## [1] "Treat phase 6 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value     Std. Error t value   Pr(>|t|)
## a   0.00494   0.00153    3.22406   0.00127
## b   0.00892   0.00128    6.96037   0.00000
## c  -0.03465   0.00070  -49.70593   0.00000
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -0.00194  0.00243   -0.79668  0.42568
## b  0.01661  0.00175    9.46939  0.00000
## c  0.03074  0.00115   26.66698  0.00000

## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter

## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter

## [1] "Treat phase 1 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
```

```
## tau: [1] 0.15
##
## Coefficients:
##   Value          Std. Error    t value       Pr(>|t|)
## a  0.000000e+00  0.000000e+00 -2.116329e+02  0.000000e+00
## b  0.000000e+00  0.000000e+00 -7.015620e+02  0.000000e+00
## c -4.089000e-02  0.000000e+00 -7.817577e+08  0.000000e+00
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -0.00977  0.00503   -1.94106  0.05232
## b  0.03096  0.00414    7.48267  0.00000
## c  0.05206  0.00244   21.33409  0.00000

## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter

## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter
```



```
## [1] "Treat phase 2 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value     Std. Error t value   Pr(>|t|)
## a   0.00351   0.00075    4.70352   0.00000
## b   0.00703   0.00081    8.63587   0.00000
## c  -0.03506   0.00057  -61.74714   0.00000
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -0.00426  0.00178   -2.39507  0.01666
## b  0.02186  0.00125   17.44361  0.00000
## c  0.03452  0.00109   31.75326  0.00000

## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter

## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter

## [1] "Treat phase 6 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value     Std. Error t value   Pr(>|t|)
## a  15.53652   1.69868    9.14623   0.00000
## b   0.62566   0.04813   12.99874   0.00000
## c  -0.03367   0.00046  -72.62516   0.00000
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
```

```
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -0.12492  4.78228   -0.02612  0.97916
## b  0.89658  0.07539   11.89234  0.00000
## c  0.02998  0.00099   30.22288  0.00000

## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter

## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter

## [1] "Treat phase 1 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value         Std. Error    t value       Pr(>|t|)
## a  9.600000e-04  1.000000e-05  1.665806e+02  0.000000e+00
## b  1.000000e-05  0.000000e+00  1.763782e+02  0.000000e+00
## c -4.089000e-02  0.000000e+00 -9.093784e+07  0.000000e+00
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -6.83153 10.45818   -0.65322  0.51365
## b  2.03398  0.17340   11.73025  0.00000
## c  0.04891  0.00237   20.65867  0.00000

## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter

## Warning in plot.xy(xy.coords(x, y), type = type, ...): "add" is not a graphical
## parameter
```

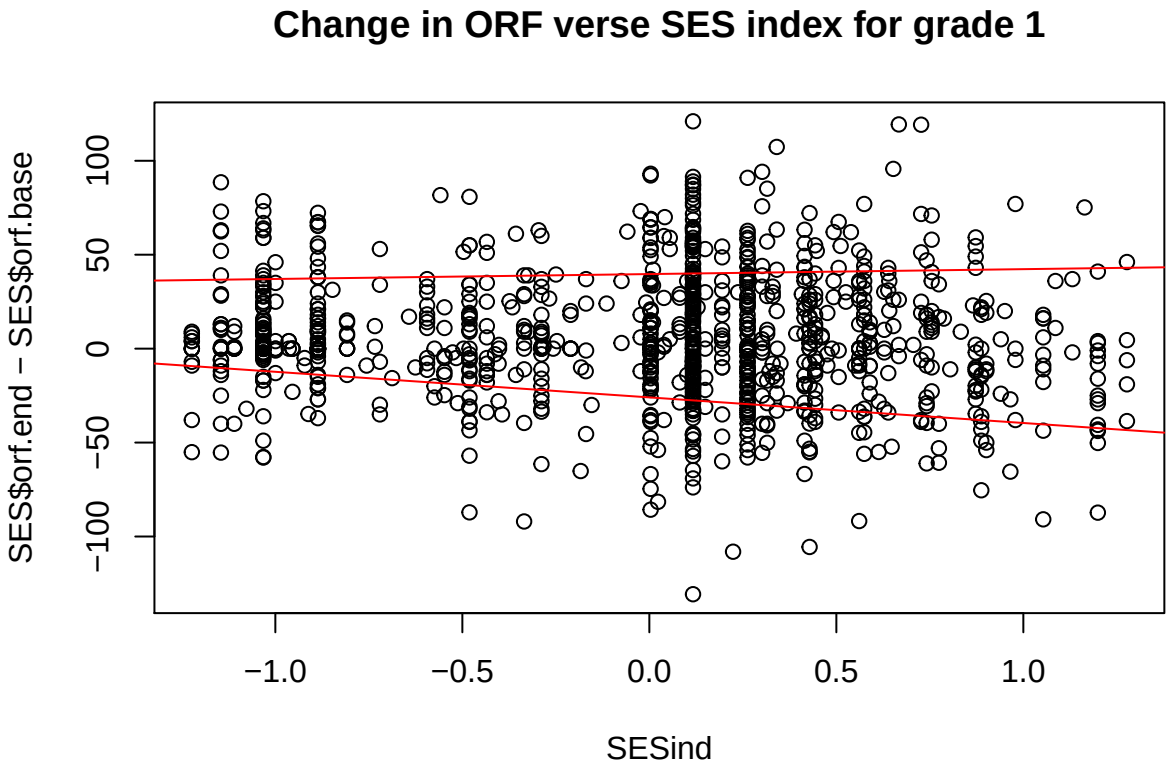


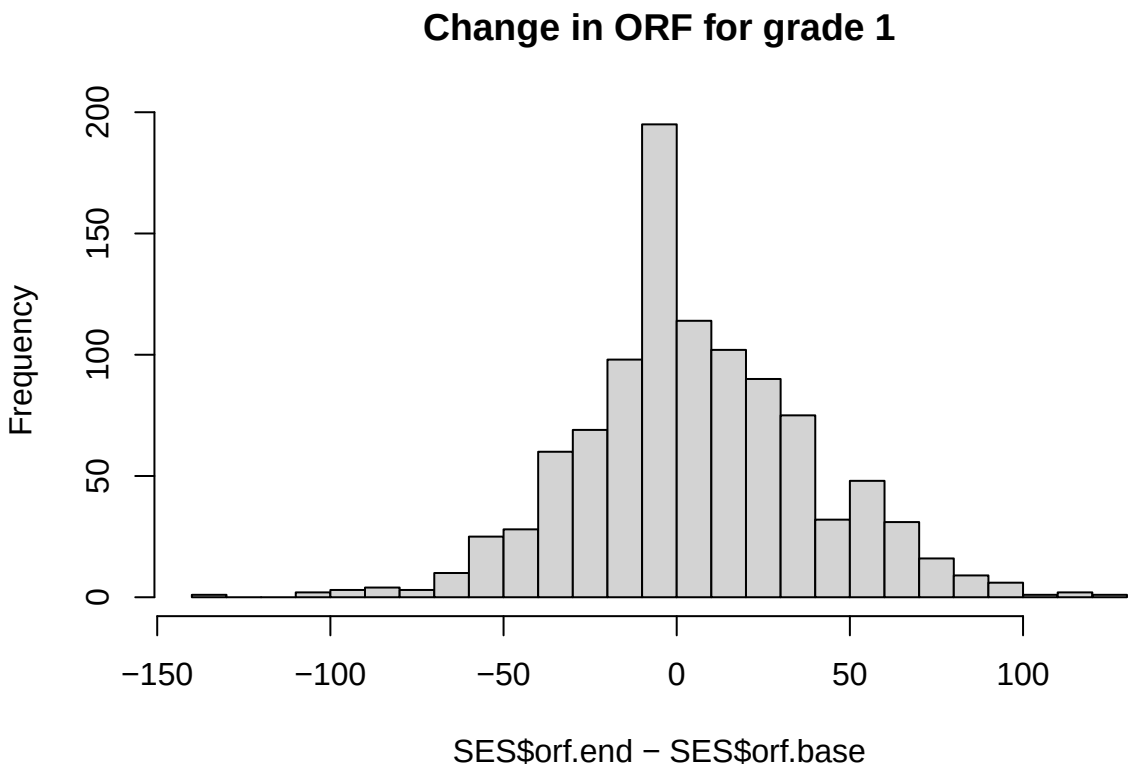

```
## [1] "Treat phase 2 quantile regression tests:"
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.15, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.15
##
## Coefficients:
##   Value     Std. Error t value   Pr(>|t|)
## a  10.64884   1.42932    7.45029   0.00000
## b   0.47077   0.03722   12.64702   0.00000
## c  -0.03381   0.00046  -73.86554   0.00000
##
## Call: nlrq(formula = quadrat, data = regdata, start = list(a = 1, b = 1,
##     c = 1), tau = 0.85, control = list(maxiter = 100, k = 2,
##     InitialStepSize = 1, big = 1e+20, eps = 1e-07, beta = 0.97),
##     trace = FALSE)
##
## tau: [1] 0.85
##
## Coefficients:
##   Value    Std. Error t value  Pr(>|t|)
## a -5.08786  5.08818   -0.99994  0.31740
## b  1.21374  0.07454   16.28269  0.00000
```

```
## c  0.03339  0.00111   29.96183  0.00000
```

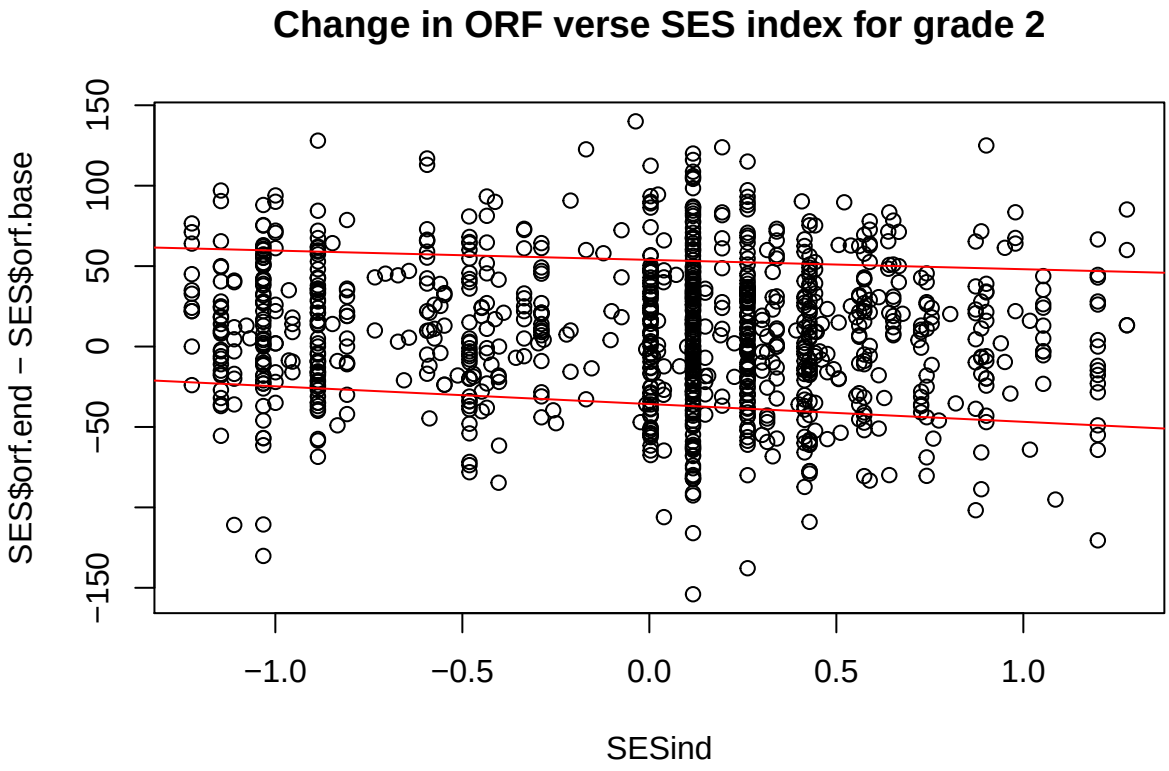
SES index verse change in ORF

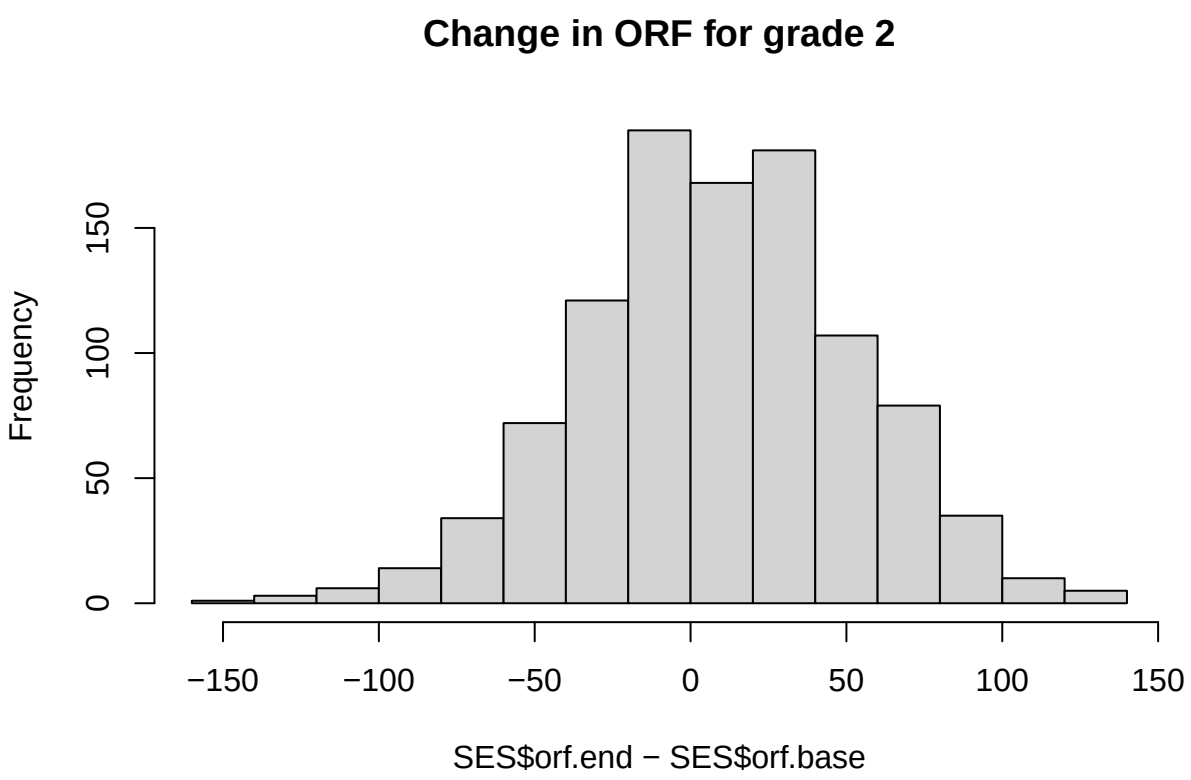
We are interested how out SES index relates to the change in Oral Reading Frequency for students with both baseline and endline data.






```
## [1] "Correlation of SES index and change in ORF for grade 1: -0.0598646737919897"
## [1] "Correlation of SES index and baseline ORF for grade 1: 0.32139208286984"
## [1] "Correlation of SES index and endline ORF for grade 1: 0.215344405184542"
```


Change in ORF verse SES index for grade 2
SES$orf.end − SES$orf.base
150
100
50
0
−50
−150
−1.0
−0.5
0.0
0.5
1.0
SESind




```
## [1] "Correlation of SES index and change in ORF for grade 2: -0.0724750949948583"
## [1] "Correlation of SES index and baseline ORF for grade 2: 0.327900446013055"
## [1] "Correlation of SES index and endline ORF for grade 2: 0.231011217612597"
```

N-tile SES-index Analysis of Gini and Mean ORF

First we conduct quantile analysis, evaluating the Gini coefficient and mean ORF for each of the 2,3,4-tiles of our SES index.

A T-test demonstrates that there is a statistically significant difference in the change in MRF for the lowest and highest tertile of our SES index.

Secondly we conduct the same analysis by medians

It appears from the above analysis that the majority of change in MRF occurs in the lowest tertile of wealth.

```
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 2.1514, df = 979.98, p-value = 0.03169
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   0.512619 11.154545
## sample estimates:
```

```
## mean of x mean of y
## 11.864005  6.030423
##
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 0.77017, df = 1013.2, p-value = 0.4414
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -2.488099  5.702898
## sample estimates:
## mean of x mean of y
##  6.899385  5.291986
##
##     X1  X2       X3      X4       X5      X6
##            grade: 2         grade: 1
##         Q# Baseline Endline Baseline Endline
##   Gini   1    0.462   0.423    0.642   0.576
##          2    0.332   0.291    0.448   0.438
##        All    0.395   0.349    0.531   0.496
##     CV   1    0.826   0.745    1.256   1.059
##          2    0.589   0.513    0.803    0.79
##        All    0.701   0.611    0.972   0.897
##     %0   1    0.156   0.124    0.363   0.275
##          2    0.045   0.043    0.149   0.132
##        All    0.094   0.078    0.241   0.193
##    MRF   1   37.563  49.427   19.331   26.23
##          2   58.592  64.622   32.053  37.345
##        All   49.417  58.107   26.646  32.594
##  Count         1025    1025     1025    1025
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 2.5679, df = 712.43, p-value = 0.01043
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   1.873435 14.039679
## sample estimates:
## mean of x mean of y
## 12.764582  4.808026
##
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 1.2285, df = 716.9, p-value = 0.2197
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.717453  7.460659
## sample estimates:
## mean of x mean of y
##  6.103326  3.231722
```

```
##
##     X1  X2       X3      X4       X5      X6
##            grade: 2         grade: 1
##         Q# Baseline Endline Baseline Endline
##   Gini   1    0.488   0.439    0.687   0.611
##          2    0.339   0.309    0.481    0.45
##          3    0.334   0.299    0.432   0.429
##        All    0.395   0.349    0.531   0.496
##     CV   1    0.889   0.776    1.416   1.151
##          2    0.604    0.54    0.867   0.805
##          3    0.588   0.527     0.77   0.772
##        All    0.701   0.611    0.972   0.897
##     %0   1    0.173   0.137    0.415   0.313
##          2    0.069   0.053    0.182   0.134
##          3    0.042   0.047    0.134   0.134
##        All    0.094   0.078    0.241   0.193
##    MRF   1   33.549  46.313    16.28  22.383
##          2   54.749   63.35   29.174    38.7
##          3   59.347  64.155   33.594  36.826
##        All   49.417  58.107   26.646  32.594
##  Count         1025    1025     1025    1025
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 3.0151, df = 489.99, p-value = 0.002702
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   3.931211 18.639317
## sample estimates:
## mean of x mean of y
## 14.778845  3.493581
##
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 2.15, df = 484.34, p-value = 0.03205
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   0.5121568 11.3834705
## sample estimates:
## mean of x mean of y
##  7.997158  2.049345
##
##     X1  X2       X3      X4       X5      X6
##            grade: 2         grade: 1
##         Q# Baseline Endline Baseline Endline
##   Gini   1     0.51   0.452    0.715   0.642
##          2    0.396    0.39    0.551   0.498
##          3    0.339   0.305    0.455   0.459
##          4    0.321   0.275    0.435   0.412
##        All    0.395   0.349    0.531   0.496
##     CV   1    0.945     0.8    1.484   1.235
```

```
##          2    0.689   0.682    1.019   0.888
##          3    0.604   0.535     0.82   0.829
##          4    0.564   0.486    0.774   0.742
##        All    0.701   0.611    0.972   0.897
##     %0   1    0.194   0.148    0.464   0.342
##          2    0.112   0.098    0.248   0.199
##          3    0.056   0.062    0.161   0.138
##          4    0.031    0.02    0.135   0.124
##        All    0.094   0.078    0.241   0.193
##    MRF   1   30.494  45.273   12.807  20.804
##          2   45.735   54.23   26.836  32.473
##          3   55.005  63.032   29.383  37.449
##          4   63.148  66.642   35.175  37.224
##        All   49.417  58.107   26.646  32.594
##  Count         1025    1025     1025    1025
```

Linear Model

```
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 3.7635, df = 999.64, p-value = 0.0001773
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   4.902385 15.584280
## sample estimates:
## mean of x mean of y
## 13.740611  3.497278
##
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 0.92441, df = 972.49, p-value = 0.3555
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -2.204443  6.130888
## sample estimates:
## mean of x mean of y
##  7.106869  5.143646
##
##     X1  X2       X3      X4       X5      X6
##            grade: 2         grade: 1
##         Q# Baseline Endline Baseline Endline
##   Gini   1    0.461   0.409     0.61   0.557
##          2    0.315   0.291    0.452   0.437
##        All    0.395   0.349    0.531   0.496
##     CV   1    0.827   0.718    1.167   1.018
##          2     0.56   0.511    0.807   0.788
##        All    0.701   0.611    0.972   0.897
##     %0   1     0.15   0.123    0.331   0.258
##          2    0.038   0.034    0.156   0.128
```

```
##        All    0.094   0.078    0.241   0.193
##    MRF   1   37.472  51.212   20.164  27.271
##          2   61.166  64.663   32.698  37.842
##        All   49.417  58.107   26.646  32.594
##  Count         1025    1025     1025    1025
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 3.8821, df = 710.06, p-value = 0.0001132
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   6.097655 18.575999
## sample estimates:
## mean of x mean of y
## 14.260498  1.923672
##
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 1.3294, df = 702.04, p-value = 0.1842
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.569858  8.153579
## sample estimates:
## mean of x mean of y
##  7.487612  4.195752
##
##     X1  X2       X3      X4       X5      X6
##            grade: 2         grade: 1
##         Q# Baseline Endline Baseline Endline
##   Gini   1    0.495   0.441    0.685    0.61
##          2    0.363   0.327    0.465   0.443
##          3    0.307   0.284    0.444   0.437
##        All    0.395   0.349    0.531   0.496
##     CV   1    0.901   0.777    1.412   1.156
##          2    0.638   0.573    0.821    0.78
##          3    0.549     0.5    0.795   0.794
##        All    0.701   0.611    0.972   0.897
##     %0   1     0.19   0.132    0.413   0.307
##          2    0.057    0.08    0.173   0.153
##          3    0.038   0.029    0.147   0.123
##        All    0.094   0.078    0.241   0.193
##    MRF   1   32.302  46.563   15.882   23.37
##          2   51.909  62.575    28.93  35.988
##          3   62.552  64.476   33.885  38.081
##        All   49.417  58.107   26.646  32.594
##  Count         1025    1025     1025    1025
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 2.7427, df = 581.98, p-value = 0.006282
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   2.672469 16.155114
## sample estimates:
## mean of x mean of y
## 11.337463  1.923672
##
##
##  Welch Two Sample t-test
##
## data:  LowestNtileMRFchange and TopNtileMRFchange
## t = 1.2782, df = 641.16, p-value = 0.2016
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.743705  8.246433
## sample estimates:
## mean of x mean of y
##  7.447116  4.195752
##
##     X1  X2       X3      X4       X5      X6
##            grade: 2         grade: 1
##         Q# Baseline Endline Baseline Endline
##   Gini   1    0.508   0.468    0.728   0.655
##          2    0.409   0.347    0.478   0.449
##          3    0.338   0.309    0.476    0.44
##          4    0.307   0.284    0.444   0.437
##        All    0.395   0.349    0.531   0.496
##     CV   1    0.939   0.831    1.602   1.276
##          2    0.721   0.609    0.854   0.798
##          3    0.591   0.541    0.837   0.773
##          4    0.549     0.5    0.795   0.794
##        All    0.701   0.611    0.972   0.897
##     %0   1    0.189   0.165    0.477   0.359
##          2    0.114   0.084    0.176   0.151
##          3    0.038   0.046    0.183   0.143
##          4    0.038   0.029    0.147   0.123
##        All    0.094   0.078    0.241   0.193
##    MRF   1   30.845  42.183   12.437  19.884
##          2   43.746  59.762   28.426  35.169
##          3   57.189  65.201     29.1  37.117
##          4   62.552  64.476   33.885  38.081
##        All   49.417  58.107   26.646  32.594
##  Count         1025    1025     1025    1025
```