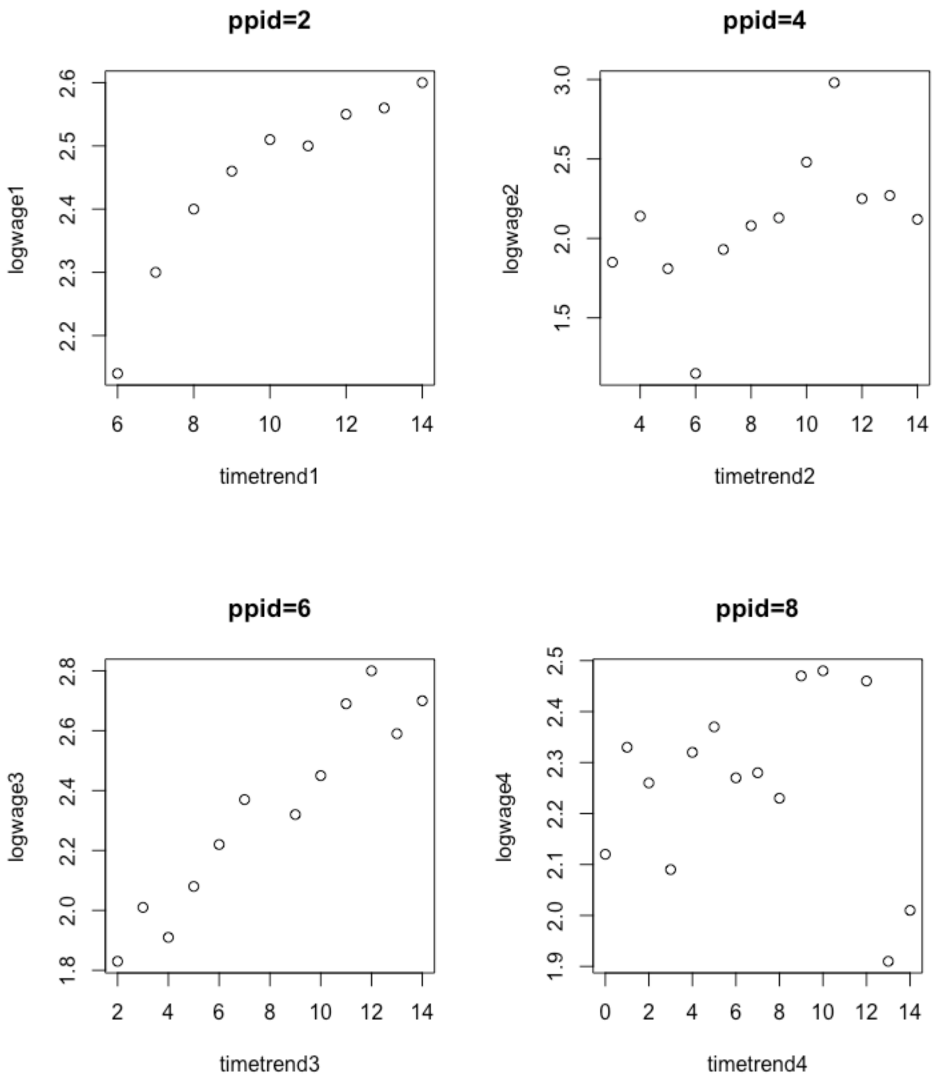
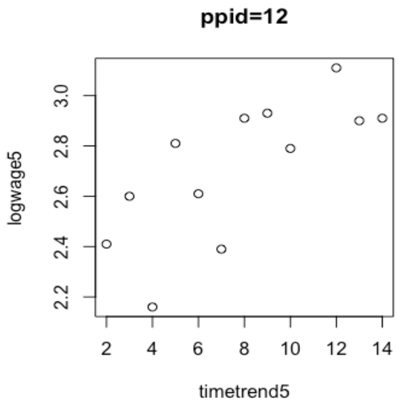
HW4 output

Exercise1 Data Represent the panel dimension of wages





Exercise2 random effects

```
> educ<-as.numeric(kt$EDUC)
> logwage<-as.numeric(kt$LOGWAGE)
> potexper<-as.numeric(kt$POTEXPER)
> re<-as.data.frame(cbind(logwage,educ,potexper))
> library(nlme)
> gls(logwage~educ+potexper,data = re)
Generalized least squares fit by REML
  Model: logwage ~ educ + potexper
  Data: re
  Log-restricted-likelihood: -12459.95

Coefficients:
(Intercept)        educ    potexper
 0.79419112  0.09386374  0.03740530

Degrees of freedom: 17919 total; 17916 residual
Residual standard error: 0.4846115
```

Exercise3 fixed effects

Between estimators

```
> lm(logwage_avg~educ_avg+potexper_avg,febtw_full)

Call:
lm(formula = logwage_avg ~ educ_avg + potexper_avg, data = febtw_full)

Coefficients:
 (Intercept)      educ_avg  potexper_avg
      0.8456        0.0931        0.0260
```

within estimators

```
> lm(logwage_wtin~educ_wtin+potexper_wtin-1,fewtn)

Call:
lm(formula = logwage_wtin ~ educ_wtin + potexper_wtin - 1, data = fewtn)

Coefficients:
    educ_wtin  potexper_wtin
      0.12366        0.03856
```

First time difference estimator

```
> lm(logwage_3~educ_3+potexper_3,fe_3)

Call:
lm(formula = logwage_3 ~ educ_3 + potexper_3, data = fe_3)

Coefficients:
(Intercept)       educ_3   potexper_3
   0.049464     0.038352     0.003989
```

Exercise4 understanding fixed effects

Likelihood function

```
beta_func<-function(beta){
  return(-sum(y*log(pnorm(X%*%beta)))+sum((1-y)*log(1-pnorm(X%*%beta))))
}# Generate the likelihood function
```

Optimize Likelihood function

```
> beta=optim(par = start,beta_func)$par
> beta
[1] 0.02500401 0.00253573
```

Individual fixed effect parameters

```
y_ppid<-as.matrix(kt_select_avr$logwage_avg)
x_ppid<-as.matrix(kt_select_avr[,3:4])
alpha<-y_ppid-x_ppid%*%beta
```

Run a regression of estimated individual effects

```
> lm(y_inv~inv1+inv2+inv3+inv4+inv5,in_ktfull)

Call:
lm(formula = y_inv ~ inv1 + inv2 + inv3 + inv4 + inv5, data = in_ktfull)

Coefficients:
(Intercept)         inv1         inv2         inv3         inv4         inv5
  1.6969783    0.0453670    0.0251907   -0.0009575   -0.0262378   -0.0059747
```

Explain and alternative method to compute standard errors

#The errors are potentially serially correlated like over t

and heteroskedastic

Use bootstrap

```
> sd_boot
                      Intercept    ABILITY   MOTHERED   FATHERED   BRKNHOME
corrected_sd_bootstrap 0.2404064 0.07203128 0.02101495 0.06326918 0.01999077
                        SIBLINGS
corrected_sd_bootstrap 0.01564511
```