Notes:
1. Unicode is supported; see help unicode_advice .
2. More than 2 billion observations are allowed; see help obs_advice .
3. Maximum number of variables is set to 5000; see help set_maxvar .

```
 1 . doedit "D:\THU\Sophomore\Econometrics\PS4\ps4-hr.do"

 2 . do "D:\THU\Sophomore\Econometrics\PS4\ps4-hr.do"

 3 . cd "D:\THU\Sophomore\Econometrics\PS4"
D:\THU\Sophomore\Econometrics\PS4

 4 . clear

 5 .
 6 . log using "2022011545-4.log", replace
-------------------------------------------------------------------------------
      name:  <unnamed>
       log:  D:\THU\Sophomore\Econometrics\PS4\2022011545-4.log
  log type:  text
 opened on:  21 May 2024, 22:03:09

 7 .
 8 . use gpa, clear

 9 . // estimate the model using OLS
10 . reg colgpa hsgpa act skipped pc

      Source |       SS           df       MS      Number of obs   =       141
-------------+----------------------------------   F(4, 136)       =     11.90
       Model |  5.03143078         4  1.2578577   Prob > F        =    0.0000
    Residual |  14.3746687       136  .105696093   R-squared       =    0.2593
-------------+----------------------------------   Adj R-squared   =    0.2375
       Total |  19.4060994       140  .138614996   Root MSE        =    .32511

------------------------------------------------------------------------------
      colgpa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       hsgpa |   .4129522   .0924311     4.47   0.000     .2301642    .5957403
         act |    .013344   .0104437     1.28   0.204    -.0073091    .0339972
     skipped |  -.0710336   .0262494    -2.71   0.008    -.1229435   -.0191238
          pc |   .1244391   .0573115     2.17   0.032     .0111021    .2377762
       _cons |   1.356509   .3275021     4.14   0.000     .7088537    2.004164
------------------------------------------------------------------------------

11 . // calculate the residual
```

```
12 . predict uhat, residual

13 . g uhat2 = uhat^2

14 .
15 . // FWLS: estimate weight
16 . g loguh2 = log(uhat2)

17 . reg loguh2 hsgpa act skipped pc
```

| Source | SS | df | MS | Number of obs = | 141 |
|---|---|---|---|---|---|
| | | | | F(4, 136) = | 5.36 |
| Model | 68.2377615 | 4 | 17.0594404 | Prob > F = | 0.0005 |
| Residual | 432.786666 | 136 | 3.1822549 | R-squared = | 0.1362 |
| | | | | Adj R-squared = | 0.1108 |
| Total | 501.024428 | 140 | 3.57874591 | Root MSE = | 1.7839 |

| loguh2 | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| hsgpa | 1.413776 | .5071729 | 2.79 | 0.006 | .4108113 | 2.416742 |
| act | .0447273 | .0573053 | 0.78 | 0.436 | -.0685974 | .1580519 |
| skipped | -.1017002 | .1440316 | -0.71 | 0.481 | -.3865314 | .1831309 |
| pc | .8458587 | .3144706 | 2.69 | 0.008 | .223974 | 1.467743 |
| _cons | -9.412827 | 1.797017 | -5.24 | 0.000 | -12.96654 | -5.859118 |

```
18 . predict g
(option xb assumed; fitted values)

19 . g h = exp(g)

20 . g w = 1/h

21 . // Method 1: using weight command
22 . reg colgpa hsgpa act skipped pc [aweight = w]
(sum of wgt is   4.7964e+03)
```

| Source | SS | df | MS | Number of obs = | 141 |
|---|---|---|---|---|---|
| | | | | F(4, 136) = | 14.61 |
| Model | 4.82919926 | 4 | 1.20729981 | Prob > F = | 0.0000 |
| Residual | 11.2411528 | 136 | .082655535 | R-squared = | 0.3005 |
| | | | | Adj R-squared = | 0.2799 |
| Total | 16.070352 | 140 | .114788229 | Root MSE = | .2875 |

| colgpa | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| hsgpa | .3695039 | .0765413 | 4.83 | 0.000 | .2181388 | .5208691 |
| act | .0160975 | .0093637 | 1.72 | 0.088 | -.0024198 | .0346149 |
| skipped | -.0858033 | .0213179 | -4.02 | 0.000 | -.1279608 | -.0436458 |
| pc | .1249907 | .0602113 | 2.08 | 0.040 | .0059192 | .2440623 |
| _cons | 1.454363 | .2871742 | 5.06 | 0.000 | .8864582 | 2.022267 |

```
23 . eststo m1 //this command store the reg results

24 . reg colgpa hsgpa act skipped pc [aweight = w], robust
(sum of wgt is   4.7964e+03)
```

Linear regression

| | | | |
|---|---|---|---|
| Number of obs = | 141 | | |
| F(4, 136) = | 22.07 | | |
| Prob > F = | 0.0000 | | |
| R-squared = | 0.3005 | | |
| Root MSE = | .2875 | | |

| colgpa | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| hsgpa | .3695039 | .0815341 | 4.53 | 0.000 | .2082653 | .5307426 |
| act | .0160975 | .0103682 | 1.55 | 0.123 | -.0044063 | .0366013 |
| skipped | -.0858033 | .0211044 | -4.07 | 0.000 | -.1275386 | -.044068 |
| pc | .1249907 | .065119 | 1.92 | 0.057 | -.0037861 | .2537675 |
| _cons | 1.454363 | .3061582 | 4.75 | 0.000 | .8489162 | 2.059809 |

```
25 . eststo m2

26 . // Method 2: transform the equation
27 . foreach i of varlist colgpa hsgpa act skipped pc{
  2.         g `i'_f = `i' / sqrt(h)
  3. }

28 . g con_f = 1/sqrt(h)

29 . reg *_f, nocons
```

| Source | SS | df | MS | Number of obs | = | 141 |
|---|---|---|---|---|---|---|
| | | | | F(5, 136) | = | 2963.10 |
| Model | 41656.4878 | 5 | 8331.29756 | Prob > F | = | 0.0000 |
| Residual | 382.388823 | 136 | 2.81168252 | R-squared | = | 0.9909 |
| | | | | Adj R-squared | = | 0.9906 |
| Total | 42038.8766 | 141 | 298.148061 | Root MSE | = | 1.6768 |

| colgpa_f | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| hsgpa_f | .3695039 | .0765413 | 4.83 | 0.000 | .2181388 | .520869 |
| act_f | .0160975 | .0093637 | 1.72 | 0.088 | -.0024198 | .0346149 |
| skipped_f | -.0858033 | .0213179 | -4.02 | 0.000 | -.1279607 | -.0436458 |
| pc_f | .1249907 | .0602113 | 2.08 | 0.040 | .0059192 | .2440623 |
| con_f | 1.454363 | .2871742 | 5.06 | 0.000 | .8864584 | 2.022267 |

```
30 . eststo m3

31 . reg *_f, nocons vce(robust)
```

Linear regression

| | | | |
|---|---|---|---|
| Number of obs | = | | 141 |
| F(5, 136) | = | | 2782.88 |
| Prob > F | = | | 0.0000 |
| R-squared | = | | 0.9909 |
| Root MSE | = | | 1.6768 |

| colgpa_f | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| hsgpa_f | .3695039 | .0815341 | 4.53 | 0.000 | .2082653 | .5307425 |
| act_f | .0160975 | .0103682 | 1.55 | 0.123 | -.0044063 | .0366013 |
| skipped_f | -.0858033 | .0211044 | -4.07 | 0.000 | -.1275386 | -.044068 |
| pc_f | .1249907 | .065119 | 1.92 | 0.057 | -.0037861 | .2537675 |
| con_f | 1.454363 | .3061582 | 4.75 | 0.000 | .8489164 | 2.059809 |

```
32 . eststo m4
```

```
. 
. // robust standard error of the OLS estimator
. reg colgpa hsgpa act skipped pc, vce(robust)
```

Linear regression — Number of obs = 141; F(4, 136) = 12.22; Prob > F = 0.0000; R-squared = 0.2593; Root MSE = .32511

| colgpa | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| hsgpa | .4129522 | .0987852 | 4.18 | 0.000 | .2175985 | .608306 |
| act | .013344 | .0107198 | 1.24 | 0.215 | -.0078551 | .0345432 |
| skipped | -.0710336 | .0264099 | -2.69 | 0.008 | -.1232608 | -.0188064 |
| pc | .1244391 | .0599858 | 2.07 | 0.040 | .0058136 | .2430647 |
| _cons | 1.356509 | .3423354 | 3.96 | 0.000 | .6795199 | 2.033498 |

```
. eststo m5

. 
. // show all regression results
. esttab m*, se
```

| | (1) colgpa | (2) colgpa | (3) colgpa_f | (4) colgpa_f | (5) colgpa |
|---|---|---|---|---|---|
| hsgpa | 0.370*** | 0.370*** | | | 0.413*** |
| | (0.0765) | (0.0815) | | | (0.0988) |
| act | 0.0161 | 0.0161 | | | 0.0133 |
| | (0.00936) | (0.0104) | | | (0.0107) |
| skipped | -0.0858*** | -0.0858*** | | | -0.0710** |
| | (0.0213) | (0.0211) | | | (0.0264) |
| pc | 0.125* | 0.125 | | | 0.124* |
| | (0.0602) | (0.0651) | | | (0.0600) |
| hsgpa_f | | | 0.370*** | 0.370*** | |
| | | | (0.0765) | (0.0815) | |
| act_f | | | 0.0161 | 0.0161 | |
| | | | (0.00936) | (0.0104) | |
| skipped_f | | | -0.0858*** | -0.0858*** | |
| | | | (0.0213) | (0.0211) | |
| pc_f | | | 0.125* | 0.125 | |
| | | | (0.0602) | (0.0651) | |
| con_f | | | 1.454*** | 1.454*** | |
| | | | (0.287) | (0.306) | |
| _cons | 1.454*** | 1.454*** | | | 1.357*** |
| | (0.287) | (0.306) | | | (0.342) |
| N | 141 | 141 | 141 | 141 | 141 |

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

```
. 
. 
. 
. 
end of do-file

. 
```