Homework #3

a. Estimate the model (1) using NLS estimation method using initial values of γ=4, δ=0, ρ= –1, ν=1. Determine the estimated value of efficiency parameter (γ), distribution parameter (δ), parameter (ν), and substitution parameter (ρ), and elasticity of substitution (σ). Perform F-test to test whether δ=0, ρ=0, and ν=0.

1) Estimated value

$$\hat{\gamma} = 2.89 \times 10^{-17}$$

$$\hat{\delta} = 0.8018$$

$$\hat{\rho} = -1.883$$

$$\hat{\nu} = 3.3959$$

$$\hat{\sigma} = \frac{1}{1-\hat{\rho}} = \frac{1}{1-(-1.883)} = 0.3469$$

2) F-test

The p-value = 0.000 , thus we can reject H_0. δ , ρ and ν are jointy significant.

b. Estimate the model (2) using NLS estimation method initial values of lnγ=4, δ=0, ρ= –1, ν=1. Determine the estimated value of efficiency parameter (γ), distribution parameter (δ), parameter (ν), and substitution parameter (ρ), and elasticity of substitution (σ). Perform F-test to test whether δ=0, ρ=0, and ν=0.

1) $\hat{\gamma} = 44.6476$

$$\hat{\nu} = 0.9727$$

$$\hat{\rho} = -0.808$$

$$\hat{\delta} = 0.2351$$

$$\hat{\sigma} = \frac{1}{1-\hat{\rho}} = \frac{1}{1-(-0.808)} = 0.5531$$

2) F-test : The p-value is 0.000 , thus δ, ρ and ν are jointy significant.

c. From (a), if we change initial values to be γ=55, δ=0, ρ= −1, ν=1, what will happen to the estimated result? Interpret the estimated result and why do we get this kind of result? (Make comparison between previous result and the new result)

The estimated result changes to be...

$\hat{\gamma} = 15.237$ $\quad R^2 = 0.4497$

$\hat{\delta} = 0.0549$ $\quad$ adj-$R^2 = 0.4470$

$\hat{\rho} = -38.857$

$\hat{\nu} = 1.064$

$\hat{\sigma} = 1/1-\hat{\rho} = 0.0251$

The previous one is ...

$\hat{\gamma} = 2.89 \times 10^{-17}$ $\quad R^2 = 0.9622$

$\hat{\delta} = 0.8018$ $\quad$ adj.-$R^2 = 0.9621$

$\hat{\rho} = -1.883$

$\hat{\nu} = 3.3959$

$$\hat{\sigma} = \frac{1}{1-\hat{\rho}} = \frac{1}{1-(-1.883)} = 0.3469$$

∴ Comparing between the previous and new result, the estimated result are different from each other. Some differs a little and some differs a lot. This is because the changing initial values. Initial values are very crucial in NLS because the model is not linear; thus linear approximation has been used. Through this method, initial values are very important as it is a point where we choose to start the linear approximation.

Moreover, considering the R^2 and adj.-R^2, the previous shows that its independent variables can explain the dependent variable better. Thus, maybe we should use the previous initial value for estimation.

d. From (a), if we change convergence value from default of 0.00001 or (1e-5) to (i) 0.1 or (1e-1) and (ii) (1e-15) with maximum iteration of 100, what will happen to the estimated result? Interpret the estimated result and why do we get this kind of result? (Make comparison between previous result and the new result)

(i) change convergence value from 1e-5 to 1e-1

The estimated results are as follow...

$\hat{\gamma} = 4.0000$ $\qquad R^2 = 0.0425$

$\hat{\delta} = 1.29 \times 10^{-7}$ $\qquad$ adj.-$R^2 = 0.0376$

$\hat{\rho} = -29.0205$

$\hat{r} = 1$

$$\hat{\sigma} = \frac{1}{1-(-29.0205)} = 0.0333$$

(ii) change convergence value to 1e-15 with max iteration of 100

The result of this is convergence not achieved.

Both results differ because they have different convergence value. The process of NLS estimation is literative. Thus, the values that are set for the estimator to converge to are important.

e. From (b), if we change initial values to be $\ln\gamma$=55, δ=0, ρ= –1, ν=1, what will happen to the estimated result? Interpret the estimated result and why do we get this kind of result? (Make comparison between previous result and the new result)

	The previous result	The new result
$\hat{\gamma}$	44.6476	7.69×10^{23}
$\hat{v}$	0.9727	-2.7696
$\hat{\rho}$	-0.808	-38.857
$\hat{\delta}$	0.2351	0.5771
$\hat{\sigma} = \frac{1}{1-\hat{\rho}}$	0.5531	0.3561
R^2	0.5435	-8.3872
adj.-R^2	0.5418	-8.4107

We get this kind of different result due to different initial value. Initial values are crucial as reasoned in question (c).
The new result's R^2 and adj-R^2 are negative, reflecting that the estimates are not very good in explaining the dependent variable.

f. From (b), if we change convergence value from default of 0.00001 or (1e-5) to (i) 0.1 or (1e-1) and (ii) (1e-15) with maximum iteration of 100, what will happen to the estimated result? Interpret the estimated result and why do we get this kind of result? (Make comparison between previous result and the new result)

(i) change convergence value to 1e-1
the estimated results are...

Source	SS	df	MS		
				Number of obs =	800
Model	976.20485	3	325.401616	R-squared =	0.5435
Residual	819.99247	796	1.03014129	Adj R-squared =	0.5418
				Root MSE =	1.014959
Total	1796.1973	799	2.24805671	Res. dev. =	2290.048

lny	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
/gamma	44.64812	18.77959	2.38	0.018	7.784746	81.5115
/nu	.9727292	.0317774	30.61	0.000	.9103518	1.035107
/rho	-.8077343	.2189571	-3.69	0.000	-1.237536	-.3779327
/delta	.2351088	.0328584	7.16	0.000	.1706095	.2996081

Parameter nu taken as constant term in model & ANOVA table

(ii) change convergence value to 1e-15 (max iteration = 100)
the estimated results are...

Source	SS	df	MS		
				Number of obs =	800
Model	222930.73	4	55732.6813	R-squared =	0.9963
Residual	819.99246	796	1.03014129	Adj R-squared =	0.9963
				Root MSE =	1.014959
Total	223750.72	800	279.688397	Res. dev. =	2290.048

lny	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
/gamma	44.64759	18.90461	2.36	0.018	7.538809	81.75636
/nu	.9727292	.0317774	30.61	0.000	.9103518	1.035107
/rho	-.807984	.2186225	-3.70	0.000	-1.237129	-.3788392
/delta	.2351024	.0328463	7.16	0.000	.1706267	.2995781

The estimated results from (i) and (ii) are very similar to each other. Though they are similar, R-squared and Adj. R-squared of both are different. (ii) possesses a higher R-squared and adjusted R^2.

I believe that this result of R squared and adjusted R^2 is caused by the convergence value — the smaller means a better estimate of the model.

g. Make comparison of the estimated results of model (1) and model (2). Which estimated result should be used in this case? Why?

It depends on the initial and convergence value we use. We should choose either model (1) or (2) that is equipped with high Adj.-R^2 value, the smallest convergence value, and, if possible to test further, no serious regression problems.

Adj.-R^2 value are very important to see if how well our dependent variable is explained by dependent variables. Moreover, I believe that the smaller the convergence value, the closer the estimated parameters.

```
  ___  ____  ____  ____  ____ (R)
 /__    /   ____/   /   ____/
___/   /   /___/   /   /___/   16.0   Copyright 1985-2019 StataCorp LLC
  Statistics/Data Analysis            StataCorp
                                      4905 Lakeway Drive
     MP - Parallel Edition            College Station, Texas 77845 USA
                                      800-STATA-PC        http://www.stata.com
                                      979-696-4600        stata@stata.com
                                      979-696-4601 (fax)

20-student 2-core Stata lab perpetual license:
       Serial number:  501606222284
         Licensed to:  Faculty of economics
                       Thammasat University

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.
      4.  New update available; type -update all-

1 . log using "C:\Users\user\Documents\BE TU\Year2\EE426\HW3\3.7.smcl"
-----------------------------------------------------------------------------------------------
      name:  <unnamed>
       log:  C:\Users\user\Documents\BE TU\Year2\EE426\HW3\3.7.smcl
  log type:  smcl
 opened on:  11 Feb 2021, 08:17:59

2 . use "C:\Users\user\Downloads\assign3 (1).dta"

3 . do "C:\Users\user\AppData\Local\Temp\STD39f4_000000.tmp"

4 . set more off

5 . nl (y = {gamma}*(({delta}*k^(-{rho}))+((1-{delta})*l^(-{rho})))^(-{nu}/{rho})), init(gamma 4 d
> elta 0 rho -1 nu 1) nolog
(obs = 800)

      Source |      SS            df       MS
-------------+----------------------------------    Number of obs =        800
       Model |  2.363e+20          4  5.9080e+19    R-squared     =     0.9622
    Residual |  9.271e+18        796  1.1647e+16    Adj R-squared =     0.9621
-------------+----------------------------------    Root MSE      =   1.08e+08
       Total |  2.456e+20        800  3.0699e+17    Res. dev.     =   31861.36

------------------------------------------------------------------------------
           y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      /gamma |   2.89e-17   6.45e-17     0.45   0.654    -9.77e-17    1.55e-16
      /delta |   .8017609   .0319332    25.11   0.000     .7390776    .8644442
        /rho |   -1.88296   .2889715    -6.52   0.000    -2.450196   -1.315724
         /nu |    3.39589   .1261608    26.92   0.000     3.148243    3.643538
------------------------------------------------------------------------------

6 . test (_b[/delta]=0) (_b[/rho]=0) (_b[/nu]=0)

 ( 1)  [delta]_cons = 0
 ( 2)  [rho]_cons = 0
 ( 3)  [nu]_cons = 0

       F(  3,   796) = 7383.35
            Prob > F =    0.0000
```

```
7 . nl (lny = ln({gamma})-({nu}/{rho})*ln(({delta}*k^(-{rho}))+(1-{delta})*l^(-{rho}))), init(gamm
  > a exp(4) delta 0 rho -1 nu 1)
  (obs = 800)

  Iteration 0:  residual SS =  1143.768
  Iteration 1:  residual SS =  1141.441
  Iteration 2:  residual SS =  1079.391
  Iteration 3:  residual SS =  1056.941
  Iteration 4:  residual SS =  1021.524
  Iteration 5:  residual SS =  983.1424
  Iteration 6:  residual SS =  899.3962
  Iteration 7:  residual SS =  828.0447
  Iteration 8:  residual SS =  820.0263
  Iteration 9:  residual SS =  819.9925
  Iteration 10:  residual SS =  819.9925
  Iteration 11:  residual SS =  819.9925
  Iteration 12:  residual SS =  819.9925
  Iteration 13:  residual SS =  819.9925


        Source |       SS           df       MS
  -------------+----------------------------------    Number of obs =        800
         Model |  976.20485          3  325.401616    R-squared     =     0.5435
      Residual |  819.99246        796  1.03014129    Adj R-squared =     0.5418
  -------------+----------------------------------    Root MSE      =   1.014959
         Total |  1796.1973        799  2.24805671    Res. dev.     =   2290.048

  ------------------------------------------------------------------------------
           lny |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
  -------------+----------------------------------------------------------------
        /gamma |    44.6476   18.90459     2.36   0.018     7.538851    81.75634
           /nu |   .9727292   .0317774    30.61   0.000     .9103518    1.035107
          /rho |  -.8079829   .2186236    -3.70   0.000     -1.23713   -.3788361
        /delta |   .2351025   .0328464     7.16   0.000     .1706266    .2995783
  ------------------------------------------------------------------------------
    Parameter gamma taken as constant term in model & ANOVA table

8 . test (_b[/delta]=0) (_b[/rho]=0) (_b[/nu]=0)

   ( 1)  [delta]_cons = 0
   ( 2)  [rho]_cons = 0
   ( 3)  [nu]_cons = 0

         F(  3,   796) =  366.55
              Prob > F =    0.0000

9 . nl (y = {gamma}*( ({delta}*k^(-{rho})) + ((1-{delta})*l^(-{rho})) )^(-{nu}/{rho})), init(gamma
  >  55 delta 0 rho -1 nu 1)
  (obs = 800)

  Iteration 0:  residual SS =  1.65e+20
  Iteration 1:  residual SS =  1.62e+20
  Iteration 2:  residual SS =  1.62e+20
  Iteration 3:  residual SS =  1.62e+20
  Iteration 4:  residual SS =  1.61e+20
  Iteration 5:  residual SS =  1.42e+20
  Iteration 6:  residual SS =  1.42e+20
  Iteration 7:  residual SS =  1.42e+20
  Iteration 8:  residual SS =  1.41e+20
  Iteration 9:  residual SS =  1.41e+20
  Iteration 10:  residual SS =  1.41e+20
  Iteration 11:  residual SS =  1.38e+20
  Iteration 12:  residual SS =  1.36e+20
  Iteration 13:  residual SS =  1.35e+20
  Iteration 14:  residual SS =  1.35e+20
  Iteration 15:  residual SS =  1.35e+20
  Iteration 16:  residual SS =  1.35e+20
  Iteration 17:  residual SS =  1.35e+20
  Iteration 18:  residual SS =  1.35e+20
  Iteration 19:  residual SS =  1.35e+20
  Iteration 20:  residual SS =  1.35e+20
```

```
      Source |       SS           df       MS
-------------+----------------------------------    Number of obs =        800
       Model |  1.105e+20          4  2.7613e+19    R-squared     =     0.4497
    Residual |  1.351e+20        796  1.6977e+17    Adj R-squared =     0.4470
-------------+----------------------------------    Root MSE      =   4.12e+08
       Total |  2.456e+20        800  3.0699e+17    Res. dev.     =   34004.88

------------------------------------------------------------------------------
           y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      /gamma |    15.2373   9.375264     1.63   0.105    -3.165861    33.64046
      /delta |   .0549001   2.022752     0.03   0.978    -3.915657    4.025458
        /rho |  -38.85711   533.6837    -0.07   0.942    -1086.451    1008.737
         /nu |   1.063514    .034893    30.48   0.000     .9950213    1.132008
------------------------------------------------------------------------------

10 . nl (y = {gamma}*( ({delta}*k^(-{rho})) + ((1-{delta})*l^(-{rho})) )^(-{nu}/{rho})), init(gamma
   >  4 delta 0 rho -1 nu 1) eps(1e-1)
   (obs = 800)

   Iteration 0:  residual SS =  2.35e+20
   Iteration 1:  residual SS =  2.35e+20


      Source |       SS           df       MS
-------------+----------------------------------    Number of obs =        800
       Model |  1.043e+19          4  2.6070e+18    R-squared     =     0.0425
    Residual |  2.352e+20        796  2.9543e+17    Adj R-squared =     0.0376
-------------+----------------------------------    Root MSE      =   5.44e+08
       Total |  2.456e+20        800  3.0699e+17    Res. dev.     =   34448.06

------------------------------------------------------------------------------
           y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      /gamma |   4.000008   15.18958     0.26   0.792    -25.81635    33.81637
      /delta |   1.29e-07   .0001605     0.00   0.999    -.0003149    .0003151
        /rho |  -29.02135   2409.429    -0.01   0.990    -4758.606    4700.563
         /nu |          1   .2149663     4.65   0.000     .5780322    1.421968
------------------------------------------------------------------------------

11 . nl (y = {gamma}*( ({delta}*k^(-{rho})) + ((1-{delta})*l^(-{rho})) )^(-{nu}/{rho})), init(gamma
   >  4 delta 0 rho -1 nu 1) eps(1e-15) iterate(100)
   (obs = 800)

   Iteration 0:  residual SS =  2.35e+20
   Iteration 1:  residual SS =  2.35e+20
   Iteration 2:  residual SS =  2.35e+20
   Iteration 3:  residual SS =  2.35e+20
   Iteration 4:  residual SS =  2.35e+20
   Iteration 5:  residual SS =  2.35e+20
   Iteration 6:  residual SS =  2.35e+20
   Iteration 7:  residual SS =  2.35e+20
   Iteration 8:  residual SS =  2.35e+20
   Iteration 9:  residual SS =  2.35e+20
   Iteration 10:  residual SS =  2.35e+20
   Iteration 11:  residual SS =  2.35e+20
   Iteration 12:  residual SS =  2.35e+20
   Iteration 13:  residual SS =  2.35e+20
   Iteration 14:  residual SS =  2.35e+20
   Iteration 15:  residual SS =  2.35e+20
   Iteration 16:  residual SS =  2.35e+20
   Iteration 17:  residual SS =  2.35e+20
   Iteration 18:  residual SS =  2.35e+20
   Iteration 19:  residual SS =  2.35e+20
   Iteration 20:  residual SS =  2.35e+20
   Iteration 21:  residual SS =  2.35e+20
   Iteration 22:  residual SS =  2.35e+20
   Iteration 23:  residual SS =  2.35e+20
   Iteration 24:  residual SS =  2.35e+20
   Iteration 25:  residual SS =  2.35e+20
   Iteration 26:  residual SS =  2.35e+20
   Iteration 27:  residual SS =  2.35e+20
   Iteration 28:  residual SS =  2.35e+20
   Iteration 29:  residual SS =  2.35e+20
```

```
Iteration 30:  residual SS =  2.35e+20
Iteration 31:  residual SS =  2.35e+20
Iteration 32:  residual SS =  2.35e+20
Iteration 33:  residual SS =  2.35e+20
Iteration 34:  residual SS =  2.35e+20
Iteration 35:  residual SS =  2.35e+20
Iteration 36:  residual SS =  2.35e+20
Iteration 37:  residual SS =  2.35e+20
Iteration 38:  residual SS =  2.35e+20
Iteration 39:  residual SS =  2.35e+20
Iteration 40:  residual SS =  2.35e+20
Iteration 41:  residual SS =  2.35e+20
Iteration 42:  residual SS =  2.35e+20
Iteration 43:  residual SS =  2.35e+20
Iteration 44:  residual SS =  2.35e+20
Iteration 45:  residual SS =  2.35e+20
Iteration 46:  residual SS =  2.35e+20
Iteration 47:  residual SS =  2.35e+20
Iteration 48:  residual SS =  2.35e+20
Iteration 49:  residual SS =  2.35e+20
Iteration 50:  residual SS =  2.35e+20
Iteration 51:  residual SS =  2.35e+20
Iteration 52:  residual SS =  2.35e+20
Iteration 53:  residual SS =  2.35e+20
Iteration 54:  residual SS =  2.35e+20
Iteration 55:  residual SS =  2.35e+20
Iteration 56:  residual SS =  2.35e+20
Iteration 57:  residual SS =  2.35e+20
Iteration 58:  residual SS =  2.35e+20
Iteration 59:  residual SS =  2.35e+20
Iteration 60:  residual SS =  2.35e+20
Iteration 61:  residual SS =  2.35e+20
Iteration 62:  residual SS =  2.35e+20
Iteration 63:  residual SS =  2.35e+20
Iteration 64:  residual SS =  2.35e+20
Iteration 65:  residual SS =  2.35e+20
Iteration 66:  residual SS =  2.35e+20
Iteration 67:  residual SS =  2.35e+20
Iteration 68:  residual SS =  2.35e+20
Iteration 69:  residual SS =  2.35e+20
Iteration 70:  residual SS =  2.35e+20
Iteration 71:  residual SS =  2.35e+20
Iteration 72:  residual SS =  2.35e+20
Iteration 73:  residual SS =  2.35e+20
Iteration 74:  residual SS =  2.35e+20
Iteration 75:  residual SS =  2.35e+20
Iteration 76:  residual SS =  2.35e+20
Iteration 77:  residual SS =  2.35e+20
Iteration 78:  residual SS =  2.35e+20
Iteration 79:  residual SS =  2.35e+20
Iteration 80:  residual SS =  2.35e+20
Iteration 81:  residual SS =  2.35e+20
Iteration 82:  residual SS =  2.35e+20
Iteration 83:  residual SS =  2.35e+20
Iteration 84:  residual SS =  2.35e+20
Iteration 85:  residual SS =  2.35e+20
Iteration 86:  residual SS =  2.35e+20
Iteration 87:  residual SS =  2.35e+20
Iteration 88:  residual SS =  2.35e+20
Iteration 89:  residual SS =  2.35e+20
Iteration 90:  residual SS =  2.35e+20
Iteration 91:  residual SS =  2.35e+20
Iteration 92:  residual SS =  2.35e+20
Iteration 93:  residual SS =  2.35e+20
Iteration 94:  residual SS =  2.35e+20
Iteration 95:  residual SS =  2.35e+20
Iteration 96:  residual SS =  2.35e+20
Iteration 97:  residual SS =  2.35e+20
Iteration 98:  residual SS =  2.35e+20
Iteration 99:  residual SS =  2.35e+20
```

```
      Source |       SS           df       MS
-------------+----------------------------------    Number of obs =        800
       Model |  1.044e+19         4  2.6110e+18    R-squared     =     0.0425
    Residual |  2.351e+20       796  2.9541e+17    Adj R-squared =     0.0377
-------------+----------------------------------    Root MSE      =   5.44e+08
       Total |  2.456e+20       800  3.0699e+17    Res. dev.     =   34448.01

------------------------------------------------------------------------------
           y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      /gamma |   4.002499   14.72642     0.27   0.786    -24.90472    32.90971
      /delta |   .0000248   .0071865     0.00   0.997     -.014082    .0141315
        /rho |   -19.1589   594.8331    -0.03   0.974    -1186.786    1148.468
         /nu |   .9999955   .2082545     4.80   0.000     .5912026    1.408788
------------------------------------------------------------------------------
convergence not achieved
r(430);

end of do-file

r(430);

12 . do "C:\Users\user\AppData\Local\Temp\STD39f4_000000.tmp"

13 . nl (lny = ln({gamma})-({nu}/{rho})*ln(({delta}*k^(-{rho}))+(1-{delta})*l^(-{rho}))), init(gamm
   > a exp(55) delta 0 rho -1 nu 1)
   (obs = 800)

   Iteration 0:  residual SS =   2124794
   Iteration 1:  residual SS =   2116579
   Iteration 2:  residual SS =   2116571
   Iteration 3:  residual SS =   2116504
   Iteration 4:  residual SS =   2114468
   Iteration 5:  residual SS =   2081538
   Iteration 6:  residual SS =   1955293
   Iteration 7:  residual SS =   1835355
   Iteration 8:  residual SS =   1039525
   Iteration 9:  residual SS =  611501.7
   Iteration 10:  residual SS =  340397.7
   Iteration 11:  residual SS =  98579.65
   Iteration 12:  residual SS =  30114.95
   Iteration 13:  residual SS =  16930.98
   Iteration 14:  residual SS =   16866.4
   Iteration 15:  residual SS =     16862
   Iteration 16:  residual SS =   16861.6
   Iteration 17:  residual SS =   16861.4
   Iteration 18:  residual SS =   16861.3
   Iteration 19:  residual SS =  16861.27
   Iteration 20:  residual SS =  16861.26
   Iteration 21:  residual SS =  16861.25
   Iteration 22:  residual SS =  16861.25


      Source |       SS           df       MS
-------------+----------------------------------    Number of obs =        800
       Model | -15065.054         2 -7532.52682    R-squared     =    -8.3872
    Residual |  16861.251       797  21.1558983    Adj R-squared =    -8.4107
-------------+----------------------------------    Root MSE      =   4.599554
       Total |  1796.1973       799  2.24805671    Res. dev.     =   4708.831

------------------------------------------------------------------------------
         lny |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      /gamma |   7.69e+23          .        .       .            .           .
         /nu |  -2.769949   .0618305   -44.80   0.000    -2.891319   -2.648579
        /rho |  -38.85704   696.6917    -0.06   0.956    -1406.424     1328.71
      /delta |   .5771581   1.842774     0.31   0.754    -3.040106    4.194423
------------------------------------------------------------------------------
  Parameter gamma taken as constant term in model & ANOVA table
```

```
14 . nl (lny = ln({gamma})-({nu}/{rho})*ln(({delta}*k^(-{rho}))+(1-{delta})*l^(-{rho}))), init(gamm
   > a exp(4) delta 0 rho -1 nu 1) eps(1e-1)
   (obs = 800)

   Iteration 0:  residual SS =  1143.768
   Iteration 1:  residual SS =  1141.441
   Iteration 2:  residual SS =  1079.391
   Iteration 3:  residual SS =  1056.941
   Iteration 4:  residual SS =  1021.524
   Iteration 5:  residual SS =  983.1424
   Iteration 6:  residual SS =  899.3962
   Iteration 7:  residual SS =  828.0447
   Iteration 8:  residual SS =  820.0263
   Iteration 9:  residual SS =  819.9925


         Source |       SS            df       MS
   -------------+----------------------------------    Number of obs =        800
          Model |  976.20485           3  325.401616    R-squared     =     0.5435
       Residual |  819.99247         796  1.03014129    Adj R-squared =     0.5418
   -------------+----------------------------------    Root MSE      =   1.014959
          Total |  1796.1973         799  2.24805671    Res. dev.     =   2290.048

   ------------------------------------------------------------------------------
            lny |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
   -------------+----------------------------------------------------------------
         /gamma |   44.64812   18.77959     2.38   0.018     7.784746     81.5115
            /nu |   .9727292   .0317774    30.61   0.000     .9103518    1.035107
           /rho |  -.8077343   .2189571    -3.69   0.000    -1.237536   -.3779327
         /delta |   .2351088   .0328584     7.16   0.000     .1706095    .2996081
   ------------------------------------------------------------------------------
     Parameter nu taken as constant term in model & ANOVA table

15 . nl (lny = ln({gamma})-({nu}/{rho})*ln(({delta}*k^(-{rho}))+(1-{delta})*l^(-{rho}))), init(gamm
   > a exp(4) delta 0 rho -1 nu 1) eps(1e-15) iterate(100)
   (obs = 800)

   Iteration 0:  residual SS =  1143.768
   Iteration 1:  residual SS =  1141.441
   Iteration 2:  residual SS =  1079.391
   Iteration 3:  residual SS =  1056.941
   Iteration 4:  residual SS =  1021.524
   Iteration 5:  residual SS =  983.1424
   Iteration 6:  residual SS =  899.3962
   Iteration 7:  residual SS =  828.0447
   Iteration 8:  residual SS =  820.0263
   Iteration 9:  residual SS =  819.9925
   Iteration 10:  residual SS =  819.9925
   Iteration 11:  residual SS =  819.9925
   Iteration 12:  residual SS =  819.9925
   Iteration 13:  residual SS =  819.9925
   Iteration 14:  residual SS =  819.9925
   Iteration 15:  residual SS =  819.9925
   Iteration 16:  residual SS =  819.9925
   Iteration 17:  residual SS =  819.9925
   Iteration 18:  residual SS =  819.9925
   Iteration 19:  residual SS =  819.9925
   Iteration 20:  residual SS =  819.9925
   Iteration 21:  residual SS =  819.9925
   Iteration 22:  residual SS =  819.9925
   Iteration 23:  residual SS =  819.9925
   Iteration 24:  residual SS =  819.9925


         Source |       SS            df       MS
   -------------+----------------------------------    Number of obs =        800
          Model |  222930.73           4  55732.6813    R-squared     =     0.9963
       Residual |  819.99246         796  1.03014129    Adj R-squared =     0.9963
   -------------+----------------------------------    Root MSE      =   1.014959
          Total |  223750.72         800  279.688397    Res. dev.     =   2290.048
```

lny	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
/gamma	**44.64759**	**18.90461**	**2.36**	**0.018**	**7.538809**	**81.75636**
/nu	**.9727292**	**.0317774**	**30.61**	**0.000**	**.9103518**	**1.035107**
/rho	**-.807984**	**.2186225**	**-3.70**	**0.000**	**-1.237129**	**-.3788392**
/delta	**.2351024**	**.0328463**	**7.16**	**0.000**	**.1706267**	**.2995781**

```
16 .
   end of do-file

17 . log close
         name:  <unnamed>
          log:  C:\Users\user\Documents\BE TU\Year2\EE426\HW3\3.7.smcl
     log type:  smcl
    closed on:  11 Feb 2021, 08:34:16

18 .
```