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# Assignment 3

a)

$$y = (2.89\times10^{-17})\left[(0.8018)K^{(1.8830)} + (1-0.8018)L^{(1.8830)}\right]^{-\frac{3.3959}{(-1.8830)}}$$

$$y = (2.89\times10^{-17})\left[(0.8018)K^{(1.8830)} + (0.1982)L^{1.8830}\right]^{1.8035}.$$

prob > chi2 = 0.0000

Hence, at least one of independant variable's variation can explain variation in y.

b)

$$\ln y = \ln\hat{\gamma} - \frac{\hat{v}}{\hat{\rho}}\ln\left[\hat{\delta}K^{-\hat{\rho}} + (1-\hat{\delta})L^{-\hat{\rho}}\right].$$

$$\ln y = \ln(44.6476) - \frac{0.9727}{(-0.8080)}\ln\left[(0.2351)K^{0.8080} + (1-0.2351)L^{0.8080}\right]$$

$$\ln y = 3.7988 + 1.2038\ln\left[(0.2351)K^{0.8080} + (0.7649)L^{0.8080}\right]$$

$H_0$ : $\delta = 0$, $\rho = 0$, and $v = 0$

$H_1$ : Otherwise

prob > chi2 = 0.0000

$\therefore$ $H_0$ is rejected

Hence, At least one of the parameters is significant.

c) $y = 15.2049\left[(0.0548)K^{38.8571} + (1-0.0548)L^{38.8571}\right]^{\frac{1.0636}{38.8571}}$.

$y = 15.2049\left[(0.0548)K^{38.8571} + (0.9452)L^{38.8571}\right]^{0.0274}$.

Iteration times in a) is 357

Iteration times in c) is 22.

Proportion of L is higher than K in Y production → Y is labor intensive.

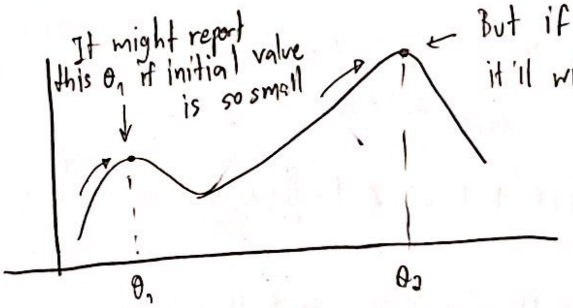
$\hat{\delta}$ and $\hat{v}$ in a) are a little bigger than in c)

$\hat{\gamma}$ and $\hat{\rho}$ in a) are way smaller than c)

This happens may due to the fact that initial value in a) is set up to be very small so it has to iterate many times to find the true value.

Also, when it's small, it might only find only small true values.

For example




But if initial value is higher, it'll will be able to find bigger $\theta$.

d) (i) $y = 4\left[(1.29\times10^{-7})K^{29.0199} + (1-1.29\times10^{-7})L^{29.0199}\right]^{\frac{1}{29.0199}}$

K has lower impact on Y than L does.

So Y is probably the labor-intensive product.

(ii) $y = 4.0025\left[(0.00002)K^{19.1599} + (1-0.00002)L^{19.1599}\right]^{\frac{1}{19.1599}}$.

It says "Convergence not achieved"

This result also shows that y is strictly labor-intensive product.

Result in (ii) shows 'Convergence not achieved' because we limit the iteration times. Also, the convergence number is very far so without the limited iteration times, it should keep finding the result (iteration = 364) But with the limited max iteration times, it can't converge.

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e) $\ln y = \ln(10^{55}) - \frac{(-8.228)}{(-1.5814)} \ln\left[(0.0973)K^{1.5814} + (1-0.0973)L^{1.5814}\right]$

$= 55 - 5.1995 \ln\left[0.0973K^{1.5814} + 0.9027L^{1.518}\right]$

$\ln\hat{r}, \hat{v}, \hat{\rho}$ in e) are bigger than b)

$\hat{\delta}$ in e) is smaller than b)

This is due to the different initial values. And the iteration times here is way higher than b). It might be because it can't can find true values when we set initial value so big.

f) (i)

$\ln y = \ln(44.6202) - \frac{(0.9727)}{(-0.8088)} \ln\left[0.2350K^{0.8088} + (1-0.2350)L^{0.8088}\right]$

The result here is pretty close to those in b)

I think it might be cause of convergence value here is close to default.

(ii)

$\ln y = \ln(44.6476) - \frac{(0.9727)}{(-0.8080)} \ln\left[0.2351K^{0.8080} + (1-0.2351)L^{0.8080}\right]$

The result here is exactly same as in b). It might be because it doesn't have any problem to converge no matter what convergence value you set. It can converge before it exceeds the max iteration times.

9) Probably model (2) because all the parameters are significant and it doesn't have any problem with the convergence not being achieved. But model (1), if we don't try some other initial values or convergence values, there is some parameter that is not significant. However, after we try to change some initial values or convergence value, we face some other problem ie. non of the parameter is significant and can't achieve the convergence.