1 Programming Setup

1.1 Set up DataCamp

I finished ”Introduction to R” course on the DataCamp.

1.2 R

The markdown file and the pdf file are here. Please find it in folder ”PS1.”

1.3 Debugger

The R script is also here. Please find it in folder ”PS1.”

1.4 Setup Github

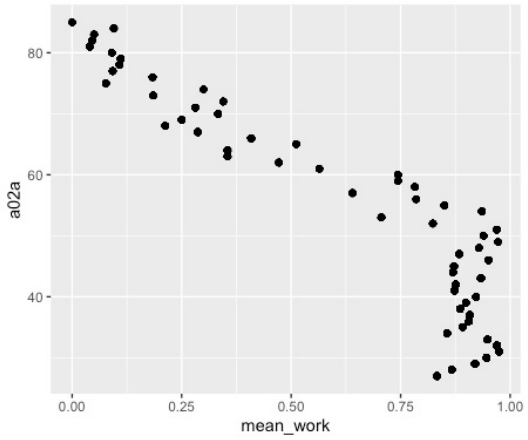
The repository is here, including the rmd, pdf, and the R script for 1.3 and 4.2.

2 Sign up NBER working paper series

1. The title of the second paper listed on the NBER weekly working paper series that I most recently received is ”A Human Capital Theory of Who Escape the Grasp of the Local Monopsonists.”
2. I download the paper ”Trade Diversion and Trade Deficits: The Case of the Korea-U.S. Free Trade Agreement”, which interests me.

3 Sign up SRDA

I downloaded the 2020 PSFD, and here's the graph.



4 Roy Model

4.1 Review

1. We derive the equations as follows.

$$\begin{aligned}
\mathbb{E}\left[w_0|I\right] &= \mu_0 + \mathbb{E}\left[\varepsilon_0|\frac{v}{\sigma_v} > Z\right] \\
&= \mu_0 + \sigma_0\mathbb{E}\left[\frac{\varepsilon_0}{\sigma_0}|\frac{v}{\sigma_v} > Z\right] \\
&= \mu_0 + \sigma_0\mathbb{E}\left[\ \mathbb{E}\left(\frac{\varepsilon_0}{\sigma_0}|\frac{v}{\sigma_v}\right)|\frac{v}{\sigma_v} > Z\right] \qquad (1) \\
&= \mu_0 + \sigma_0\rho_{0v}\mathbb{E}\left[\frac{v}{\sigma_v}|\frac{v}{\sigma_v} > Z\right] \qquad (2) \\
&= \mu_0 + \sigma_0\rho_{0v}\left(\frac{\phi(z)}{1-\Phi z}\right) \\
&= \mu_0 + \sigma_0\frac{\sigma_{0v}}{\sigma_0\sigma_v}\left(\frac{\phi(z)}{1-\Phi z}\right) \\
&= \mu_0 + \frac{\sigma_{0v}}{\sigma_v}\left(\frac{\phi(z)}{1-\Phi z}\right) \\
&= \mu_0 + \frac{\sigma_{01} - {\sigma_0}^2}{\sigma_v}\left(\frac{\phi(z)}{1-\Phi z}\right) \\
&= \mu_0 + \frac{\sigma_0\sigma_1}{\sigma_v}\left(\frac{\sigma_{01}}{\sigma_0\sigma 1} - \frac{\sigma_0}{\sigma_1}\right)\left(\frac{\phi(z)}{1-\Phi z}\right) \\
&= \mu_0 + \frac{\sigma_0\sigma_1}{\sigma_v}\left(\rho_{01} - \frac{\sigma_0}{\sigma_1}\right)
\end{aligned}$$

Note that from (1) to (2) need to be further explained. First, let $s = \frac{v}{\sigma_v} \sim N(0,1)$. Then

$$\mathbb{E}\left(\frac{\varepsilon_0}{\sigma_0}|\frac{v}{\sigma_v}\right) = \frac{1}{\sigma_0}\,\mathbb{E}\left(\varepsilon_0|s\right) = \frac{1}{\sigma_0}\frac{\sigma_{0s}}{{\sigma_s}^2}s = \frac{1}{\sigma_0}\frac{\frac{\sigma_{0v}}{\sigma_v}}{1}\frac{v}{\sigma_v} = \rho_{0v}\frac{v}{\sigma_v}$$

Similarly, we can derive $\mathbb{E}\left[w_1|I\right] = \mu_1 + \frac{\sigma_1\sigma_0}{\sigma_v}\left(\frac{\sigma_1}{\sigma_0} - \rho_{01}\right)\left(\frac{\phi(z)}{1-\Phi z}\right)$ □

2. If $Q_0 > 0$ and $Q_1 < 0$, then it must be the case that $\rho > \frac{\sigma_0}{\sigma_1}$ and $\rho > \frac{\sigma_1}{\sigma_0}$. No matter $\sigma_0 > \sigma_1$, $\sigma_0 < \sigma_1$ or even $\sigma_0 = \sigma_1$, $\rho > 1$ in one of the inequalities, which is not possible.

4.2 Simulation

The R script of this simulation is also here. Please find it in folder "PS1". The result of 5. and 6. are quite similar, which is not surprising. All other questions are answered in the R script.

5 Roy Model is Everywhere

1. We want to examine the effect of join WTO or not on trade volumes.

2. We conside the following Roy model for our WTO discussing.

$$trade_0 = \mu_0 + \varepsilon_0$$
$$trade_1 = \mu_1 + \varepsilon_1$$

where joining WTO is 1, not joining WTO is 0.