Problem Set #2

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Question I.

- Individual i's sequential problem can be written as follows:

$$\begin{aligned}&\max_{\{c_t^i\}} E[\sum_{t=0}^{\infty} \beta^t u(c_t^i)] \\ &\text{s.t. } \sum_{t=0}^{\infty} q_t c_t^i = \sum_{t=0}^{\infty} q_t(\pi_e + 0.5\pi_u).\end{aligned}$$

By taking FOC,

$$\begin{aligned}&[c_t^i] : \beta^t u'(c_t^i) = \lambda q_t \\ &\Rightarrow u'(c_t^i) = u'(c_t^j) \\ &\Rightarrow c_t^i = c_t^j = \pi_e + 0.5\pi_u = \bar{c} \ \ \forall t.\end{aligned}$$

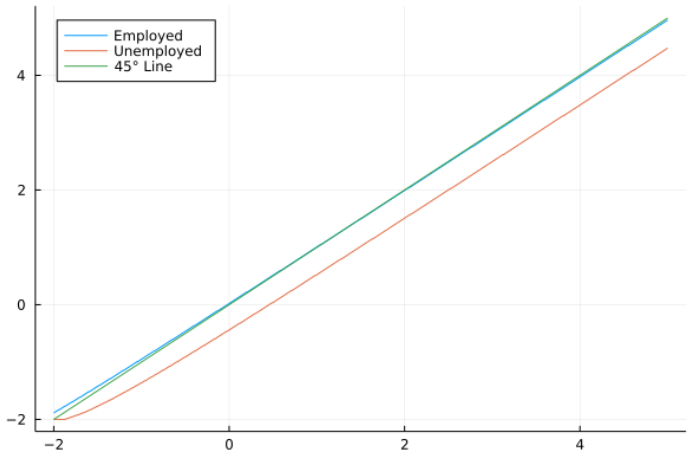
Also, it is followed by:

$$\begin{aligned}&\lambda = \beta^t u'(\bar{c})/q_t = \beta^{t+1} u'(\bar{c})/q_{t+1} \\ &\Rightarrow q_{t+1} = \beta q_t\end{aligned}$$

Thus, normalizing $q_0 = 1$, we can obtain $q_t = \beta^t$.

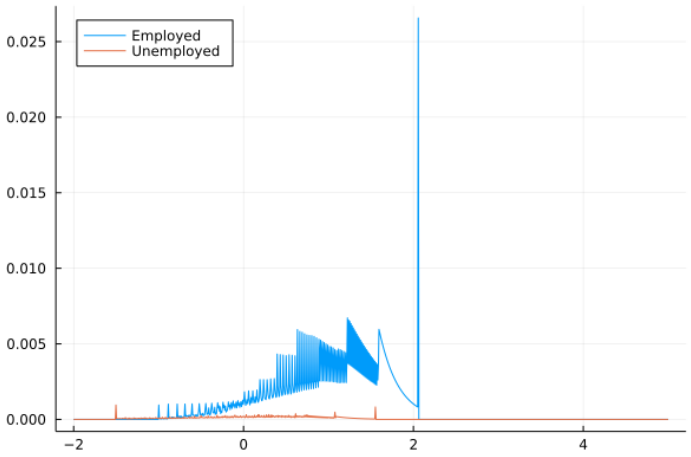
Question II.

a. The policy function $g(a, s)$ is illustrated below.

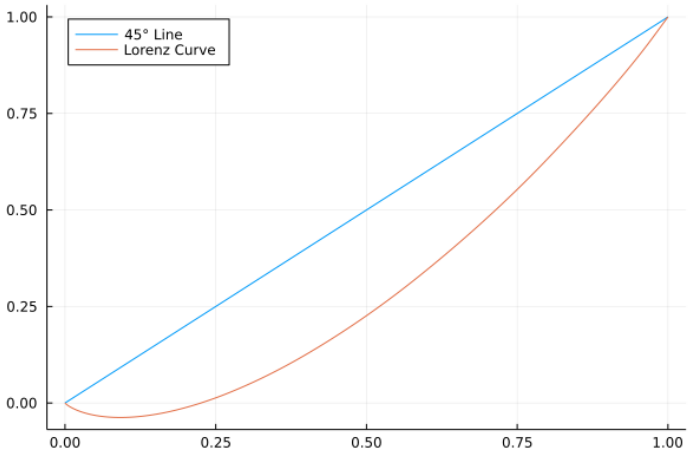


We can obtain $\hat{a} = 1.055$ for those employed and $\hat{a} = -2$ for those unemployed.

b. Equilibrium bond price q is equal to 0.99424. The wealth distributions of the employed and unemployed are drawn below.



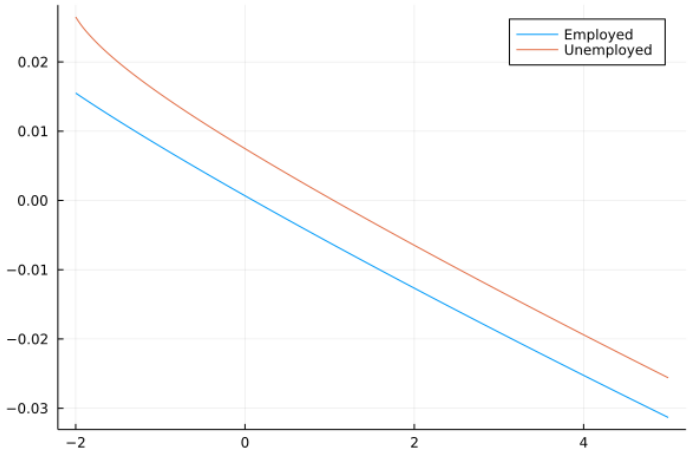
c. Lorenz curve is plotted below.



The gini index is 0.38 for this economy. This estimate accounts for about half of the gini index calculated by real world data (0.8).

Question III.

a. The graphs of $\lambda(a, s)$ for both employed and unemployed people are presented as follows.



b. $W^{FB} = -4.253$ and $W^{INC} = -4.426$. Thus $WG = W^{FB} - W^{INC} = 0.173$.

c. The fraction of the population who favor transforming into complete markets are:

$$\sum_{(a,s)\in A\times S} \mathbf{1}_{\{\lambda(a,s)\geq 0\}}(a, s)\mu(a, s) = 0.527$$