ECON 634 Problem Set 3

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1. The recursive problem is

$$\max_{\{c_t\}_{t=0}^{\infty}} \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t u(c_t) \right]$$

$$s.t.\ c_t + q_t a_{t+1} = y(s_t) + a_t$$

$$a_{t+1} \in \Gamma(s_t, a_t)$$

$$a_{t+1} \geq \underline{a},\ \forall t,\ \text{and } a_0 \text{ given.}$$

The functional equation of the dynamic programming problem is

$$V(s,a) = \max_{a' \in \Gamma(s,a)} \left\{ \frac{[y(s) + a - qa']^{(1-\sigma)}}{1-\sigma} + \beta \mathbb{E}_{s'|s} V(s', a') \right\}$$

where s and a are the state variables and s' and a' are the control variables.
The state space is the combination of the possible states of asset

$$\mathscr{A} = \{a_1, a_2, ..., a_n\}$$

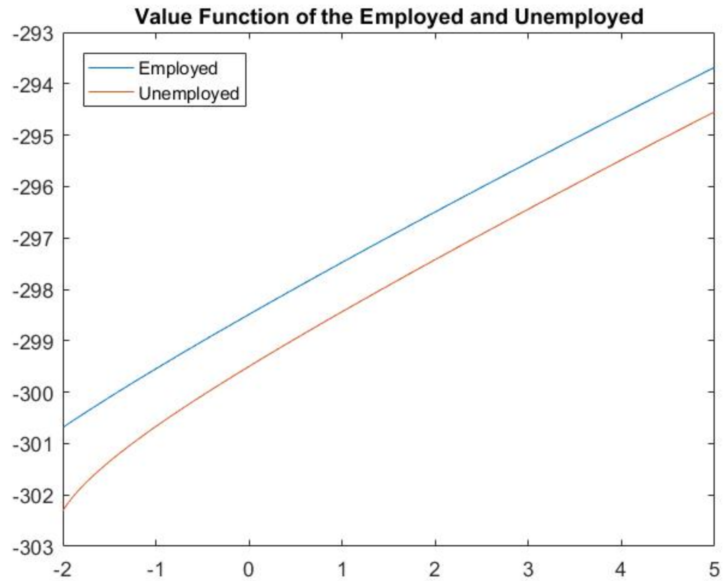
and the possible states of employment

$$\mathscr{S} = \{e, u\}.$$

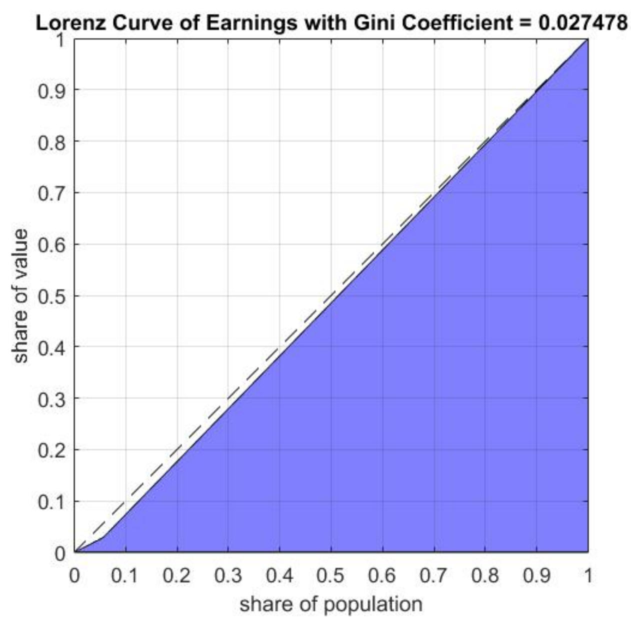
The constraint correspondence is

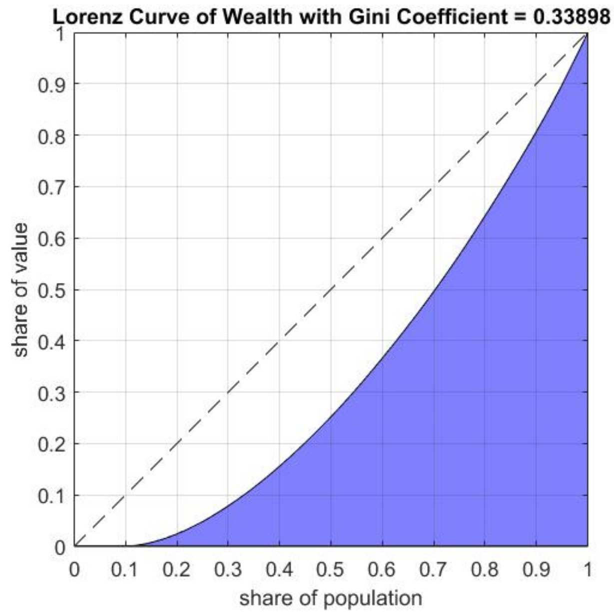
$$\Gamma(a,s) = \left\{ a' : a' \geq 0,\ a' \leq \frac{y(s) + a}{q} \right\}.$$

2. The market clearing bond price is $q^{ss} = 0.9943$. Therefore, the risk-free interest rate in the economy in the steady state is $\frac{1}{q^{ss}} = 1.0057$.
The plot of value functions is following:



3. The plots of Lorenz Curves are following:




Lorenz Curve of Wealth with Gini Coefficient = 0.33898
share of value
share of population
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1