Fall 2019 - ECON 634 - Advance Macroeconomics - Problem Set 4

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1. Based on the information in the firm maximization prolem, and because of constant return to scale, the firm's FOC are given by:

$$w_t = F_N(K_t, 1) \tag{1}$$

$$r_t = F_K(K_t, 1) \tag{2}$$

2. For the household, we can write the budget constraint in recursive form as $c = zw\bar{l} + ra - a'$

   - **State variable**: a, z
   - **Control variable**: a'

   Therefore, the Bellman equation:

   $$V(a, z) = \underset{a' \in \Gamma(a,z)}{\text{Max}} \left\{ \frac{\left(zw\bar{l} + ra - a'\right)^{1-\sigma}}{1 - \sigma} + \beta \sum_{z' \in Z} \Pi(z'|z) V(a', z') \right\}$$

   subject to
   $$\Gamma(a, z) \in \left[0, zw\bar{l} + ra\right] \tag{3}$$

3. The aggregate labor is equal to $N^s = 1$ using the Rouwenhorst's method.

4. See code.

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5. See code.

6. My code does not finish and get stuck in one interest rate. I decide to add a limit in the iteration and the final (gross) interest rate is: 1.0099. Compare with the complete equilibrium solution, $\frac{1}{\beta} = 1.010101$, which means that the interest rate is -0.02% in the incomplete market.

   The policy functions are as follows:
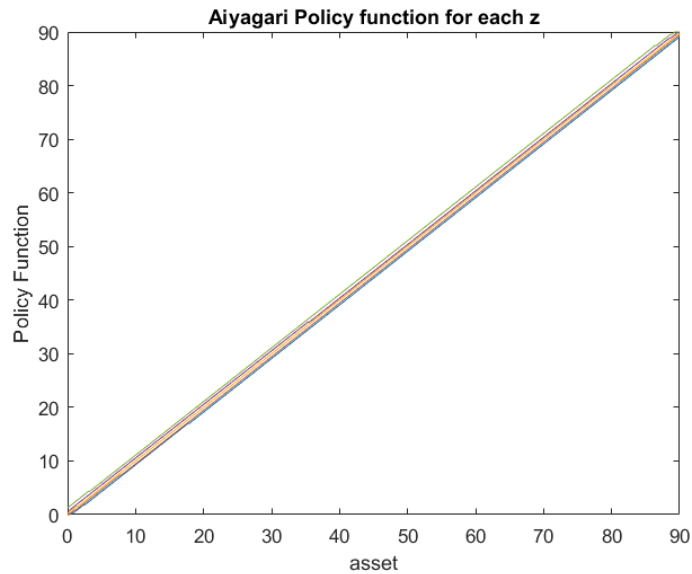
   The Lorenz curve is like in the second picture:
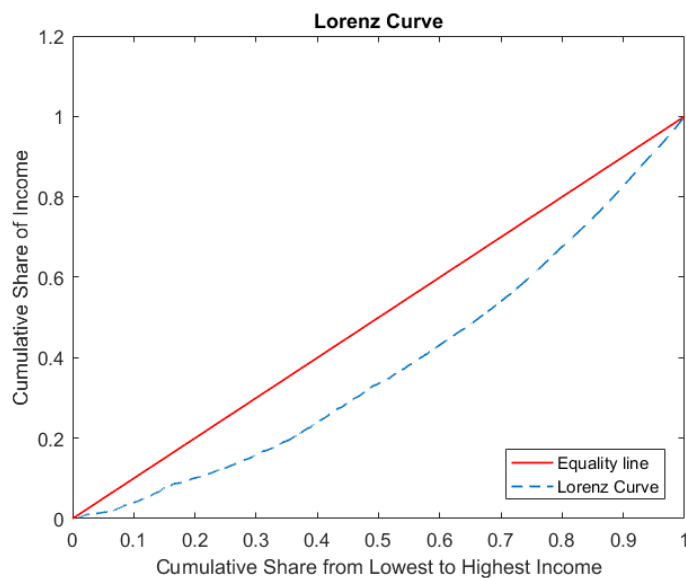
   The Gini value is:

   From the Lorenz curve we can see that the distribution seems more realistic because there the shave of the inequality is more convex.

7.