

# Problem Set 9

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## Overlapping Generation Model

**Objective:**

1. To extend the basic overlapping generation model for S-period lived agents
2. Add endogenous labor supply

**Background:** The labor supply euler equation is given by:

$$u(c_{s,t}, n_{s,t}) = \frac{c_{s,t}^{1-\sigma} - 1}{1-\sigma} - \chi_s^n \frac{(n_{s,t})^{1+\frac{1}{\theta}}}{1+\frac{1}{\theta}} \quad (1)$$

The disutility of labor equation is given by:

$$w_t(c_{s,t})^{-\sigma} = \chi_s^n \left( \frac{b}{\tilde{l}} \right) \left( \frac{n_{s,t}}{\tilde{l}} \right)^{v-1} \left[ 1 - \left( \frac{n_{s,t}}{\tilde{l}} \right)^v \right]^{\frac{1-v}{v}} \quad \forall s, t \quad (2)$$

Here

- $c_{s,t}$  is the consumption
- $w_t$  is the wage
- $\sigma$  is coefficient of relative risk aversion on consumption

- $b$  and  $v$  are elliptical utility parameters
- $\tilde{l}$  is the time in each period endowed to each household to be spent in either labor or leisure
- $\chi_s^n$  is a scale parameter that can vary by age  $s$  influencing the relative disutility of labor to the utility of consumption
- $n_{s,t}$  is the individual labor supply that varies endogenously with age  $s$  and time  $t$

The budget constraint is given by:

$$c_{s,t} + b_{s+1,t+1} = (1 + r_t)b_{s,t} + w_t n_{s,t} \quad (3)$$

In order to analyze the results to the maximum period possible, I have worked on a **100-period** lived agents model. The graphs are as follows:

**Plots:**

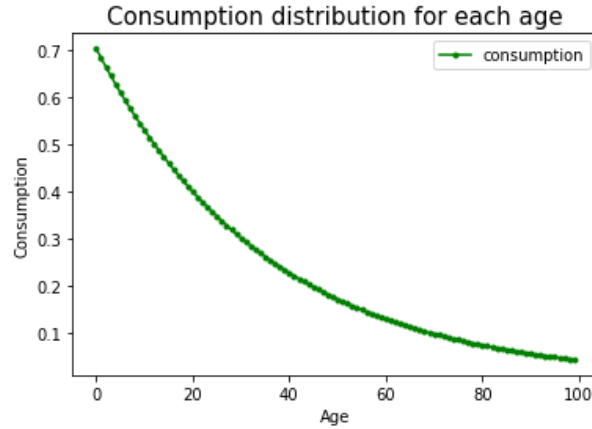


Figure 1: We see from the decreasing plot that with an increase in age there is a decrease in consumption by individual.

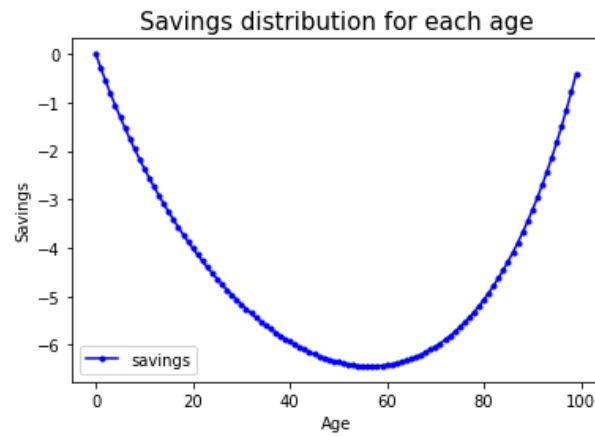


Figure 2: Next we see that there is a decrease in savings near the age of 66. However this starts increasing thereafter. Hence we see from the first two plots that with an increase in age consumption decreases at the same level however, there is a change in savings in the mid age individuals.



Figure 3: Finally the above plot shows that labor supply increases steadily in the first 20 years. However, it stays at the same level of height once the age turns 25.