PS2b - Exercise 2

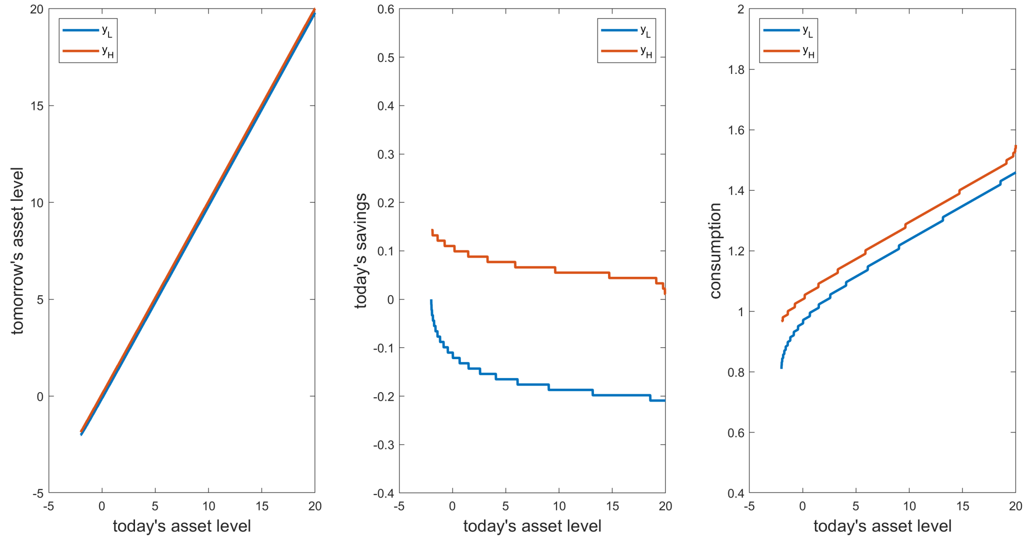
1. Since $prob(y'_L|y_L) = prob(y'_H|y_H) = 0.95$, we have $prob(y'_H|y_L) = prob(y'_L|y_H) = 0.05$.

2. Please see Matlab code: `PS2b_2_VFI.m`.

3. Please see Matlab code: `PS2b_2_VFI.m`.

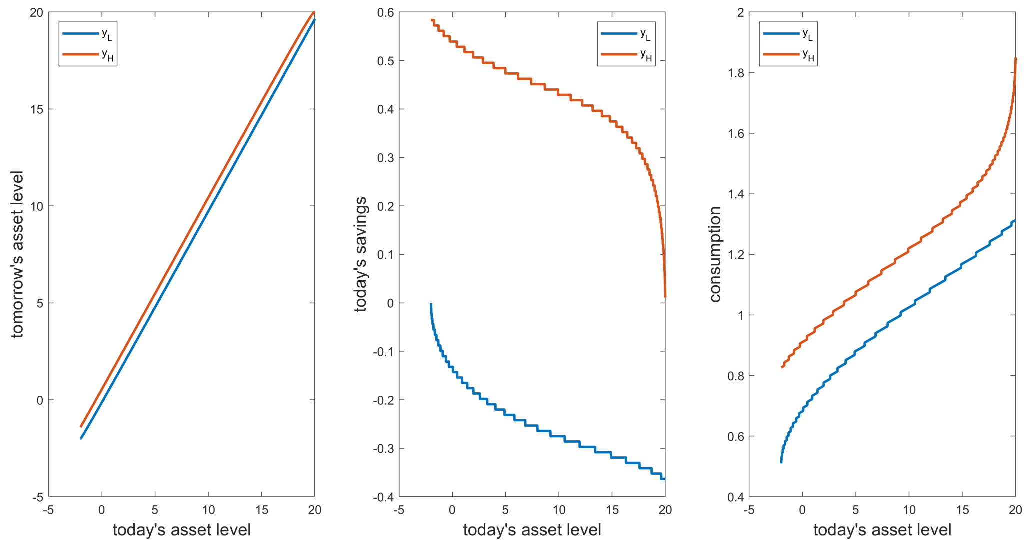
4. The asset, savings, and consumption policy functions are depicted in Figure 1.

Figure 1: Policy functions using Value Function Iteration for $y_L = 0.85$, $y_H = 1.15$, and $prob(y'_L|y_L) = prob(y'_H|y_H) = 0.95$



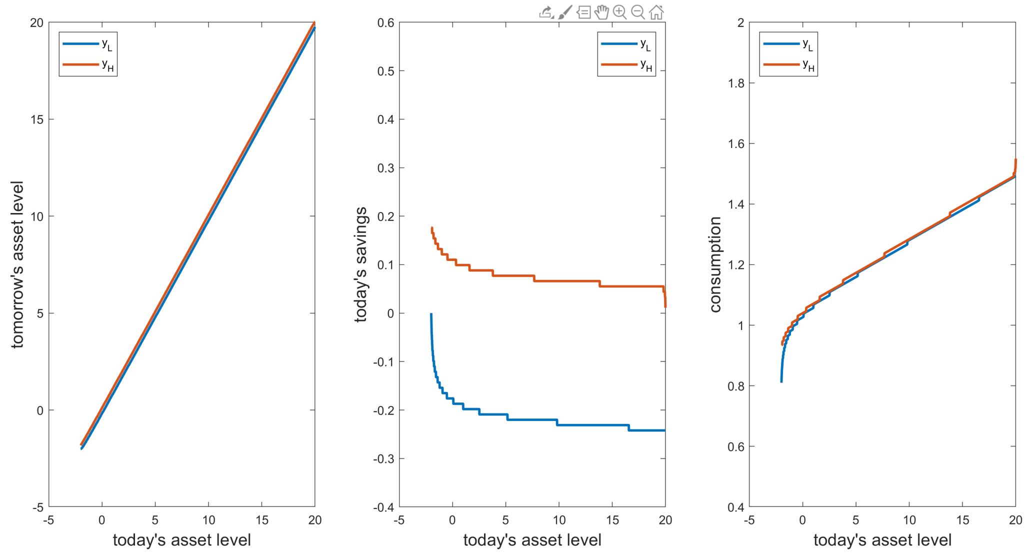
5. The greater the amplitude of incomes fluctuations, the bigger the distance between the two consumption policy functions. For example, Figure 2 shows the policy functions if we let $y_L = 0.55$, $y_H = 1.45$.

Figure 2: Policy functions using Value Function Iteration for $y_L = 0.55$, $y_H = 1.45$, and $prob(y'_L|y_L) = prob(y'_H|y_H) = 0.95$



6. The lower (higher) the persistence (transition) probabilities, the greater the convergence of the two consumption policy functions. Figure 3 reports the policy functions assuming $prob(y'_L|y_L) = prob(y'_H|y_H) = 0.55$.

Figure 3: Policy functions using Value Function Iteration for $y_L = 0.85$, $y_H = 1.15$, and $prob(y'_L|y_L) = prob(y'_H|y_H) = 0.55$



PS2b - Exercise 3

1. Please see Matlab code: `PS2b_3_PFI.m`.

2. As shown in Figures 4, 5, and 6, the policy functions using Policy Function Iteration with endogenous grid method are similar to the policy functions using Value Function Iteration (respectively, Figures 1, 2, and 3) derived in Exercise 2. Note that the curves are smoother than in Exercise 2.

Figure 4: Policy functions using Policy Function Iteration with endogenous grid method for $y_L = 0.85$, $y_H = 1.15$, and $prob(y'_L|y_L) = prob(y'_H|y_H) = 0.95$

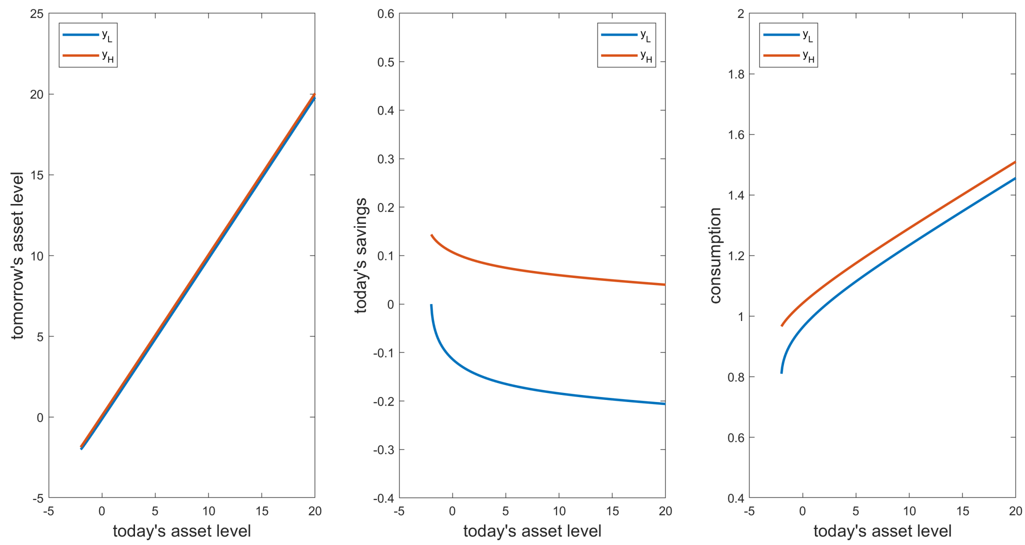


Figure 5: Policy functions using Policy Function Iteration with endogenous grid method for $y_L = 0.55$, $y_H = 1.45$, and $prob(y_L'|y_L) = prob(y_H'|y_H) = 0.95$

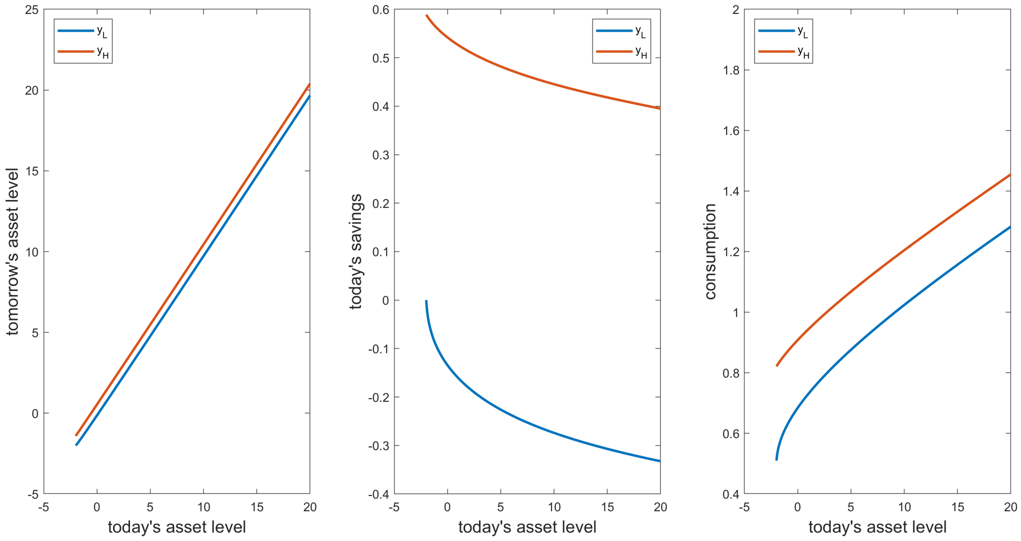
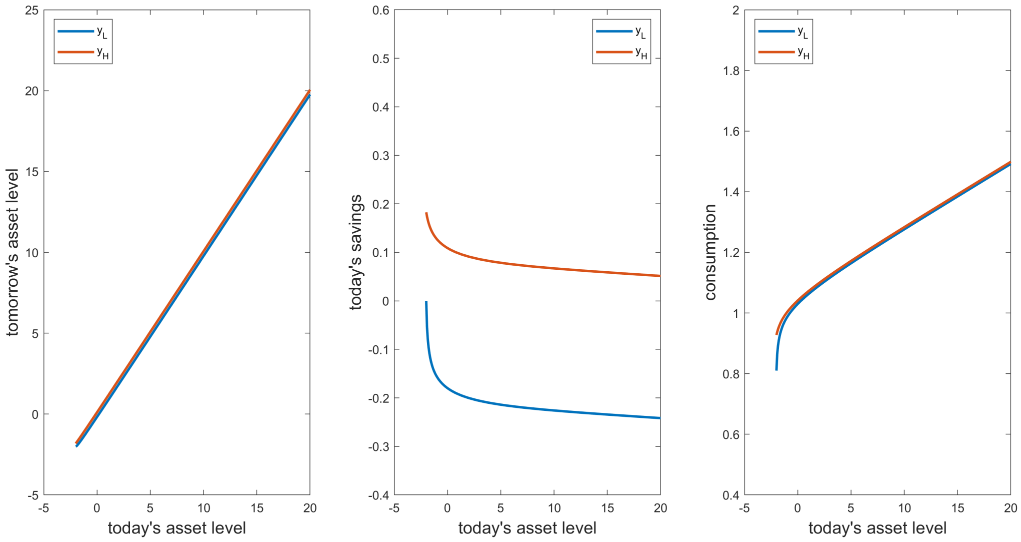
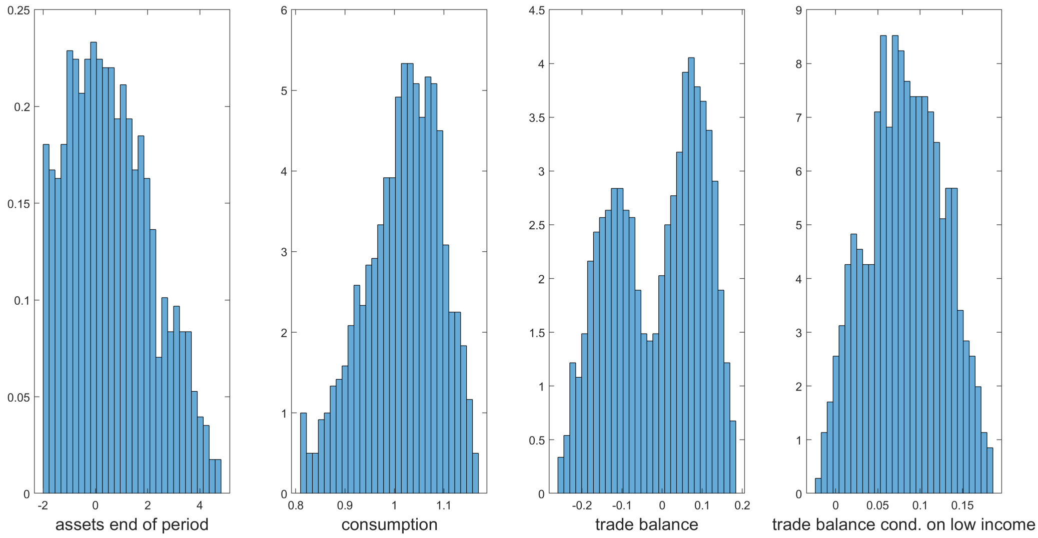


Figure 6: Policy functions using Policy Function Iteration with endogenous grid method for $y_L = 0.85$, $y_H = 1.15$, and $prob(y_L'|y_L) = prob(y_H'|y_H) = 0.55$



3. Please see Matlab code: `PS2b_3q1to4_PFI.m`. Figure 7 shows the density functions of the simulated model.

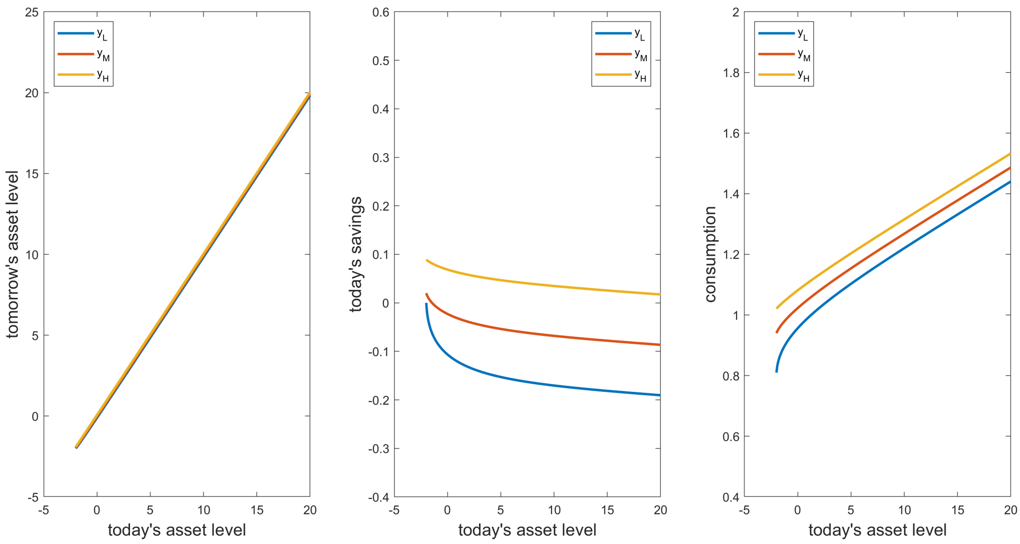
Figure 7: Density functions of 1,000 draws simulation with $prob(y_L'|y_L) = prob(y_H'|y_H) = 0.95$



4. The less persistent the income process, the higher the correlation between trade balance and income. For instance, the simulation of 1,000 draws resulted in $corr(tb_t, y_t)$ equal to 0.39 if $prob(y_L'|y_L) = prob(y_H'|y_H) = 0.99$, 0.68 if persistence is 0.95, 0.94 if 0.75, 0.97 if 0.50, and 0.99 if 0.25. In fact, $prob(y_L'|y_L) = prob(y_H'|y_H) = 0$ yields $corr(tb_t, y_t) = 1$. In this model, trade is used to smooth consumption against transitory income fluctuations. Hence, a higher probability of transition from one income state to another (i.e., a lower persistence of the income process) results in greater reliance on trade.

5. Please see Matlab code: `PS2b_3q5_PFI.m`. Policy functions for the case of three income states are depicted in Figure 8.

Figure 8: Policy functions using Policy Function Iteration for $y_L = 0.85$, $y_M = 1$, $y_H = 1.15$, and $prob(y_L'|y_L) = prob(y_M'|y_M) = prob(y_H'|y_H) = 0.95$, $prob(y_M'|y_L) = prob(y_M'|y_H) = 0.05$, $prob(y_L'|y_M) = prob(y_H'|y_M) = 0.025$



6. Please see Matlab code: `PS2b_3q6_PFI.m`. Figure 9 shows the policy functions assuming a savings constraint $\bar{b} = 5$.

Figure 9: Policy functions using Policy Function Iteration for $y_L = 0.85$, $y_M = 1$, $y_H = 1.15$, and $prob(y'_L|y_L) = prob(y'_M|y_M) = prob(y'_H|y_H) = 0.95$, $prob(y'_M|y_L) = prob(y'_M|y_H) = 0.05$, $prob(y'_L|y_M) = prob(y'_H|y_M) = 0.025$, with $\bar{b} = 5$.