Assignment I: Suggested Answer

Answer 1.1

(**1.1 a**)

$$c_1 + c_2 \leq 20.$$

(**1.1 b**) First period budget constraint: $c_{1,t} + v_t m_t \leq y$. Second period budget constraint: $c_{2,t+1} \leq v_{t+1} m_t$. The life-time budget constraint: $c_{1,t} + \frac{v_t}{v_{t+1}} c_{2,t+1} \leq 20$.

(**1.1 c**) $\frac{v_{t+1}}{v_t} = 1$.

(**1.1 d**) $v_t = 2.5$ and $p_t = 0.4$.

(**1.1 e**) An increase in population growth rate, n, increases the real rate of return on money. The real demand for money increases and also its value which makes initial old better-off.

(**1.1 f**) $v_t = 1.25$. The value of money declines, but the rate of return on money $\frac{v_{t+1}}{v_t}$ remains unchanged. Thus, the initial old is neither better-off nor worse-off.

Answer 1.2

(**1.2 a**) The rate of return on money in each country is 1.

(**1.2 b**) Given the preferences $c_1^A > c_1^B$, which implies that the value of money in country A is lower, as real demand for money (for saving) in country A is lower.

Answer 1.3

(**1.3 a**) The feasible set is

$$c_1 + \frac{1}{n} c_2 \leq y_1 + \frac{1}{n} y_2.$$

(**1.3 b**) Plot the feasibility constraint and the indifference curve.

(**1.3 c**) $v_t M_t = N_t (y_1 - c_{1,t})$.

(**1.3 d**) $\frac{v_{t+1}}{v_t} = n$.

(**1.3 e**) The life-time budget constraint is

$$c_1 + \frac{v_t}{v_{t+1}} c_2 \leq y_1 + \frac{v_t}{v_{t+1}} y_2.$$

Monetary equilibrium attains the golden rule allocations.

Answer 1.4

(**1.4 a**) Since population is constant, but the endowment (or total availability of goods) is growing over time, we cannot have stationary consumption pattern. This is because under stationary consumption pattern, total demand will remain constant, but the total supply is growing over time. In this case, consumption as young, $c_{1,t}$ and consumption as old, $c_{2,t+1}$, will be growing at the same rate as the endowment. The first period budget constraint is $c_{1,t} \leq \frac{y_t}{2}$ and the second period budget constraint is $c_{2,t+1} \leq v_{t+1}m_t$. The life-time budget constraint is $c_{1,t} + \frac{v_t}{v_{t+1}}c_{2,t+1} \leq y_t$.

(**1.4 b**) $v_tM = N(y - c_{1,t})$ which implies $v_t = \frac{Ny_t}{2M}$. The rate of return on money $\frac{v_{t+1}}{v_t} = \alpha$.

Answer Appendix Exercise 1.1

(**1.1 a**) Set-up the utility maximization problem and the first order condition gives the desired result.

(**1.1 b**) $c_1 = \frac{y}{1+\beta}$, $c_2 = \frac{v_{t+1}}{v_t}\frac{\beta y}{1+\beta}$.

(**1.1 c**) Differentiate the above expressions for c_1 and c_2 with respect to β taking as given the rate of return on money $\frac{v_{t+1}}{v_t}$. c_1 falls and c_2 rises.