Assignment II: Suggested Answer

Answer 3.1

(a)

Combining the period budget constraints, we have

$$c_1 + \frac{v_t}{v_{t+1}} c_2 = y + a_t. \tag{1}$$

The money market clearing condition imply that

$$\frac{v_{t+1}}{v_t} = \frac{n}{z}. \tag{2}$$

As usual the tangency of the indifference curve and the budget constraint will pin down the monetary equilibrium.

(b)

The feasibility constraint is given by

$$c_1 + \frac{c_2}{n} = y. \tag{3}$$

Note that the feasibility constraint will be steeper than the inter-temporal budget constraint. Also the x-axis intercept for the feasibility constraint will be smaller, but the y-axis intercept will be larger.

(c)

Using the above information, you can show that the monetary equilibrium does not maximize the utility of the future generations. c_1 will be larger and c_2 will be lower compared to the golden rule allocations.

Answer 3.2

(a)

The money market clearing condition imply that

$$\frac{v_{t+1}}{v_t} = \frac{1}{z}. \tag{1}$$

(b)

Combining the period budget constraints, we have

$$c_1 + \frac{v_t}{v_{t+1}} c_2 = y - \frac{v_t}{v_{t+1}} \tau. \tag{2}$$

In monetary equilibrium (1) and (2) imply that

$$c_1 + z c_2 = y - z\tau. \tag{3}$$

The feasibility constraint is

$$c_1 + c_2 = y. \tag{4}$$

Using (3) and (4) you can show that that the monetary equilibrium does not maximize the utility of the future generation. Consumption by young will be lower and consumption of old will be higher than the Golden rule.

(c)

In monetary equilibrium, consumption of old will be higher and thus the initial old will be better-off.

Answer 3.3

(a)

$$\frac{v_{t+1}}{v_t} = \frac{n}{z} = .5$$

(b)

$$a = (1 - \frac{1}{z})v_t m_t.$$

Since, $N = 1000,\ v_t m_t = 10,\ \&\ z = 2$, we have $a = 5$.

(c) $v_1 = \frac{N_1(y-c_1)}{M_1}$. Thus, $v_1 = .5\ \&\ p_1 = 2$.

Answer 3.4

Note that every old will receive $n\tau$ units of transfer.

(a)

Combining the period budget constraints, we have

$$c_1 + \frac{v_t}{v_{t+1}} c_2 = y - \tau + \frac{v_t}{v_{t+1}} n\tau. \tag{1}$$

(b)

The money market clearing condition imply that

$$\frac{v_{t+1}}{v_t} = n. \tag{2}$$

(c)

(1) and (2) imply that in monetary equilibrium the inter-temporal budget constraint is given by

$$c_1 + \frac{c_2}{n} = y \tag{3}$$

which coincides with the feasibility constraint. Thus the monetary equilibrium maximizes the utility of the future generation.

(d)

This tax policy has no effect on an individual's welfare.

(e)

In this case, actually their will not be any monetary equilibrium. The young would consume their net endowment $y - \tau$ and old will consume $n\tau$. Individuals would be worse-off as they will not be able to use their money holding to balance their consumption over two-periods.

(f)

Now the inter-temporal budget constraint becomes

$$c_1 + \frac{c_2}{n} = y - .5\tau. \tag{4}$$

Tax and subsidy policy reduces the inter-temporal income of individuals. Thus, individuals are worse-off.

Answer 3.9

(a) $\alpha M_{t-1} = M_t - M_{t-1}$ which implies $z = 1 + \alpha$.

(b) The period budget constraints are $c_{1,t} + v_t m_t = y$ and $c_{2,t+1} = v_{t+1}(1+\alpha)m_t$.

The life-time budget constraint is

$$c_{1,t} + \frac{v_t}{v_{t+1}(1+\alpha)} c_{2,t+1} \leq y.$$

(c) Note that for every dollar saved in the first period, an individual have $1+\alpha$ dollars next period. In other words, for v_t dollar saved in real terms, one gets return of

$(1+\alpha)v_{t+1}$ in real terms next period. Thus, the real rate of return on money

$$\frac{v_{t+1}(1+\alpha)}{v_t} = \frac{1+\alpha}{z} = 1.$$

(d) Putting the above expression in the life time budget constraint, we have

$$c_1 + c_2 \leq y$$

which is the same as the feasibility constraint.Thus the market equilibrium and golden rule allocations coincide irrespective of the value of z. The reason for the coincidence is that money transfer in proportion to the money holding by the government negates the adverse effect of z on the rate of return of money.