

Answer Keys for Homework 2

2. Life-cycle budgets

- a) C_{yt} Consumption when young, C_{ot+1} Consumption when old and A_{t+1} Savings;

$$C_{yt} + A_{t+1} = W_{yt};$$
$$C_{ot+1} = W_{ot+1} + (1 + r_{t+1}) A_{t+1};$$

$$A_{t+1} = W_{yt} - C_{yt};$$
$$C_{ot+1} = W_{ot+1} + (1 + r_{t+1})(W_{yt} - C_{yt});$$

Life-time budget constraint

$$C_{yt} + \frac{C_{ot+1}}{(1 + r_{t+1})} = W_{yt} + \frac{W_{ot+1}}{(1 + r_{t+1})};$$

- b) Plot $C_{ot+1} = W_{ot+1} + (1 + r_{t+1}) W_{yt} - (1 + r_{t+1}) C_{yt}$;

If $C_{yt} > W_{yt}$ then the young agent is a net borrower;

$$C_{ot+1} = 0, \quad C_{yt} = W_{yt} + \frac{W_{ot+1}}{(1 + r_{t+1})} > W_{yt};$$

If $C_{yt} < W_{yt}$ then the young agent is a net saver;

$$C_{yt} = 0 < W_{yt}; \quad C_{ot+1} = W_{ot+1} + (1 + r_{t+1}) W_{yt};$$

- c) $W_{yt}=10$, $W_{ot+1}=5$, $r_{t+1}=1$ and $C_{yt} = C_{ot+1}$;

$$C_{yt} = C_{ot+1};$$

$$W_{yt} - A_{t+1} = W_{ot+1} + (1 + r_{t+1}) A_{t+1};$$

$$W_{yt} - W_{ot+1} = A_{t+1} + (1 + r_{t+1}) A_{t+1};$$

$$A_{t+1} = \frac{W_{yt} - W_{ot+1}}{2 + r} = \frac{10 - 5}{2 + 1} = \frac{5}{3};$$

$$K_{t+1} = N A_{t+1} = 50(5/3) = 250/3;$$

d) B Bequest;

Agent t-1;

$$C_{yt-1} + A_t = W_{yt-1};$$

$$C_{ot} + B_t = W_{ot} + (1 + r_t) A_t + (1 + r_t) B_{t-1};$$

Agent t;

$$C_{yt} + A_{t+1} = W_{yt};$$

$$C_{ot+1} + B_{t+1} = W_{ot+1} + (1 + r_{t+1}) A_{t+1} + (1 + r_{t+1}) B_t;$$

Agent t+1;

$$C_{yt+1} + A_{t+2} = W_{yt+1};$$

$$C_{ot+2} + B_{t+2} = W_{ot+2} + (1 + r_{t+2}) A_{t+2} + (1 + r_{t+2}) B_{t+1};$$

Life-time budget constraint, agent t;

$$C_{yt} + \frac{C_{ot+1}}{(1 + r_{t+1})} + \frac{B_{t+1}}{(1 + r_{t+1})} = B_t + W_{yt} + \frac{W_{ot+1}}{(1 + r_{t+1})};$$

Stock of Capital

$$K_{t+1} = N A_{t+1} + N B_t;$$

e)

f) Chapter 2, page 39;

g) B Bequest;

Agent t-1;

$$C_{yt-1} + A_{yt} = W_{yt-1};$$

$$C_{mt} + A_{mt+1} + B_{t+1} = W_{mt} + (1 + r_t) A_{yt} + (1 + r_t) B_t;$$

$$C_{ot+1} = W_{ot+1} + (1 + r_{t+1}) A_{mt+1};$$

Agent t;

$$C_{yt} + A_{yt+1} = W_{yt};$$

$$C_{mt+1} + A_{mt+2} + B_{t+2} = W_{mt+1} + (1 + r_{t+1}) A_{yt+1} + (1 + r_{t+1}) B_{t+1};$$

$$C_{ot+2} = W_{ot+2} + (1 + r_{t+2}) A_{mt+2};$$

Agent t+1;

$$C_{yt+1} + A_{yt+2} = W_{yt+1};$$

$$C_{mt+2} + A_{mt+3} + B_{t+3} = W_{mt+2} + (1 + r_{t+2}) A_{yt+2} + (1 + r_{t+2}) B_{t+2};$$

$$C_{ot+3} = W_{ot+3} + (1 + r_{t+3}) A_{mt+3};$$

Life-time budget constraint, agent t;

$$C_{yt} + \frac{C_{mt+1}}{(1+r_{t+1})} + \frac{C_{ot+2}}{(1+r_{t+1})(1+r_{t+2})} + \frac{B_{t+2}}{(1+r_{t+1})} = B_{t+1} + W_{yt} + \frac{W_{mt+1}}{(1+r_{t+1})} + \frac{W_{ot+2}}{(1+r_{t+1})(1+r_{t+2})};$$

Stock of Capital

$$K_{t+1} = N (A_{yt+1} + A_{mt+1} + B_{t+1});$$