

## Week 4 Tutorial Solution

ECON203: Macroeconomics 2

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### Multiple Choice Questions

**Question 1.** If the substitution effect of the real interest rate on saving is smaller than the income effect of the real interest rate on saving, then a rise in the real interest rate leads to a \_\_\_\_\_ in consumption and a \_\_\_\_\_ in saving, for someone who's a lender.

- (a) fall; fall
- (b) fall; rise
- (c) rise; rise
- (d) rise; fall

**Answer:** D

**Question 2.** With a nominal interest rate of 4%, an expected inflation rate of 1%, and interest income taxed at a rate of 25%, what is the expected after-tax real interest rate?

- (a) 3%
- (b) 2%
- (c) 1%
- (d) 0%

**Answer:** B

**Question 3.** Three factors that cause interest rates among different financial instruments to vary are

- (a) default risk, expected inflation, and taxability.
- (b) default risk, current inflation, and taxability.
- (c) default risk, maturity, and taxability.
- (d) default risk, expected inflation, and maturity.

**Answer:** C

**Question 4.** The yield curve shows

- (a) the yields on stocks of different maturities.
- (b) the interest rates on bonds of different maturities.
- (c) the yields on stocks with differing default risk.
- (d) the yields on bonds with differing default risk.

**Answer:** B

**Question 5.** Desired national saving would increase unambiguously if there were

- (a) an increase in current output and expected future output.
- (b) an increase in expected future output and government purchases.
- (c) an increase in expected future output and the expected real interest rate.
- (d) a fall in both government purchases and expected future output.

**Answer:** D

**Question 6.** The Ricardian equivalence proposition suggests that a government deficit caused by a tax cut

- (a) causes inflation.
- (b) causes a current account deficit.
- (c) raises interest rates.
- (d) doesn't affect consumption.

**Answer:** D

**Question 7.** If the government cuts taxes today, issuing debt today and repaying the debt plus interest next year, a rational taxpayer will

- (a) spend the full amount of the tax cut today and reduce consumption next year.
- (b) increase consumption today, before taxes go up next year.
- (c) increase saving today, leaving consumption unchanged.
- (d) leave a smaller gross bequest to her or his heirs.

**Answer:** C

**Question 8.** Which of the factors listed below might cause the Ricardian equivalence proposition to be violated?

- (a) There may be international capital inflows and outflows.
- (b) Consumers may not understand that an increase in government borrowing today is likely to lead to higher future taxes.
- (c) There may be constraints on the level of government spending.
- (d) There may be constraints on the level of government taxation.

**Answer:** B

**Question 9.** Which of the following machines has the lowest user cost? Machine A costs \$15,000 and depreciates at a rate of 25%; machine B costs \$10,000 and depreciates at a rate of 20%; machine C costs \$20,000 and depreciates at a rate of 10%; and machine D costs \$17,000 and depreciates at a rate of 11%. The expected real interest rate is 0%.

- (a) Machine A
- (b) Machine B
- (c) Machine C
- (d) Machine D

**Answer:** D

**Question 10.** You are trying to figure out how much capacity to add to your factory. You will increase capacity as long as

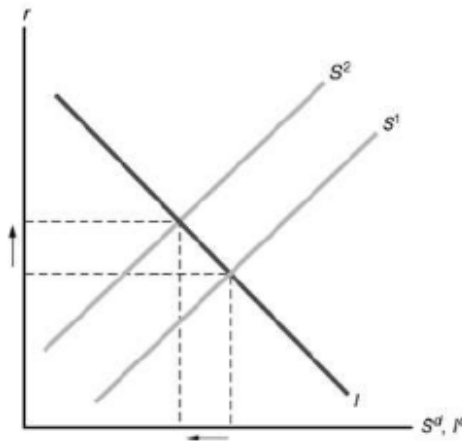
- (a) the expected marginal product of capital is positive.
- (b) the expected marginal product of capital is greater than or equal to the marginal product of capital.
- (c) the expected marginal product of capital is greater than or equal to the expected marginal product of labour.
- (d) the expected marginal product of capital is greater than or equal to the user cost of capital.

Answer: D

## Problem Solving Questions

**Question 11.** “A permanent increase in government purchases has a larger effect than a temporary increase of the same amount.” Use the saving-investment diagram to evaluate this statement, focusing on effects on consumption, investment, and the real interest rate for a fixed level of output. (*Hint:* The permanent increase in government purchases implies larger increases in current and future taxes.)

When there is a temporary increase in government spending, consumers foresee future taxes. As a result, consumption declines, both currently and in the future. Thus current consumption does not fall by as much as the increase in  $G$ , so national saving ( $S^d = Y - C^d - G$ ) declines at the initial real interest rate, and the saving curve shifts to the left from  $S^1$  to  $S^2$ . Thus the real interest rate increases and consumption and investment both fall.



When there is a permanent increase in government spending, consumers foresee future taxes as well, with both current and future consumption declining. But if there is an equal increase in current and future government spending, and consumers try to smooth consumption, they will reduce their current and future consumption by about the same amount, and that amount will be about the same amount as the increase in government spending. So the saving curve in the saving-investment diagram does not shift, and there is no change in the real interest rate.

Since the saving curve shifts upward more in the case of a temporary increase in government spending, the real interest rate is higher, so investment declines by more. However, consumption falls by more in the case of a permanent increase in government spending.

**Question 12.** Suppose that the economywide expected future marginal product of capital is  $MPK^f = 20 - 0.02K$ , where  $K$  is the future capital stock. The depreciation rate of capital,  $d$ , is 20% per period. The current capital stock is 900 units of capital. The price of a unit of capital is 1 unit of output. Firms pay taxes equal to 15% of their output. The consumption

function in the economy is  $C = 100 + 0.5Y - 200r$ , where  $C$  is consumption,  $Y$  is output, and  $r$  is the real interest rate. Government purchases equal 200, and full-employment output is 1000.

a. Suppose that the real interest rate is 10% per period. What are the values of the tax-adjusted user cost of capital, the desired future capital stock, and the desired level of investment?

$$r = 0.1$$

$$uc/(1 - \tau) = (r + d)p_K/(1 - \tau) = [(0.1 + 0.2) \times 1]/(1 - 0.15) = 0.35$$

$$MPK^f = uc/(1 - \tau), \text{ so } 20 - 0.02K = 0.35; \text{ solving this gives } K = 982.5$$

$$\text{Since } K - K_{-1} = I - dK, I = K - K_{-1} + dK = 982.5 - 900 + (0.2 \times 900) = 262.5$$

b. Now consider the real interest rate determined by goods market equilibrium. This part of the problem will guide you to this interest rate.

i. Write the tax-adjusted user cost of capital as a function of the real interest rate  $r$ . Also write the desired future capital stock and desired investment as functions of  $r$ .

**Solving for this in general:**

$$uc/(1 - \tau) = (r + d)p_K/(1 - \tau) = [(r + 0.2) \times 1]/(1 - 0.15) = 0.235 + 1.176r$$

$$MPK^f = uc/(1 - \tau), \text{ so } 20 - 0.02K = 0.235 + 1.176r; \text{ solving this gives } K = 988.25 - 58.8r$$

$$\text{Since } I = K - K_{-1} + dK = 988.25 - 58.8r - 900 + (0.2 \times 900) = 268.25 - 58.8r$$

ii. Use the investment function derived in Part (i) along with the consumption function and government purchases, to calculate the real interest rate that clears the goods market. What are the goods market-clearing values of consumption, saving, and investment? What are the tax-adjusted user cost of capital and the desired capital stock in this equilibrium?

$$Y = C + I + G$$

$$1000 = [100 + (0.5 \times 1000) - 200r] + (268.25 - 58.8r) + 200$$

$$1000 = 1068.25 - 258.8r, \text{ So } 258.8r = 68.25$$

$$r = 0.264$$

$$C = 100 + (0.5 \times 1000) - (200 \times 0.264) = 547.2$$

$$I = 268.25 - (58.8 \times 0.264) = 252.7 = S$$

$$uc/(1 - \tau) = 0.235 + (1.176 \times 0.264) = 0.545$$

$$K = 988.25 - (58.8 \times 0.264) = 972.7$$