Review concepts

Topic 1 Self-adjustment theorem and Inflation dynamic

1. Explain the meaning of these terms. Make sure you understand their implications for business cycles properties, and how they are relevant for explaining the key business cycles stylized-facts.
    a. One-period Wage contract v.s. Multi-period Wage contract
        i. Real-wage contracting
        ii. Nominal-wage contracting
        iii. Nominal-wage contracting with full-indexation.
    b. *Natural-level variable*
        i. Natural level of employment
        ii. Natural level of unemployment rate
        iii. Natural level of output
        iv. Potential output
        v. Output gap
        vi. Unemployment gap
    c. Nominal price rigidities and price stickiness
        i. Sectoral price rigidities
        ii. Frequency of price adjustments
        iii. Unsynchronized adjust in nominal prices
    d. Gradual adjustment theory
    e. Output and inflation persistence
2. *True/False:*
    a. Under the rational expectation, money is always neutral.
    b. Policymaker can exploit the trade-off between inflation and unemployment.
3. Guided by our economic theory, how do we practically measure the natural level of output under the absence of real-wage contracting?
4. The impact of demand/supply shocks
    a. Temporary shocks v.s. Permanent shocks
    b. Anticipated v.s. unanticipated shocks? Does it matter to the behavior response of key economic variables in our model? Transitory outcome? Adjustment?
5. How did the economist explain the inflation-unemployment observation proposed by A.W. Phillips?

6. Why did we see the unstable macroeconomic outcomes during the 70s? Origin? How did things get worse? What did we (policymakers and academic economists) learn then?
7. How well does the New classical model explain business cycles? How do we fix the shortcomings (if any)?

Topic 2 Micro-founded business cycle model

Consumption-leisure and Static general equilibrium model

1. Explain the meaning of these terms. How important are they?
    a. Utility maximization problem
        i. Budget set
        ii. Feasible v.s. Infeasible set
        iii. Earned income v.s. Unearned income
        iv. Lump-sum tax v.s. Pay-roll tax
        v. Utility function v.s. indifference curve
        vi. Diminishing marginal utility
        vii. Marginal rate of substitution
        viii. Optimal bundle and Tangency condition
    b. Firm's profit maximization problem
        i. Technology v.s. production function
        ii. Capital input (K), labor input (N) and Total Factor Productivity (Z)
        iii. Returns to scales: constant, increasing, decreasing
        iv. Marginal product of labor (MPn)
        v. Law of diminishing marginal productivity and MPn curve
        vi. Value of marginal product (VMPn) and VMPn curve
        vii. The optimal hiring rule

2. Behavior of consumers
    a. How does consumer respond to change in "wage"?
    b. How does consumer respond to change in "lump-sum tax"?
    c. How does consumer respond to change in "Pay-roll tax"?
    d. What is the labor supply curve? Discuss about the shape of labor supply curve, and the factors that shift the labor supply curve.
    e. What is the consumption demand curve? Discuss about the shape of consumption demand curve, and the factors that shift the consumption demand curve.
3. Behavior of firms
    a. How does firm adjust the hiring to change in "wage"?
    b. How does firm adjust the hiring to change in "total factor productivity (z)"?

c. How does firm adjust the hiring to change in "the level of capital input (K)"?
d. What is the labor demand curve? Discuss about the shape of labor demand curve, and the factors that shift the labor demand curve.
e. What is the output supply curve? Discuss about the shape of output supply curve, and the factors that shift the output supply curve.

4. Equilibrium analysis
    a. Circular flow diagram of static model
    b. Labor market and Goods market
        i. Labor demand and labor supply
        ii. Aggregate (output) demand curve and Aggregate (output) supply curve
    c. General equilibrium v.s. Multi-market equilibrium
    d. Walras's law
    e. Edgeworth box diagram
    f. Competitive equilibrium (free-market equilibrium) and Pareto optimal

4. Comparative static analysis
    a. How does the change in government spending work in our model? Do the model predictions match with empirical regularities observed in the data?
    b. How does the change in TFP and capital input spending work in our model? Do the model predictions match with empirical regularities observed in the data?
    c. What are the drawbacks of this model? What are the missing elements in this model?

Consumption-saving model: Pure-endowment intertemporal equilibrium model

1. Explain the meaning of these terms. How important are they?
    a. Pure-endowment economy v.s. Endogenous production economy
    b. Life-time resource constraint
        i. Period budget constraint v.s. life-time budget constraint
        ii. Present value and discount rate
        iii. Lump-sum tax v.s. Pay-roll tax
    c. Intertemporal utility function

i. Period utility v.s. life-time utility
ii. indifference curve and life-time utility
iii. Convex to the origin and the consumption smoothing motive

d. Optimal bundle and Tangency condition

2. Behavior of household
    a. How does the change in interest rate affect consumption and saving of agent?
    b. How does the change in transitory income affect consumption and saving of agent?
    c. How does the change in interest rate affect consumption and saving of agent?
    d. What is the saving curve? What are the factors that determine the saving curve?

3. Equilibrium analysis and comparative static
    a. Credit market
        i. Loan demand *and* loan supply
        ii. Determinant of loan demand? Determinant of lending supply?
    b. What is the Ricardian equivalence? When does the Ricardian equivalence hold? When doesn't it hold?

Real intertemporal model

1. Explain how intertemporal substitution is important for current labor supply and for current demand for consumption goods.
2. What are three factors that determine current labor supply?
3. What happens to current demand of consumption goods when real interest rate decreases? What implicit assumption do you make to support your analysis?
4. What is the purpose of investment? What is the benefit of investment? What is the cost of investment?
5. What is the optimal investment rule?
6. When does the optimal investment curve shift?

7. What happens when the optimal investment schedule shifts to the right?
8. What is the output supply curve? How do we derive the output supply?
9. What are the factors that shift output supply curve?
10. Determine how the following affects the *slope* of output demand curve. (Output demand is steeper/flatter under the following situations)
    a. Government spending decreases at a lower rate than the rate at which lifetime wealth increases.
    b. The intertemporal substitution effect of real interest rate on the employment in labor market increases.
11. What is the output demand curve? How do we derive the output demand curve?
12. What are the factors that shift output demand curve?
13. Determine how the following affects the *slope* of output demand curve. (Output demand is steeper/flatter under the following situations)
    a. Marginal propensity to consumer increases
    b. The intertemporal substitution effect of real interest rate on consumption increases
    c. The demand for investment goods becomes less responsive to real interest rate

Question 14

LO 3 The government wishes to bring about an increase in investment expenditures, and is considering two tax policies that policymakers think could bring this about. Under the first tax policy, firms would receive a subsidy in the current period of t per unit of current output produced. Policymakers reason that firms will use this subsidy for investment. The second policy under consideration is an investment tax credit, by which firms would receive a subsidy of s per unit of investment in the current period. Determine which tax policy would be more effective in accomplishing the government's goal of increasing current investment expenditures, and carefully explain your results.

Question 15

LO 7 The government decreases current taxes, while holding government spending in the present and the future constant.

(a) Using diagrams, determine the equilibrium effects on consumption, investment, the real interest rate, aggregate output, employment, and the real wage. What is the multiplier, and how does it differ from the government expenditure multiplier?

(b) Now suppose that there are credit market imperfections in the market for consumer credit, for example due to asymmetric information in the credit market. Repeat part (a), and explain any differences in your answers in parts (a) and (b).

Question 16

LO 3 Suppose that we modify the model of the firm's investment behavior by assuming that any capital the firm has remaining at the end of the period can be sold at the price p'_K (in our model we assumed the capital could be sold at a price of one, in terms of consumption goods).

(a) Determine how this change affects the optimal investment rule for the firm.

(b) Suppose that we interpret p'_K as the firm's stock price. If p'_K increases, what effect does this have on the firm's optimal investment schedule? What does this imply about the relationship between investment expenditures and stock prices?

Question 17

LO 7 Suppose that there is a permanent increase in total factor productivity. Determine the implications of this for current macroeconomic variables, and show how the impact differs from the case where total factor productivity is expected to increase only temporarily. Explain your results.

Topic 3 Growth theory

Question 1: True/False questions

a. *True/False:* In virtually all countries around the world, output-per-person *is converging to the level of output-per-person in the United states.*
b. *True/False:* Under the convergence theorem, low-income countries should experience a higher growth rate than the level at which high-income countries have experienced.
c. *True/False:* At the steady state condition, income-per-capita should grow at the same rate as population growth
d. *True/False:* The economy with higher saving rate is associated with higher income-per-capita growth at the steady state
e. *True/False:* Under the Cobb-Douglass production function, the technology always demonstrates a constant return to scale.
f. *True/False:* Output-per-head function can always be written in terms of capita-per-head.

Question 2

3. Consider the production function

$$Y = \sqrt{K}\sqrt{N}$$

a. Compute output when $K = 49$ and $N = 81$.
b. If both capital and labor double, what happens to output?
c. Is this production function characterized by constant returns to scale? Explain.
d. Write this production function as a relation between output per worker and capital per worker.
e. Let $K/N = 4$. What is Y/N? Now double K/N to 8. Does Y/N double as a result?
f. Does the relation between output per worker and capital per worker exhibit constant returns to scale?

g. Is your answer to (f) the same as your answer to (c)? why or why not?

h. Plot the relation between output-per-worker and capital-per-worker. Does it have the same general shape as the relation in figure that we discussed in class?

Question 3

LO 5 In the Solow growth model, suppose that the marginal product of capital increases for each quantity of the capital input, given the labor input.

(a) Show the effects of this on the aggregate production function.

(b) Using a diagram, determine the effects on the quantity of capital per worker and on output per worker in the steady state.

(c) Explain your results.

Question 4

LO 5 Suppose that the economy is initially in a steady state and that some of the nation's capital stock is destroyed because of a natural disaster or a war.

(a) Determine the long-run effects of this on the quantity of capital per worker and on output per worker.

(b) In the short run, does aggregate output grow at a rate higher or lower than the growth rate of the labor force?

(c) After World War II, growth in real GDP in Germany and Japan was very high. How do your results in parts (a) and (b) shed light on this historical experience?

Question 5 Numerical example of Solow growth

In the Solow growth model, assume that n=0.02, s= 0.4, d=0.2 and F(K,N) = $Y = zK^{0.4}N^{0.6}$.

a. Derive the output-per-head production function.
b. Derive the capital accumulation function, and express the equation in terms of per-head variable.

Suppose that initially, in period t=0, z = 1 and the economy is in a steady state.

c. Draw the Solow diagram (two curves in the same figure). Explain what they are, and then numerically calculate the steady-state capital-per-head (k*).
d. Determine the per-head consumption (c*), per-head saving (s*), per-head output (y*) in the steady state.
e. At the steady-state equilibrium, what happen to the balanced growth path of all aggregate variables (Y,C,S,I).

Suppose now the level of saving rate increases to 0.06. Discuss the following

f. What is the new steady-state equilibrium (k*,c*,s*,y*)?
g. Explain how the economy adjusts toward the new steady-state level?
h. What is going to happen to the growth path along the transitory and along the balanced growth path of all per-capita and aggregate variables?