Department of Economics
Queen's University

ECON 222: Macroeconomic Theory I
Fall 2018

Sections: 001 and 002
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Final Exam
7 – 10 p.m. December 8, 2018

This exam is 3 hours long. Budget your time carefully. Hand calculators (Casio 991) are permitted for this exam. The exam consists of two sections with a total of 100 marks allocated:

Section A consists of multiple choice questions. You should answer all 25 of them. Each question is worth 1 mark for a total of 25 marks. A multiple choice answer card is provided for your answers. Please complete this answer card correctly using a soft lead HB pencil as described on the next page.

Section B consists of long questions. Do THREE (3) of the four questions. Each question is worth 25 marks for a total of 75 marks. Please read all the questions carefully. You are encouraged to draw diagrams to support your answers where appropriate. Please label the axis and lines or curves on your diagrams. Marks will be awarded on the basis of the logical arguments given to support your answers.

Please note: Proctors are unable to respond to queries about the interpretation of exam questions. Do your best to answer exam questions as written.

Upon completion of your exam, you MUST hand in the following three items:
The multiple choice card, completed correctly.
The answer booklet clearly labeled with your student number and class section
This exam question paper.

ECON 222 Cheat Sheet

Notation:

Y = gross domestic product; C = household consumption expenditures
I = total investment; G = government consumption expenditure; NX = net exports
S = national saving; NFP = net factor payments from abroad
CA = current account balance; KA = capital and financial account balance
MPK^f = expected future marginal product of capital; uc = user cost of capital
i = domestic nominal interest rate; i_{For} = foreign nominal interest rate
r = real interest rate; A = total factor productivity
d = rate of depreciation of physical capital; p_k = unit price of capital good
τ = effective tax rate on capital income
s = savings rate; n = population growth rate;
k = capital stock per worker; $y = Af(k)$ = output per worker;
e = real exchange rate; e_n = nominal exchange rate
M = stock of monetary assets; V = velocity of money
P = domestic price level; P_{For} = foreign price level

Identities and equilibrium conditions:

$$Y = C + I + G + NX$$

$$S = Y + NFP - C - G$$

$$CA = NX + NFP$$

$$CA + KA = 0$$

$$uc = (r + d)p_k$$

$$MPK^f = \frac{uc}{1 - \tau}$$

$$\frac{\Delta A}{A} = \frac{\Delta Y}{Y} - \alpha_K \frac{\Delta K}{K} - \alpha_N \frac{\Delta N}{N}$$

$$\Delta k = sAf(k) - (n + d)k$$

$$\frac{M}{P} = \frac{M^d}{P} = L(Y, i)$$

$$V = PY/M$$

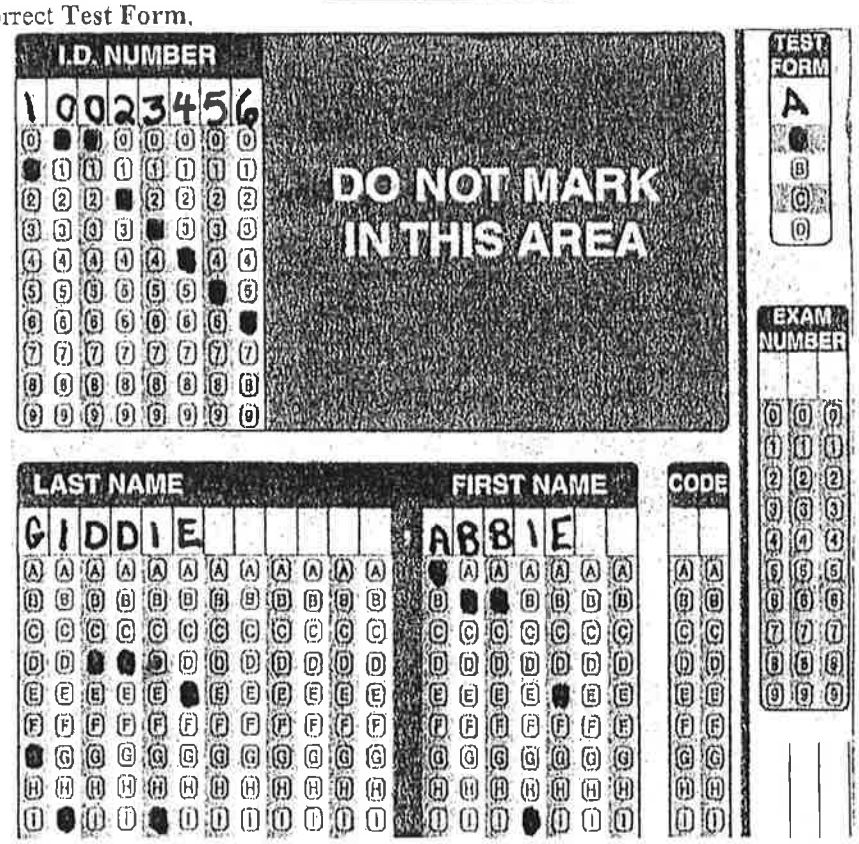
$$e = \frac{e_n P}{P_{For}}$$

$$i = i_{For} - \frac{\Delta e_n}{e_n}$$

Multiple Choice Instructions. Multiple-choice answers on the answer sheet are marked by an optical scanner. It reads only what is in the rectangle. Fill it in completely and stay within its limits. **You must use a soft lead (e.g. "HB") pencil to fill in the Answer Sheet.** Remember, if you change your answer, COMPLETELY ERASE IT, and correct. For all questions there is only one best (correct) answer; if two or more choices are marked, the item will be graded incorrect.

Before you begin:

1. Write your Student # under "**ID Number**" on the Answer Sheet and fill in the appropriate rectangle below each number.. **See example below.**
2. Print your **Last Name** followed by first name in the appropriate space, and fill in the appropriate rectangle under each letter.
3. Under "**Test Form**", fill in "**A**" as indicated at the top of this page *(see example below)*. Please ensure that you have entered the correct **Test Form**.



Section A (MULTIPLE CHOICE): Answer ALL of the following questions. Choose the one alternative that best completes the statement or answers the question.

1. The growth accounting equation
(A) measures empirically the relative importance of the sources of output growth.
(B) is the production function written in growth rate form.
(C) is used to calculate the total factor productivity.
(D) all of the above.

2. Over the past year, output grew 3%, capital grew 4%, and labour grew 3%. If the elasticities of output with respect to capital and labour are 0.3 and 0.7 respectively, how much did productivity grow?
(A) -0.6%
(B) -0.3%
(C) 0.0%
(D) 0.3%

3. In the steady state of the Solow (neoclassical) growth model, if productivity does NOT grow,
(A) output per worker will be constant.
(B) output will grow at the same rate as the population growth.
(C) consumption will be constant.
(D) both A and B are correct.

4. The Golden Rule of the capital stock is the level of capital stock that
(A) maximizes the output per worker in the steady state.
(B) maximizes the consumption per worker in the steady state.
(C) maximizes the investment per worker in the steady state.
(D) maximizes the saving per worker in the steady state.

5. Conditional convergence means that in the long run
(A) living standards converge only within groups of countries having similar characteristics.
(B) living standards converge only for countries that have the same initial capital-labour ratio.
(C) living standards around the world become the same.
(D) living standards converge even if countries have different population growth rates.

6. For something to satisfy the medium of exchange function of money, it must be
(A) backed by gold.
(B) readily exchangeable for other goods.
(C) issued by a Central Bank.
(D) an inherently valuable commodity.

7. Higher interest rates lower the real quantity of money demanded
(A) by making alternative non-monetary assets look relatively more attractive to wealth holders.
(B) by causing an increase in the issuance of corporate debt.
(C) by changing the distribution of wealth toward the poor who have a lower demand for money.
(D) by increasing government interest payments, which in turn increase taxes, lowering disposable income.

8. When prices rise rapidly,
(A) money loses its function as a medium of exchange.
(B) money loses its function as a store of value.
(C) money loses its function as a unit of account.
(D) money keeps all its functions.

9. The tendency of many different economic variables to have regular and predictable patterns across industries over the business cycle is called
(A) persistence.
(B) co-movement.
(C) periodicity.
(D) recurrence.

10. The fact that business cycles are recurrent but not periodic means that
(A) business cycles occur at predictable intervals, but do not last a predetermined length of time.
(B) the business cycle's standard contraction-trough-expansion-peak pattern has been observed to recur over and over again, but not at predictable intervals.
(C) business cycles occur at predictable intervals, but do not all follow a standard contraction-trough-expansion-peak pattern.
(D) business cycles last a predetermined length of time, but do not all follow a standard contraction-trough-expansion-peak pattern.

11. One of the reasons for less volatility in the economy since the second world war is
(A) better monetary policy.
(B) increasing financial market activities.
(C) higher productivity.
(D) advances in technology.

12. Which of the following would shift the LM curve up?
(A) an increase in consumer spending
(B) an increases in taxes
(C) a decrease in supply of money
(D) a decrease in taxes

13. A rise in the price of a bond causes the yield on the bond to
(A) rise.
(B) fall.
(C) remain unchanged.
(D) rise if it's a short-term bond and fall if it's a long-term bond.

14. A temporary decrease in government purchases causes the real interest rate to _____ and output to _____ in the short run, before prices adjust to restore equilibrium.
(A) rise; rise
(B) rise; fall
(C) fall; rise
(D) fall; fall

15. Keynesian economists think general equilibrium is not attained quickly because
(A) the real interest rate adjusts slowly.
(B) the level of output adjusts slowly.
(C) the real wage rate adjusts slowly.
(D) the price level adjusts slowly.

16. Which of the following changes shifts the AD curve to the left?
(A) a decline in the nominal money supply
(B) a decrease in income taxes
(C) a decrease in the risk on non-monetary assets
(D) an increase in the future marginal productivity of capital

17. The real exchange rate is
(A) the number of foreign goods that can be obtained in exchange for one unit of the domestic good.
(B) the nominal exchange rate minus the rate of inflation.
(C) the amount of foreign currency.
(D) the amount of domestic currency that can be obtained in exchange for one unit of the foreign currency.

18. When the British pound rises in value relative to other currencies, then
(A) goods imported into Britain rise in price.
(B) British exports rise in price.
(C) neither British exports nor imports rise in price.
(D) both British exports and imports rise in price.

19. Which of the following changes would cause Canadian net exports to increase?
(A) an increase in the real value of the dollar
(B) an increase in Canadian income
(C) an increase in foreign income
(D) a shift in demand by Canadian consumers away from domestically produced goods

20. The Canadian interest rate is 4 percent and the U.S. interest rate is 6 percent. If the interest parity condition holds, we should expect
(A) the Canadian dollar to appreciate by 2 percent.
(B) the Canadian dollar to depreciate by 6 percent.
(C) the U.S. dollar to depreciate 2 percent.
(D) the U.S. dollar to appreciate by 2 percent.

21. The net export crowding out effect refers to a situation in which
(A) a fiscal expansion causes the local currency to appreciate, reducing net exports.
(B) a fiscal contraction causes the local currency to depreciate, reducing net exports.
(C) a monetary expansion causes the local currency to appreciate, reducing net exports.
(D) a monetary expansion causes the local currency to depreciate, increasing net exports.

22. Which of the following statements about the effectiveness of the fiscal and the monetary policies in response to a recession in a small open economy with flexible exchange rates is true?
(A) In recession, fiscal policy is ineffective, but monetary policy is effective.
(B) In recession, fiscal policy is effective, but monetary policy is ineffective.
(C) In recession, both fiscal and monetary policies are effective.
(D) In recession, both fiscal and monetary policies are ineffective.

23. Which one of the following describes the traditional Keynesians' rationale for the positively sloped SRAS curve?
(A) Nominal wages are fixed for the term of labour contracts, but price level changes, leading to a change in real wages and output.
(B) Demand for labour increases as prices increase and therefore profits increase.
(C) Workers prefer longer term contracts because of job security.
(D) There is misperception about the relative price levels.

24. The Keynesian theory of nominal wage rigidity predicts that
(A) the real wage is countercyclical.
(B) the real wage is procyclical.
(C) the real wage is acyclical.
(D) the real wage is constant.

25. The theory that firms will be slow to change their products' prices in response to changes in demand because there are costs to changing prices is called
(A) transactions cost theory.
(B) cost-benefit theory.
(C) menu cost theory.
(D) gift exchange theory.

Section B (LONG QUESTIONS): Answer any THREE (3) of the following four questions. Each question is worth 25 marks for a total of 75 marks.

B1. Solow (neoclassical) growth model: Consider the Solow (neoclassical) growth model seen in class where y denotes output per worker, k physical capital per worker, and A total factor productivity. Suppose that at any point in time the production function in per-worker terms is represented by

$$y = Ak^{\frac{1}{2}},$$

where $f(k)$ is increasing in k and there are diminishing returns to capital. Suppose that A is constant, labour N grows at rate n, the saving rate is s, and the rate of capital depreciation is d.

(a) With the aid of a diagram, explain how the steady state capital stock per worker, k^*, is determined.

(b) Solve for the steady-state level of capital per worker k^*, output per worker, y^*, and consumption per worker, c^*, assuming that total factor productivity, A, is 1, the saving rate, s, is 0.4, the population growth, n, is 0.02, and the depreciation rate, d, is 0.08.

(c) Suppose that there is a war that destroys half the capital stock, K, but leaves the labour force unchanged. Calculate the *immediate* impact of the war on capital per worker, output per worker, and consumption per worker.

(d) Show graphically how the economy returns to the steady-state following the destruction of half the capital stock.

(e) Suppose instead that the war destroys half the labour force (N) but leaves the capital stock unchanged. Assume that the economy was in the steady-state derived in part **(b)** before the war and the rate of population growth, n, returns to normal after the war. Calculate the *immediate* impact of the war on capital per worker, output per worker, and consumption per worker.

B2. Closed Economy IS-LM-FE model: The behaviour of households and firms in a closed economy is represented by the following equations:

$$\begin{aligned} \text{Desired consumption} &: \quad C^d = 200 + 0.8(Y - T) - 500r \\ \text{Desired investment} &: \quad I^d = 200 - 500r \\ \text{Real money demand} &: \quad \frac{M^d}{P} = 0.5Y - 250(r + \pi^e) \end{aligned}$$

where expected inflation is $\pi^e = 0.10$ and taxes depend on income according to

$$T = 20 + 0.25Y.$$

Government purchases are represented by G.

(a) Derive an expression for the IS curve with the real interest rate on the left side of the equation. How does the position of the IS curve depend on G?

(b) If the money supply is $M = 9890$ derive an expression for the LM curve, with the real interest rate on the left side of the equation. How does the position of the LM curve depend on P?

(c) If government purchases are $G = 196$, derive an expression for the aggregate demand curve. If the full-employment output level is $\bar{Y} = 1000$, what is the price level and the real interest rate in general equilibrium?

(d) Starting from the situation in part **(c)**, suppose government purchases are increased to $G = 216$, what are the resulting values of Y, r, P, T, C^d and I^d in the short-run?

(e) How does the economy adjust to its new general equilibrium after the change in part **(d)**? What are the resulting general equilibrium values of Y, r, P, T, C^d and I^d?

B3. Open Economy IS-LM-FE model: The behaviour of households and firms in an open economy is represented by the following equations:

$$\begin{aligned}
\text{Full-employment output} &: \quad \bar{Y} = 1200 \\
\text{Desired consumption} &: \quad C^d = 350 + 0.5Y - 200r \\
\text{Desired investment} &: \quad I^d = 250 - 300r \\
\text{Government purchases} &: \quad G = 95 \\
\text{Net exports} &: \quad NX = 100 - 0.1Y - 0.5e \\
\text{Real exchange rate} &: \quad e = 90.
\end{aligned}$$

Assume that the real interest rate, r, does not deviate from the foreign interest rate and that the economy is initially in general equilibrium.

(a) Derive the open-economy IS curve writing the real interest rate on the left side of the equation.

(b) The LM curve for this economy is described by

$$r = \frac{Y - M/P}{4000}$$

where P denotes the price level and M denotes the nominal money supply. Assume $M = 480$. What are the general equilibrium values of r and P? Illustrate this general equilibrium using the IS-LM-FE diagram.

(c) Suppose that this economy has a *flexible* nominal exchange rate and that the government decides to impose an import quota in order to restrict imports. What would be the short-run effect of this policy on Y, NX, and e holding the price level P constant (no calculations necessary)? Illustrate the effects using the IS-LM-FE diagram.

(d) Suppose instead that this economy has a *fixed* exchange rate. What would be the short-run effect of this policy on Y, NX, and e holding the price level P constant (no calculations necessary)? Illustrate the effects using the IS-LM-FE diagram.

(e) Explain the process that restores the economy to general equilibrium under fixed exchange rates. How do the Keynesian and classical views differ on this process?

B4. Closed economy Keynesian model: The aggregate demand-side of the economy of Rigidia is well-described by a standard IS-LM-FE framework while the short-run aggregate supply side is characterized by

$$Y = \bar{Y} + b(P - P^e). \qquad \text{(SRAS)}$$

Here Y is realized aggregate output/income, $\bar{Y}$ is the full employment output level, P is the aggregate realized price level, P^e is the expected price level and b is a constant that depends on the slope of the labour demand curve.

Explain the effects of each of the following on the values of Y, the real interest rate, r, P and P^e, both in the short-run and as the economy adjusts towards general equilibrium. Assume that all changes are unanticipated. In each case, illustrate the effects using IS-LM-FE and AD-AS diagrams, starting from an initial situation of general equilibrium and explain in words.

(a) A reduction in the effective tax rate on capital that increases desired investment.

(b) A rise in the expected rate of inflation.

(c) An influx of working-age immigrants which increases the labour supply.

(d) An increase in the volatility of the stock market.

(e) An decrease in government purchases.