HOWARD UNIVERSITY

DEPARTMENT OF ECONOMICS

COMPREHENSIVE EXAMINATION: FALL 2019

MACROECONOMIC THEORY/ PH.D.

EXAMINERS:

Dr. Mika Kato, Chairperson

Dr. Gerald Daniels

Dr. Gaminie Meepagala

1. The examination is scheduled between the hours: 9:30 a.m-1.00 pm

   ALL STUDENTS ARE TO BE SEATED BY 9:15 a.m.
2. YOU ARE REQUIRED TO ANSWER ONLY FIVE (5) QUESTIONS.

   Any additional questions answered over the required number from each category will NOT receive credit.
3. Correct answers to questions NOT asked will receive NO credit.
4. Be sure to write the Code Number assigned to you in the TOP LEFT HAND CORNER OF THIS SHEET AND ON EACH ANSWER SHEET. DO NOT WRITE YOUR NAME ON ANY SHEET OF THE EXAMINATION.
5. Begin each question on a new page. Number each page used in sequence. Write only on one side of the paper.
6. Write clearly and illustrate your answers with graphs whenever and wherever possible.
7. USE ONLY BLACK INK PENS.
8. At the end of the examination, please indicate the total number of pages being submitted in the space provided in the TOP RIGHT HAND CORNER of this sheet.

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1. Bring your pens, pencils, calculators and rulers.
2. No briefcases, book bags or sacks, no handbags larger than 10 x 6 of any form are to be brought into the examination room.
3. No books, notes or other study material are to be brought into the examination room.
4. During the Examination there is to be no communication between or amongst students for any purpose. All questions must be directed to and channeled through the faculty member conducting the examination.
5. Only the scrap paper provided by the proctor is to be used for the examination. Scrap paper should bear the code number assigned to each student, and be handed over to the proctor along with the examination.
6. Students are not expected to leave the examination room before completing their examination and turning it in to the proctor.
7. NO FOOD OR SMOKING is permitted in the examination room.
8. It is the student's responsibility to remove any coffee or water containers taken into the examination room.
9. NO CELL PHONES ARE ALLOWED.
10. EXAMINATION RESULTS WILL ONLY BE GIVEN TO STUDENTS WHO ARE REGISTERED.

Revised 09/07/2004

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CODE NUMBER _____ TOTAL NUMBER OF PAGES _____

STUDENTS:

PLEASE CIRCLE ONLY THE QUESTIONS ANSWERED AND PROVIDE THE PAGE NUMBERS.

QUESTIONS	PAGE NUMBERS
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

PH.D. MACROECONOMIC THEORY
COMPREHENSIVE EXAMINATION FALL 2019

PART A. ANSWER ANY TWO (2) QUESTIONS FROM QUESTIONS 1-3.

1. Explain (a)-(f). You may use a simple model and/or a graph if appropriate.

(a) Club convergence.
(b) Relative risk aversion.
(c) Arrow (1962)'s learning by doing.
(d) Voluntary and involuntary unemployment.
(e) Money is neutral.
(f) Knowledge spillover.

2. Given the following production function:

$$Q = F(K, L) = BK^{\alpha}L^{1-\alpha},$$

where $B > 0$ and $0 < \alpha < 1$ and with output Q divided between consumption and investment. The fraction of income devoted to investment is s, a constant, capital depreciates at the rate δ, and labor grow at a constant rate n. Answer questions (a)-(d).

(a) Write Q in an intensive (per capita) form, q.
(b) Find the equation that describes the evolution of the capital stock per unit of labor, k.
(c) Find the steady-state levels, k^* and q^*. Draw a diagram showing q, depreciation, and savings.
(d) If the population growth rate increases show what happens to the equilibrium consumption. You may use a diagram.

3. Consider a closed economy described by

$Y = E(Y, r, G, T); \quad 0 < E_Y < 1, E_r < 0, E_G > 0, E_T < 0$ **(IS)**
$r = r(Y, \pi); \quad r_Y > 0, r_\pi > 0$ **(Taylor rule)**

Answer questions (a)-(d).

(a) Show the multiplier effect, i.e., $\left.\frac{\partial Y}{\partial G}\right|_{IS} > 1$, using the given IS equation.
(b) Why it is said that Taylor rule is more realistic than the traditional LM equation as a description of money market.
(c) Analyze the effect of an inflation rise on the equilibrium output and real interest rate.
(d) Derive the aggregate demand (AD) equation from the above model and show that the AD curve is negatively sloped.

PART B. ANSWER ANY THREE (3) QUESTIONS FROM QUESTIONS 4-8.

4. Suppose that there is a large number of competitive firms. The representative firm seeks to maximize profits:

$$\pi = Y - wL,$$

where the output technology is described by

$$Y = F(eL),$$

where effort e depends on the wage the firm pays:

$$e = e(w).$$

Answer questions (a)-(c).

(a) Write out the problem of the representative firm.
(b) Derive the first-order necessary conditions for profit maximization.
(c) Compute the efficiency wage when the effort function is given as:

$$e(w) = 0.001w + 0.1w^2 - 0.05w^3.$$

5. Consider the IS-LM model. where both consumption and investment decisions very much depend on expectations of future income and interest rates. Goods-market equilibrium requires that output be equal to aggregate spending:

$$Y = A(Y, T, r, Y^e, T^e, r^e) + G$$

where *A* stands for aggregate private spending -- the sum of consumption spending and investment spending and the superscript *e* denotes an expectation.

Equilibrium in financial markets requires that the supply of money be equal to the demand for money:

$$(M/P) = YL(r)$$

Now, suppose that the economy is a recession, and the Fed decides to increase the money supply. Answer questions (a) and (b).

(d) Assume that this expansionary monetary policy does not change expectations of either the future interest rate or future output. Show how IS and LM curves shift and explain the effects of the Fed policy on the economy in words.
(e) Once changes in expectations are taken into account, how do IS and LM curves shift? Explain the effects also in words.

6. make up for the previous period's price level (P_{t-1}) and suppose flexible prices and a competitive goods market. Thus the aggregate supply side of the economy is described by

$$W_t = AP_{t-1},\ A > 0.$$
$$Y_t = F(L_t),\ F'(L_t) > 0,\ F''(L_t) < 0$$
$$F'(L_t) = \frac{W_t}{P_t}$$
$$\pi_t \equiv \frac{P_t - P_{t-1}}{P_{t-1}}$$

Answer questions (a)-(c).

(a) Show that this economy has a positive relationship between employment L_t and inflation π_t.
(b) Discuss why a stable Phillips relationship is sometimes viewed as a critical support for the traditional Keynesian theory.
(c) In 1970s and 1980s, the Phillips relationship failed with no significant supply shock, and modern Keynesians developed the so-called expectation-augmented Phillips curve. Show a typical formulation of the expectation-augmented Phillips curve and discuss how it is different from the traditional Phillips relationship.

7. **Consider a Ramsey-Cass-Koopmans model where a representative agent consumes and engages in production for $t \in [0, \infty)$. The agent's utility depends on its current consumption $u(c_t)$ and its production technology is $y_t = f(k_t)$. Both functions have usual properties.**

   Answer questions (a)-(d).

   (a) Write down the representative agent's problem to find the optimal consumption to maximize the present-value of utility when its subjective discount rate is ρ and the depreciation rate of capital is δ.
   (b) Show the first-order necessary conditions for maximization.
   (c) Using a phase diagram, show that there is a unique steady state and that the steady state is stable.
   (d) Show that the golden rule capital stock is not guaranteed in the steady state.

8. **Consider a simple investment problem. A firm maximizes its present value of profit:**

$$max \int_{t=0}^{\infty} \{\pi(K) - I - \varphi(I)\} e^{-rt} dt$$
$$s.t. \quad \dot{K} = I$$

   where r is the interest rate, π is the firm's profit function, K is the capital stock, I is the investment, and φ is the adjustment cost of investment.

   Answer questions (a)-(c).

   (e) Write down the firm's problem to find the optimal investment to maximize its present value of profit.
   (f) Show the first-order necessary conditions for maximization.
   (g) Find the optimal investment rule. Show that the derived rule is actually compatible with the Tobin's q (Tobin, 1969) theory of investment.