QUEEN'S UNIVERSITY
FACULTY OF ARTS AND SCIENCE

DEPARTMENT OF ECONOMICS

Economics 222 A& B
Macroeconomic Theory I

Final Examination
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DURATION: 3 hours (180 minutes)

INSTRUCTIONS: Use the EXAMINATION BOOKLETS to answer. Show ALL RELEVANT STEPS**.**

Calculators: non-programmable, Casio 991, blue sticker, gold sticker.

PLEASE NOTE: "Proctors are unable to respond to queries about the interpretation of exam questions. Do your best to answer exam questiosn as written"

Part A (Short Questions): Do **FIVE** of the **SEVEN** questions. Each question is worth **8 MARKS** for a total of **40 MARKS**.

Part B (Long Questions): Do **THREE** of the **FOUR** questions. Each question is worth **20 MARKS** for a total of **60 MARKS**.

TOTAL: 100 MARKS.

Put your student number on the front of all answer booklets. Make sure to clearly list which questions you have selected on the front page of the first answer booklet. 1 bonus point will be awarded for doing this correctly

Part A – Short Questions (True/False/Uncertain)

*Do **five (5)** of the **seven (7)** questions. Each question is worth **8 marks**, for a total of **40 marks**.* When mentioned, state whether you think the statement is true/false/uncertain, and explain why, using the appropriate diagrams if applicable. ***No marks*** will be given for answers lacking an explanation.

A1

(i) Business cycle data indicates that money growth is a procyclical and leading variable while inflation is a procyclical and lagging variable. Can a monetary expansion in the IS-LM-FE model account for these observations?

(ii) Argue if the following statement is true, false or uncertain. From 1982 to 2007, the Canadian business cycle has become less severe and this can be attributed to the fact that stock prices coincide the business cycle during this period of time.

A2

Suppose that the standard AS-AD model is augmented with a **medium-run aggregate supply** curve which has a positive slope and intersects the other curves at exactly the same point. Is money neutral in the medium run? What about money neutrality in the long run? Argue to which school of thought (Classicals or Keynesians) the introduction of this curve would be most in accordance? Provide the appropriate graphs to support your answer.

A3

(i) Suppose that total capital and labour increase by the same percentage amount so that the amount of capital per worker k does not change. Writing the production function in per-worker terms, $y = f(k)$, requires that this increase in capital and labour must not change the amount of output produced per worker y. Use the growth accounting equation to show that equal percentage increases in capital and labour will leave output per worker unaffected only if $a_K + a_N = 1$.

(ii) Even though it may explain economic growth facts, investment in human capital (education) is not included in the simplest form of the neoclassical growth model. Argue which variable(s) of the growth accounting equation are capturing increases in human capital.

A4

Suppose the Bank of Canada decides to return to a fixed exchange rate once again, so that the Canadian dollar would be at par with the U.S. dollar. Discuss the advantages of this exchange rate regime. The business cycle of Alberta is negatively correlated with the U.S. business cycle. Based on this fact, would instituting a fixed exchange rate be beneficial for this province?

A5

The economy of Fishingland depends primarily on fishing. Suppose there is a one-time oil spill that destroys half the fish stock for the coming year, but is not believed to affect the future fish stock. Using the AD-AS and IS-LM model and a horizontal short-run aggregate supply curve and assuming that Fishingland is a closed economy, what happens to w, N, r, Y, and the price level in the short and long run. Would your answer differ if the fish stocks were not believed to ever recover?

A6

Consider a small open economy, described by the following equations:

$$Y = 1200 - 1000r - 2e$$
$$M/P = 0.5Y - 120i$$

The economy starts with, $\overline{Y} = 300, M = 132, r = 0.05, NX = 100 - 0.2Y - e, \pi^e = 0.10$, and the domestic and foreign price levels are both equal to 1. The exchange rate e_{nom} is flexible and in this economy the interest rate, r, does not deviate from the foreign interest rate.

(i) If the economy is initially operating at full employment, solve for the equilibrium values for e and NX.

(ii) Suppose that there is a monetary expansion, whereby the money supply, M, expands to 190. Find the new short run values of Y, NX, e, and e_{nom}.

(iii) Given the eventual adjustment in the price level, what will be the long-run values of e and e_{nom}?

A7

Walking down the street one day in Dartmouth, Nova Scotia (Canada), Bubbles finds $100 dollars U.S on the sidewalk. He is trying to decide whether to invest the money in a US bond,a Canadian bond or a Japanese bond. Bubbles is planning to invest in the US bond but Julian says that Bubbles should invest in the Japanese bond while Ricky says that he should invest in the Canadian bond. The Canadian bond pays i = 6%, the US bond pays 5% and the Japanese bond pays 4%. The current nominal Canadian-US exchange rate is $e_{nomCU} = 0.95$ and the current Canadian-Japanese exchange rate is $e_{nomCJ} = 80.0$. They read in the Halifax Chronicle Herald that the US dollar (USD) is going to depreciate so $e^f_{nomCU} = 0.90$ while the Japanese Yen is going to appreciate to $e^f_{nomCJ} = 70.0$. Bubbles calculates the values into Canadian dollars to show them which is better. Which bond does Bubbles end up buying?

Part B – Long Questions

*Do **three (3)** of the **four (4)** questions. Each question is worth **20 marks**, for a total of **60 marks**.*

B1 – The Asset Market, Money and Prices

a) [4 MARKS] Suppose the economy is populated by only two people : you and your grandma. Since she does not trust the banking system, she keeps all her money under her pillow, whereas you have the following real money demand equation:

$$L(Y, i) = 0.6Y \cdot i^{-\frac{1}{2}}$$

Due to unexpected circumstances, your grandma tragically dies and you inherit all of her fortune. Explain qualitatively what would be the consequences of her death on the nominal interest rate. Support your answer by providing the appropriate graphs.

b) [4 MARKS] Suppose there are two types of bonds in Denmark, one denominated in real terms and the other one denominated in nominal terms. If the real return bond gives an annual return of 5% and the price of a nominal bond that pays out 100$ in one year is 90$, what is the expected inflation?

c) [5 MARKS] Suppose that the Danish production function is given by $Y = AN$, where $\Delta A/A = 1\%$ and $\Delta N/N = 2\%$. Moreover, suppose that the level of inflation corresponds to the one expected in part (b) and the income elasticity of money demand is $\eta_Y = 0.4$. Find the growth rate of nominal money supply.

d) [3 MARKS] Assume that households have adaptive expectations with regards to inflation, i.e. the expected level corresponds to the one currently prevailing. The central bank wishes to have a target for inflation of 0%, at what rate should money grow in this case?

e) [4 MARKS] Suppose that there are fluctuations in the marginal product of capital (MPk), but output is always at its potential level. Furthermore, the real money demand in Denmark is best described by the following equation:

$$L(Y, i) = \frac{0.6Y}{i^{\sigma}}$$

Which value(s), if there are any, σ can take for the quantity theory of money to hold while the central bank targets inflation.

B2 – Wind Power Shocks in a Closed Economy IS-LM model

Suppose that all ferries leaving for Wolfe Island are canceled, so that it can now be considered a closed economy. A special feature of Wolfe Island is that it relies on wind power (E_W). The following equations characterize its economy:

$$\begin{aligned} C^d &= 1275 + 0.5Y - 200r \\ I^d &= 900 - 200r \\ L &= 0.5Y - 200i \\ \frac{M^s}{P} &= 175 \\ \pi^e &= 0 \end{aligned}$$

a) [3 MARKS] Derive the equation for the IS curve.

b) [3 MARKS] Derive the equation for the LM curve.

c) [3 MARKS] Assume that the initial state of the economy is at the long-run equilibrium. With a price level, P, equal to 1, solve for this equilibrium.

d) [7 MARKS] The production function is:

$$Y = AE_W^{0.5}N^{0.5}$$

where $A = 2$ is total factor productivity. Accordingly, the marginal product of labour (MPN) and labour demand (N^d) is:

$$MPN = 0.5AE_W^{0.5}N^{-0.5}$$

The labour supply corresponds to:

$$N^s = 2w$$

Initially, $E_W = 28480$, but suddenly Æolus , the God of Wind goes on strike and the quantity of wind blown on Wolfe Island is cut by half. Find the new level of full employment, $\bar{N}$, and the potential output, $\bar{Y}$. Furthermore, show graphically how curves would shift to

attain the long-run equilibrium.

e) [4 MARKS] Suppose labour markets are rigid in the short run, such that both wages and prices are sticky. Argue whether or not the combination of these two elements could produce cyclical unemployment. Support your answer graphically.

B3 – Open Economy Model Graph Bonanza

a) Petoria is a small open economy. Starting from full-employment, show the effect of the following on the price level, output, real interest rate, the nominal exchange rate and employment in the short run and in the long run. Make sure to include all relevant graphs as necessary to construct a complete answer (ex: AD-AS, IS-LM, Asset market, Goods market, Labour market, Exchange rate market ... etc.). Also make sure to relate your answer to your graphs.

i) [6 MARKS] What would be the impact of a decrease in future marginal productivity of capital if Petoria has a flexible exchange rate?

ii) [5 MARKS] What is the impact of a decrease in real money demand in a small open economy if Petoria has a flexible exchange rate?

iii) [6 MARKS] What is the impact of a temporary increase in government taxes (assume that Ricardian Equivalence does not hold) if Petoria had a fixed exchange rate?

b) [3 MARKS] (True/False/Uncertain) An increase in the price level shifts the real money demand (M^D/P) up to the right?

B4 – Output and Growth

a) [4 MARKS] What is Green GDP, how is it measured and why it might be a preferable measure of growth? Are there any flaws in measures of Green GDP?

b) For each of the following two scenarios, using the neoclassical growth model, discuss what will happen to the growth rate of C, Y, K and N in the short run and in the long run.

Use relevant graphs to show and discuss what happens to consumption per worker, savings per worker, investment per worker and output per worker. Assume that the economy is starting at its steady state k1* to the left of the Golden Rule k_G. Make sure to label k_G and k_{max}.

i) [5 MARKS] Springfield is a closed economy that produces lemon juice. A rival country, Shelbyville attacks Springfield with Nuclear Arms that destroys half of its lemon trees permanently.

ii) [4 MARKS] If the attack by Shelbyville on Springfield only destroyed the lemon picking machines that were used to pick lemons, but did not have any impact on anything else in Springfield, would your answer differ from i), and if so, describe the impact of the destruction of the lemon picking machines.

c) Consider an economy that has the following Cobb-Douglas production function: $Y_t = AK_t^{0.4}N_t^{0.6}$
The population grows at 3% per year, capital depreciates at a rate of 6% per year, and saving is proportional to current income: $S_t = sY_t$, with $s = 0.4$. Total factor productivity is fixed at A = 2.

i) [4 MARKS] Write the production function in per worker terms. Derive an equation that characterizes the level of the capital-labour ratio in the steady state (show all necessary steps). Solve for the the steady-state capital-labour ratio, k*, and the steady-state consumption per worker, c*. (6 marks)

ii) [3 MARKS] Using $\frac{dc}{dk} = f'(k) - (n + d) = 0$, (where $f'(k)$ denotes the derivative), find the golden rule level of capital-labour ratio k_G. Looking at your answer from part i), is this economy producing at a point that maximizes consumption?