

TEMPORARILY CONFIDENTIAL turn in midterm question paper
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QUEEN'S UNIVERSITY
FACULTY OF ARTS AND SCIENCE
DEPARTMENT OF ECONOMICS

Economics 222 A
Macroeconomic Theory I

Midterm Examination
October 27, 2009

Instructor: Jean-François Rouillard (Section A)

DURATION: 1.5 hours (90 minutes)

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

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

Part A (Short Questions, True/False/Uncertain): Do **THREE** of the **FOUR** questions. 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. Each question is worth **12 MARKS** for a total of **36 MARKS**.

Part B (Long Questions): Do **TWO** of the **THREE** questions. Each question is worth **32 MARKS** for a total of **64 MARKS**.

TOTAL: 100 MARKS.

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

Do *three (3)* of the *four (4)* questions. Each question is worth **12 marks**, for a total of **36 marks**. 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. If you provide answers to the four questions, only the first three ones will be marked.

A1

In the classical model of the labour market, in equilibrium the level of employment is always a full-employment one and therefore the natural rate of unemployment is equal to zero.

A2

The positive slope of the desired savings curve is based on the reaction of savers to shifts in the interest rate.

A3

Assuming that the Ricardian Equivalence proposition holds in small open economy (SOE), a temporary tax cut will have no effects on the current account.

A4

Since the golden rule capital-labour ratio (k^g) corresponds to the point where the level of consumption per worker (c^g) is maximized, k^g is greater than any other steady-state capital-labour ratio levels. ($k^g > k^*$)

Part B – Long Questions

Do *two (2) of the three (3) questions*. Each question is worth **32 marks**, for a total of **64 marks**.

B1 – Employment, Labour, and Production

In 2000, a couple years preceding the advent of the Olympic Games, Beijing is a city in expansion. First, assume that the production function and the labour supply curve are given by the following equations:

$$Y = 3K^{\frac{1}{2}}N^{\frac{1}{2}}$$

$$N^S = w^2$$

The capital stock is given by $K = 36$. Using this information, answer the following questions.

a) [6 MARKS] Draw a graph showing the appropriate labour demand (N^d) and labour supply (N^s) curves. Explain why we should expect a labour demand N^d *curve* instead of a demand *line*.

b) [6 MARKS] Find the labour market equilibrium wage rate, w^* , and level of employment, N^* .

c) [8 MARKS] Assume again that $K = 36$, but now the Chinese authorities limit the right for its citizens to have any leisure time. Since everyone in the population is employed and spend their time working, this results in an inelastic labour supply curve ($N^s = 16$). Find the new wage equilibrium, w^* .

Now, the Chinese regime in his great kindness, lets **half** of its citizens have access to Google, which improves the productivity for half of the population ($\overline{N}^s = 8$), but reduces it for the other half ($\underline{N}^s = 8$). Production functions are now as follows:

$$\overline{Y} = 4\overline{K}^{\frac{1}{2}}\overline{N}^{\frac{1}{2}}$$

$$\underline{Y} = 2\underline{K}^{\frac{1}{2}}\underline{N}^{\frac{1}{2}}$$

d) [12 MARKS] Find the new equilibrium wages. What is average wage for the whole population? Compare your answer to part c). Explain why we should expected the average wage to be lower, equal or greater than your result for part c).

B2 – Saving and Investment in the Open Economy

January 2008

Budapest, Hungary

Hungary, a small open economy, that has recently joined the European Union has experienced rapid economic growth. Suppose its national account statements and desired investment are as follows:

$$I^d = 15 - 500r^w$$

$$C^d = 200 - 300r^w$$

$$\bar{Y} = 300, T = 65, INT = 5, TR = 45, G = 100, NFP = 0$$

where $\bar{Y}$ is full-employment output, T is taxes, INT is domestic interest paid by the government, TR is transfers, G is government spending, C^d is desired consumption and NFP is net factor payments.

- a) [6 MARKS] Find the government's budget deficit (surplus).
- b) [6 MARKS] Find an equation for desired national saving (S^d) as a function of the world interest rate r^w .
- c) [10 MARKS] Suppose now that the world interest rate r^w is equal to 1% ($r = 0.01$). Find CA , the current account deficit (surplus), NX , net exports and KA , the capital and financial account. Represent this situation graphically.
- d) [10 MARKS] In October 2008, the economic crisis spreads to Hungary and foreign investors fear that they will never see their initial investments back. An IMF mission recommends the Hungarian government to either cut or raise its spending (G) up to the point that its current account (CA) would be equal to zero. Find the new level of G and also illustrate your answer with a diagram.

B3 – Long-Run Economic Growth

Consider Alberta that has the following Cobb-Douglas production function:

$$Y_t = AK_t^{0.5}N_t^{0.5}$$

a) [6 MARKS] Following the notation used in class, write the production function in per worker terms. Suppose the economy is off the steady-state and that both output per worker (y) and capital-labour ratio (k) grow by 4%. Find the value of the Solow residual.

Assume now that Alberta's population grows at 2% per year, capital depreciates at a rate of 14% per year, and saving is proportional to current income: $S_t = sY_t$, with $s = 0.4$. Total factor productivity is fixed at $A=2$.

b) [10 MARKS] Derive an equation that characterizes the level of the capital-labour ratio, k . Find the steady-state capital-labour ratio, k^* , and the steady-state consumption per worker, c^* . Show your results graphically. (Hint: remember in the steady-state $I_t = (n + d)K_t$)

c) [12 MARKS] Suppose now that the government wants to attain the golden rule level of the capital-labour ratio, k , which corresponds to the level that maximizes steady-state consumption per worker, c . It is possible to find this level by taking the first order condition, where:

$$\frac{dc}{dk} = Af'(k) - (n + d) = 0$$

where $f'(k)$ denotes the derivative.

Using this condition, calculate the golden rule level of capital-labour ratio, k^{**} . Assume that the government can dictate the level of saving s for the households. Find y^{**} and the new s^{**} at the golden rule steady-state. Assume now that the government does not intervene, $s = 0.4$, can an increase in total factor productivity A bring the economy to the same golden rule level of capital-labour ratio. If it is the case, find A^{**} . Show your results graphically.

d) [4 MARKS] Now suppose Saskatchewan has the same production function, depreciation rate, total factor productivity and level of saving per income. However, it differs from Alberta since its capital-labour ratio is below the steady-state one. Argue whether we should expect in the long-run Saskatchewanians to catch up to the living standards (output) of Albertans.