EC202A1 – Intermediate Macroeconomic Analysis
Spring 2011, Boston University

Instructor: Jeremy Smith

Final Exam

Saturday, May 14, 2011

This is a 120-minute test. There is a total of 120 points allocated across five questions. Use the number of points allocated to each part as a suggestion for how long to spend on that part. I recommend that you attempt all parts before using more time than is suggested for any one part. If you complete some parts in less than the suggested time, use your extra time to revisit parts you may have had trouble with the first time through and to check your work.

Please read the questions carefully and write your answers in the space provided. You can use the backs of the sheets for scrap paper, but to get full credit you must show all relevant work in the space provided.

Please follow my instructions at all times.

Concentrate and think carefully, but try to relax too!

University ID:

(Please do not include your name.)

1. [30 points total, 3 parts] Consider the simple Solow growth model with no technological progress and no employment growth. The economy is described by the production function $Y = A\sqrt{K}\sqrt{N}$. Technology, A, and the number of workers, N, are constant. The capital stock, K, depreciates at the fixed rate δ per period, and the economy saves a fixed proportion, s, of output, Y, per period. Assume throughout that taxes and government expenditure are zero.

a) [10 points] Derive the expression for the steady state capital-labor ratio. Show all of your work.

b) [10 points] Suppose that the depreciation rate decreases to $\delta' < \delta$ but that technology, the saving rate and employment stay constant.

i. Show the initial steady state and the new steady state in a carefully-labeled graph. You do not need to include the production function.

ii. Describe briefly how the economy will converge to the new steady state, starting from the old steady state.

c) [10 points] Assume that the depreciation rate is 8%, the saving rate is 40%, and the level of technology is 15.

i. Calculate the steady state levels of output per worker, investment per worker, and consumption per worker.

ii. If output per worker is otherwise known as labor productivity, how would you define capital productivity? Calculate the level of capital productivity in the steady state.

2. [15 points total, 2 parts] Consider the general open-economy *IS-LM* model. The economy is currently in an initial short-run equilibrium.

a) [7 points] Suppose that the domestic government decides to cut taxes. Illustrate this situation graphically, carefully labeling all axes and curves. Also label the values of output, the interest rate, and the exchange rate corresponding to the initial equilibrium and the new equilibrium.

b) [8 points] State how each of the following variables will have changed in the new equilibrium relative to the initial equilibrium, and explain briefly why.

i. Consumption.

ii. Investment.

iii. Net exports.

iv. The government budget balance.

3. [30 points total, 4 parts] Consider an economy characterized by the following Aggregate Supply and Aggregate Demand relations:

$P = P^e(0.5 + 0.0005Y)$ [*AS*]
$P = 10 - 0.008Y + 0.02c_0$ [*AD*].

a) [5 points]

i. Confirm that the natural level of output is 1000.

ii. If the economy starts in medium run equilibrium with consumer confidence of $c_0 = 150$, find: the level of output; the actual price level; and the expected price level.

b) [10 points] Now suppose that the economy suffers a permanent decrease in consumer confidence, to $c_0 = 100$, i.e. consumer confidence remains at this new level indefinitely.

i. Find the short run equilibrium level of output and the price level that would arise if there were no adjustment to the new output level in the labor market.

ii. Find the short run equilibrium level of output and the price level accounting for adjustment in the labor market to the change in output. (You can round your answers to one or two decimal places, but you should use up to five decimal places in your intermediate calculations where necessary.)

c) [5 points] Starting from the short run equilibrium in which the labor market has adjusted to the new output level, and continuing to assume that $c_0 = 100$, now suppose that price expectations adjust, such that P^e becomes equal to the actual price level you found for this short run equilibrium.

i. Find the subsequent short run equilibrium output and price level. (You can round your answers to one or two decimal places, but you should use up to five decimal places in your intermediate calculations where necessary.)

d) [10 points] Continue to assume that $c_0 = 100$. Suppose that the economy has completed its convergence to the new medium run equilibrium.

i. Find the medium run equilibrium: output level; price level; and expected price level.

ii. State how consumption and investment will have changed in the new medium run equilibrium compared to the initial medium run equilibrium. Explain.

4. [15 points total, 2 parts] Consider the following behavioral equation and information describing the goods market:

$C = c_0 + c_1 Y_D$

Government expenditure is represented by the exogenous variable G as usual, and investment is represented by the exogenous constant I throughout.

a) [5 points] Find the expression for the equilibrium level of output in this closed-economy goods market.

b) [10 points] Now suppose that the goods market becomes open to trade. The behavioral equation and information of the previous part remain valid, and are augmented by the following:

$IM = m_0 + m_1 Y$
$X = x_1 Y^*$.

Assume that the real exchange rate is fixed at a value of 1 and treat foreign income, Y^*, as fixed.

i. Find the expression for the equilibrium level of output in this open-economy goods market.

ii. Suppose that government expenditure increases by 100. By how much would output have increased in the closed-economy case? By how much will output increase in the open-economy case. Is the increase in output larger in the open-economy or the closed-economy case? Explain briefly and intuitively why.

5. [30 points total, 3 parts] Consider the closed-economy *IS-LM* model. The following behavioral equations and exogenous variables describe the economy:

$C = 200 + 0.4Y_D$
$I = 200 + 0.3Y - 1200i$
$(M/P)^d = 1.5Y - 4000i$

$G = 225$
$T = 100$
$(M/P)^s = 2425.$

a) [10 points] Derive the *IS* relation. Derive the *LM* relation. Find the short-run equilibrium output level and interest rate.

b) [10 points] Now suppose that the central bank reduces the real money supply to $(M/P)^s = 1825$.

i. Find the new short-run equilibrium output level and interest rate.

ii. Calculate the level of private saving before and after the reduction in the real money supply.

iii. Without calculating investment, state by how much it must change following the monetary contraction. Explain.

c) [10 points] Now suppose that, with the real money supply still at $(M/P)^s = 1825$, the government decides that it would like the output level to be 1750, and that it will attempt to achieve this by changing the level of government expenditure, G, only.

i. Find the new level of G that will achieve this output target.

ii. What is the value of the multiplier in this economy?