QUEEN'S UNIVERSITY
FACULTY OF ARTS AND SCIENCE

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ECONOMICS 222

SECTIONS A AND B

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Instructions:

The exam is three hours in length.

Answer five (5) of the nine questions in Part A.
Each question in Part A is worth eight (8) marks.

Answer three (3) of the five questions in Part B.
Each question in Part B is worth twenty (20) marks.

For questions in Part B that involve a numerical part be sure to show your calculations and intermediate steps.

Read the questions carefully. Put your student number on each answer booklet.

You may use a hand calculator. Allowed calculators include those with blue or gold stickers, the Casio 991, the Sharp EL376S, or other non-programmable calculators. No red-sticker calculators or other aids are allowed.

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

PART A
Answer five (5) of the following nine (9) questions
as True, False, or Uncertain.

Explain your answer.

Each question is worth eight (8) marks.

1. Changes in government spending will not affect the current account balance if Ricardian equivalence holds.

2. The expectations-augmented Phillips curve predicts that a decrease in the natural rate of unemployment is likely to be inflationary.

3. Compared to Germany, if Canada has a lower unemployment rate and a higher participation rate then it must also have a higher employment ratio.

4. To be in the index of leading indicators, a macroeconomic variable must be pro-cyclical.

5. If purchasing power parity holds then one should expect an increase in the value of the Canadian dollar in response to an increase in the U.S. inflation rate.

6. The Taylor Rule prescribes that a central bank should raise interest rates when the inflation rate rises.

7. Under its fixed exchange-rate regime, if China's currency is over-valued then it must undergo a revaluation (*i.e.* raise the level at which the exchange rate is fixed).

8. In a small open economy that takes the world real interest rate as given, fiscal policy can be used to speed up recovery from recessions.

9. Inflation targeting offers no advantages over discretionary monetary policy.

PART B
Answer three (3) of the following five (5) questions.
Each question is worth twenty (20) marks.

1. This question studies one way in which a classical, small, open economy may be affected by a foreign productivity boom (like the one in the U.S. in the late 1990s). Suppose that output in the U.S. is given by:

$$Y_u = A_u N_u,$$

that $\Delta A_u / A_u = 1\%$, and that $\Delta N_u / N_u = 2\%$. Also suppose that

$$\frac{M_u}{P_u} = Y_u^{\frac{1}{2}}.$$

Meanwhile, in Canada

$$Y = AN,$$

with $\Delta A / A = 1\%$, and that $\Delta N / N = 2\%$. Also suppose that

$$\frac{M}{P} = Y^{\frac{1}{2}}.$$

The two countries thus have the same rate of growth of labour productivity. Finally suppose that the real exchange rate is always $e = 1$.

(a) Find $\Delta Y_u / Y_u$ and $\Delta Y / Y$.

(b) If

$$\frac{\Delta M_u}{M_u} = 4.5,$$

then what is the rate of inflation in the U.S.?

(c) If

$$\frac{\Delta M}{M} = 3.5,$$

then what is the rate of inflation in Canada?

(d) What is happening to the nominal exchange rate?

(e) Find the effect on the rate of appreciation or depreciation of the Canadian dollar of a doubling of U.S. productivity growth to $\Delta A_u / A_u = 2\%$.

2. This question uses the growth model to make predictions for economic growth in Japan following an earthquake there. Let Japan's production function be:

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

Suppose that there is no depreciation of capital, so

$$K_{t+1} = K_t + I_t.$$

The savings rate is $s = 0.24$. Population grows like this:

$$N_{t+1} = 1.02N_t.$$

Think of Japan as a closed economy.

(a) Find a mathematical expression for the real interest rate, r, in terms of the capital-labour ratio, k.

(b) Find the steady-state values of k, r, and output per worker, y.

(c) Suppose that an earthquake destroys half the capital stock, so that the capital-labour ratio falls to half the value you found in part (b). What is value of the real interest rate at that time?

(d) What happens to the real wage as time passes?

(e) What is the rate of growth in output per capita in the year after the earthquake (*i.e.* starting from the situation in part (c))?

3. This question investigates the effect of a change in the world real interest rate on the borrowing of a less-developed country. Let there be two time periods. Output is given as $Y_1 = 80$ in period 1 and $Y_2 = 100$ in period 2. There are no capital goods or investment, so in each period:

$$Y = C + G + NX.$$

Government spending is given by $G_1 = G_2 = 10$. Initial foreign debt is zero. The world, real interest rate is given as $r = 0.10$. The present-value budget constraint for households is:
$$C_1 + \frac{C_2}{1 + r} = Y_1 - T_1 + \frac{Y_2 - T_2}{1 + r},$$
while for the government it is:

$$G_1 + \frac{G_2}{1 + r} = T_1 + \frac{T_2}{1 + r}.$$

(a) Suppose that there is consumption-smoothing, so that $C_1 = C_2$. Solve for the value of consumption in terms of exogenous variables.

(b) Find $NX_1 = CA_1$. Is this country a lender or a borrower? What is the value of its foreign debt or assets at the end of period 1?

(c) Find NX_2. Also try to find CA_2 by also calculating net factor payments. (Hint: What are the interest payments on its debt?)

(d) Now suppose that the world real interest rate rises. In what direction will this country's lending or borrowing (*i.e.* CA_1) change? (Hint: Use theory, or else a numerical example.)

(e) Suppose that an external agency was concerned about the scale of this country's foreign debt. What change in fiscal policy might it recommend?

4. Supply-side economists argue that reductions in certain tax rates will significantly boost output. In this question, we look at how this effect might come about and also at the effects on the price level and on the interest rate. Imagine a closed economy, with production function:
$$Y = 60N^{\frac{1}{2}}.$$

Labour supply is given by
$$N^S = [w(1 - \tau)]^2,$$

where τ is a tax rate.

(a) Set the marginal product of labour equal to the pre-tax wage, and so find the labour-demand curve.

(b) If $\tau = 0.40$, solve for w, N, and Y.

(c) In the goods market, government expenditure G equals total revenue T:
$$G = T = \tau(wN).$$

Consumption follows:
$$C = 0.8(Y - T),$$

and investment follows:
$$I = 80 - 20r.$$

Find the real interest rate.

(d) If $M = PY$ and $M = 500$, find the price level.

(e) Now imagine a tax cut, so $\tau = 0.3$. Prices are flexible. Find the effect of the tax cut on w, N, Y, r, and P. Will the tax cut be inflationary?

5. This question studies how macroeconomic changes in the U.S. might affect Canada. Suppose that Canadian net exports and the real exchange rate are described by:

$$NX = 0.1Y_{for} - 3e$$
$$e = 4 + r - r_{for}$$

For simplicity, suppose that $G = 0$. Also, $C = 0.75Y$ and $I = 40 - 10r$. In the money market:

$$\frac{M}{P} = Y - 20r,$$

with $M = 60$. Finally,

$$\overline{Y} = 100.$$

(a) Suppose that $Y_{for} = 200$, $r_{for} = 1$, and $P_{for} = 1$. Find r, e, NX, and P.

(b) Now imagine that a resumption in growth in the U.S. leads to $Y_{for} = 210$ and $r_{for} = 2$ and $P_{for} = 1.05$. Use a Keynesian model in which the price level is fixed in the short run. Find the short-run effects on five Canadian variables: r, e, NX, e_{nom}, and Y.

(c) Next find the long run effects on r, e, NX, and e_{nom}.

(d) Suppose that Canada had a fixed exchange rate. What would the Bank of Canada have had to do to prevent the value of the Canadian dollar from changing in the short run if Y_{for} and r_{for} changed in this way? (Your answer should be qualitative only, and could use a diagram.)

222 Final Exam Answers
December 2004

1.

2.

3.

4.

5.

6.

7.

8.

9.

1. (a) Both are 3%.

(b) 3%

(c) 2%

(d) $e_{nom} = P_{for}/P$ so the rate of appreciation is $\pi_{for} - \pi = 1\%$

(e) The US inflation rate falls to 2.5% so the rate of Canadian dollar appreciation falls to 0.5%.

2. (a)
$$r = 0.5k^{-0.5}$$

(b) We have
$$k_{t+1} = 0.980k_t + .235k_t^{0.5}$$
Also $0.24k^{0.5} = 0.02k$. So $k^* = 144, y^* = 12$, and $r^* = 0.0417$.

(c) After the quake: $k = 72$, $y = 8.4853$ and $r = 0.0589$

(d) Wages gradually rise as time passes.

(e) Using the equation
$$k_{t+1} = 0.980k_t + .235k_t^{0.5}$$
gives $k_{t+1} = 72.554$. Thus k grows by .769% so y grows by .384%.

3. (a)
$$C = \frac{1.1}{2.1}[70 + \frac{90}{1.1}] = 79.52.$$

(b) In period 1 $NX_1 = CA_1 = 70 - 79.52 = -9.52$.

(c) In period 2 $NX_2 = 90 - 79.52 = 10.48$. Net factor payments are -0.952 so the current account is 9.52.

(d) This country is a borrower, so both the substitution and income effects lead to a rise in its saving when the interest rate rises. Thus its current account will rise (its deficit will fall).

(e) It might recommend a reduction in G_1, that would raise CA_1 and so reduce the growth of the country's debt.

4. (a)
$$w = 30N^{-0.5}$$

(b) $w = 7.07$ $N = 18$ $Y = 254.55$

(c) $r = 1.9635$

(d) $P = 1.9642.$

(e) If instead $\tau = 0.3$ then $w = 6.546$, $N = 21$, $Y = 274.95$, $r = 1.6629$ and $P = 1.8185$
So prices fall; the tax cut is not inflationary.

5. (a) The open-economy IS curve is:

$$0.25Y = 28 - 13r + 0.1Y_{for} + 3r_{for}.$$

This gives $r = 2$, $e = 5$ and $NX = 5$. Also $P = 1$.

(b) The IS curve specializes to:

$$0.25Y = 55 - 13r.$$

Combine this with the LM curve: $60 = Y - 20r$. This gives $r = 2.222$ and $Y = 104.44$.
That means $e = 4.222$ and $NX = 8.333$. Lastly, the nominal exchange rate is $e_{nom} = eP_{for}/P = 4.433$.

(c) In the long run, $Y = 100$, so $r = 2.307$. That gives $e = 4.307$ and $NX = 8.076$. The
new price level is $P = 1.1139$, so the nominal exchange rate is $e_{nom} = eP_{for}/P = 4.059$.

(d) To prevent this nominal depreciation, the central bank would tighten monetary
policy (shifting the LM curve back).