Final Examination Answers

This exam is 80 minutes long, and is worth 80 points. You are given 88 minutes to complete it. Part I is multiple choice, Part II is a short answer. The points are allocated in proportion to the time you should spend on each problem. **Part I ~~and Part II, Q1~~ goes into bluebook A; Part II, ~~Q2 and Q3~~ goes into bluebook B.**

BEGIN BLUEBOOK A   BEGIN BLUEBOOK A   BEGIN BLUEBOOK A

PART I: Multiple Choice [40 minutes total, 2.5 points each]. Do NOT explain. (16 problems)

1. Suppose the Fed decides to restrict the rate of growth of the money supply in the United States. You should expect to see
a) an initial increase in the value of the dollar that is diminished somewhat over the long run.
b) an initial increase in the value of the dollar that is swamped by a second round depreciation.
c) an initial increase in the value of the dollar that continues until the Fed changes policy again.
d) an initial decline in the value of the dollar that is offset somewhat over the long run.
e) an initial decline in the value of the dollar that continues until the Fed changes policy again.

2. With markup pricing and multiyear contracts staggered across three-year intervals,
a) monetary policy cannot influence real GDP even if expectations are rational.
b) monetary policy cannot influence real GDP even if wages are otherwise flexible.
c) monetary policy can influence real GDP even if expectations are rational.
d) monetary policy cannot influence real unemployment even if wages are otherwise flexible.
e) none of the above.

3. Which of the following is a source of growth in potential GDP?
a) Growth in the labor force
b) Growth in the capital stock
c) Growth in labor productivity
d) All of the above
e) None of the above

4. The income tax system of the United States can discourage investment. This tendency, however, can be offset by the stimulative effects of
a) increasing the tax credit percentage that firms can subtract from their tax liabilities.
b) allowing interest payments to be deducted from income before tax liability is computed.
c) allowing depreciation to be deducted more quickly from income before tax liability is computed.
d) lowering the real rate of interest through macroeconomic policy.
e) all of the above.

5. Purchasing power parity does not hold up as well in the short run as it does in the long run because
a) prices are fixed in the short run and the resulting inflexibility is hard to describe theoretically.
b) substitution among similar goods is nearly impossible when an international transaction is involved.
c) goods arbitrage is not an instantaneous, costless process.
d) its conclusions are drawn from price stability, a long-term phenomenon.
e) all of the above.

6. Housing investment is more sensitive to interest rates than business investment because
a) the price of housing trends up over time.
b) the rate of physical depreciation is greater for houses.
c) the rate of physical depreciation is greater for business investment.
d) all of the above.
e) both a and c.

7. Suppose that the desired capital stock is always equal to three times total output for any year. In that case, the accelerator principle implies that investment should always
a) equal some constant multiple greater than 3 times the annual change in GDP to accommodate depreciation.
b) be precisely equal to three times the annual change in GDP regardless of the rate of depreciation.
c) equal some constant multiple less than three times the annual change in GDP to accommodate depreciation.
d) be proportional to the annual change in GDP, but the information provided is insufficient to compute the multiple exactly.
e) none of the above.

8. For the purposes of integrating forward-looking business investment decisions into a model of macroeconomic behavior, capital employment decisions proceed along at least two dimensions. The most important of these considerations are
a) how much capital stock to maintain and how much to depreciate.
b) how much capital stock to maintain and how quickly to achieve that stock by a flow of investment expenditure.
c) how much capital to rent and how much to purchase.
d) how much of the capital that is rented should be depreciated and how much should be sent back.
e) how fast to expand the capital stock of a growing division and how fast to contract the capital stock of a failing division.

9. If point A represents an economy's initial position away from equilibrium at point E, which of the panels of the figure below displays a recovery trajectory from a materials price shock that produced unexpected inflation?
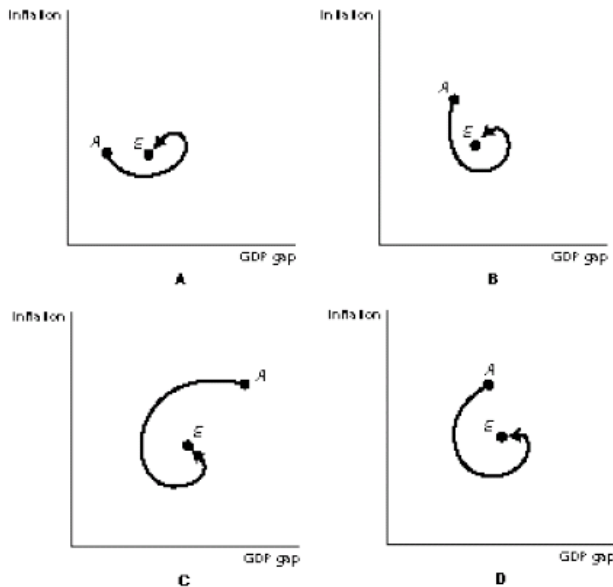
a) A
b) B
c) C
d) D
e) none of the panels

10. Given the monetary policy rule, $r_t = \pi_t + 0.5\hat{Y}_t + 0.5(\pi_t - \pi_t^*) + 3_t^*$ and

assuming $\hat{Y}_t = 0$ and $\pi_t = \pi_t^*$, let inflation increase by 2 percentage points. By how much would the Fed increase interest rates?
a) 6 percentage points
b) 2 percentage points
c) 3 percentage points
d) 5 percentage points
e) Less than 2 percentage points

11. Assume an expectations augmented Phillips curve holds, and expected inflation equals lagged inflation. Then
a) the unemployment rate must exceed the natural rate if actual GDP falls short of its potential.
b) the unemployment rate is independent of any accelerated inflation caused by outside price shocks.
c) the unemployment rate must fall short of the natural rate if actual GDP exceeds its potential.
d) any attempt to keep actual GDP above its potential must produce accelerating rates of inflation.
e) unemployment can be maintained at the natural rate even given accelerating inflation.

12.

13. Let expected inflation in the United States be 5 percent with a nominal rate of interest equal to 10 percent; let corresponding inflationary expectations abroad equal 10 percent with a nominal interest rate of 12 percent. According to interest rate parity,
a) people must expect the dollar to appreciate by 3 percent.
b) people must expect the dollar to appreciate by 5 percent.
c) people must expect the dollar to appreciate by –3 percent.
d) people must expect the dollar to appreciate by –5 percent.
e) expectations about the future strength of the dollar must still be undetermined.

14. Which of the following is an assumption of the information-based model of supply developed by Lucas?
a) Prices and wages are assumed to be flexible.
b) People are not fully informed about what is going on in the economy.
c) A positive correlation between supply price and quantity is assumed for firms' individual supply curves.
d) All of the above are accurate.
e) None of the above is accurate.

15. Given the Lucas formulation of supply $Y_i = h(P_i - P) + Y_i^*$ where Y_i represents the output of some firm i, P_i represents that firm's price, P represents an overall price index, and Y_i^* is the ith firm's potential output, the parameter h is
a) positive because prices are sticky going down.
b) negative because the lack of pricing information is positively correlated with output.
c) positive because, when the relative price of their product rises, firms increase their output.
d) negative because firms' implicit demand curves are assumed to be negatively sloped.
e) none of the above.

16.

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PART II: Short Answer (40 minutes total)

1. (20 minutes) Suppose equilibrium income is given by:

$$Y_0 = \tilde{\alpha}[\hat{A}_0 + m_w Y_{w,0} - \frac{(d+nv)\mu}{h} + \frac{(d+nv)}{h}\left(\frac{M_0}{P}\right)]$$
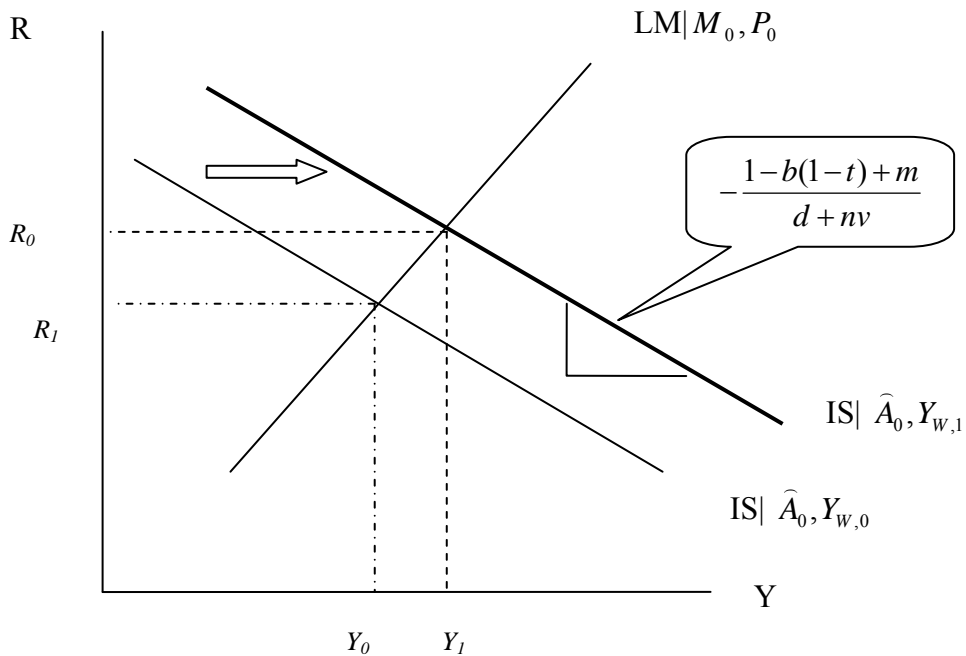
$$\text{where } \tilde{\alpha} \equiv \frac{1}{1 - b(1-t) + m + (d+nv)k/h}$$

$$\hat{A} \equiv a_0 - bTA_0 + e_0 - dR + GO_0 + g_0 - nq_0$$

Note that in this model,

$$\frac{EP}{P_w} = q_0 + vR \quad \text{and} \quad T = TA_0 + tY, \ C = a_0 - bTA_0 + b(1-t)Y$$

1.1 (4 minutes) Show graphically what happens if rest-of-world income exogenously rises from $Y_{w,0}$ to $Y_{w,1}$ (call this ΔY_w). Label axes and curve shifts carefully, showing how far the curve(s) shifts ~~in~~.

R

LM$| M_0, P_0$

$$-\frac{1 - b(1-t) + m}{d + nv}$$

R_0

R_1

IS$| \hat{A}_0, Y_{W,1}$

IS$| \hat{A}_0, Y_{W,0}$

Y

$Y_0 \quad Y_1$

1.2. (4 minutes) Work out algebraically the change US income Show your work! Hint: use total differentials.

Take the total differential of the expression for equilibrium income.

$$\Delta Y = \tilde{\alpha}[\Delta \hat{A} + m_w \Delta Y_w - \frac{(d+nv)\Delta \mu}{h} + \frac{(d+nv)}{h}\Delta\left(\frac{M}{P}\right)]$$

$$where \ \tilde{\alpha} \equiv \frac{1}{1 - b(1-t) + m + (d+nv)k/h}$$

Since nothing else changes, the $\Delta \hat{A} = 0 = \Delta \mu = \Delta\left(\frac{M}{P}\right)$. This means the change in income is given

by: $\boxed{\Delta Y = \tilde{\alpha} m_w \Delta Y_w}$

1.3. (4 minutes) Work out algebraically the change in US interest rate. Show your work! Hint:

$$R = \left(\frac{\mu_0}{h}\right) - \left(\frac{1}{h}\right)\left(\frac{M_0}{P}\right) + \left(\frac{k}{h}\right)Y$$

Take the total differential:

$$\Delta R = \left(\frac{\Delta \mu}{h}\right) - \left(\frac{1}{h}\right)\Delta\left(\frac{M}{P}\right) + \left(\frac{k}{h}\right)\Delta Y$$

Substitute in the answer from 1.2:

$$\Delta R = \left(\frac{k}{h}\right)\tilde{\alpha} m_w \Delta Y_w$$

1.4. (4 minutes) Work out algebraically what the change in the real exchange rate. Show your work!

The real exchange rate equation is given by:

$$\frac{EP}{P_w} = q_0 + vR$$

Take the total differential:

$$\Delta\left(\frac{EP}{P_w}\right) = \Delta q + v\Delta R$$

Substituting in the answer from 1.3:

$$\Delta\left(\frac{EP}{P_w}\right) = v\left(\frac{k}{h}\right)\tilde{\alpha} m_w \Delta Y_w$$

1.5. (4 minutes) Show the change in net exports (or the "trade balance"). Hint: the original level of net exports is given by:

$$X = g_0 - mY + m_w Y_{w,0} - n\left(\frac{EP}{P_W}\right)$$

Is the change positive or negative?

Take the total differential:

$$\Delta X = \Delta g - m\Delta Y + m_w \Delta Y_w - n\Delta \left(\frac{EP}{P_W} \right)$$

Substitute in for each component:

$$\Delta X = -m\tilde{\alpha}m_w \Delta Y_w + m_w \Delta Y_w - nv\left(\frac{k}{h} \right)\tilde{\alpha}m_w \Delta Y_w$$

The impact of higher imports into the rest-of-the-world (US exports) is positive, but higher income increases imports and hence reduces net exports. In addition, higher real interest rates in the US induce dollar appreciation, and further expenditure switching away from US goods, so that we don't know what happens to net exports.

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Exam continues

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2. (15 minutes total) Suppose we have an economy where the central bank follows a Taylor rule:
$$r_t = \pi_t + \beta\hat{Y}_t + \delta(\pi_t - \pi_t^*) + R_t^*$$
And the macroeconomic policy rule is given by:
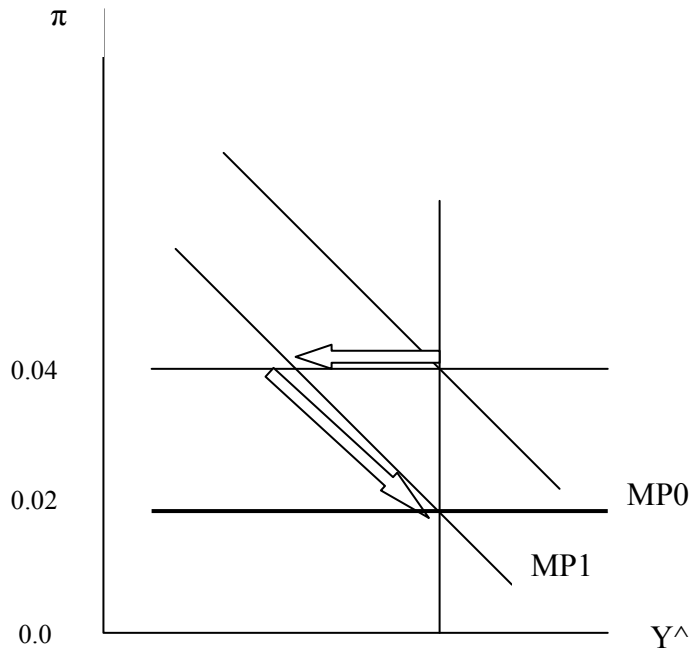$$\hat{Y}_t = \frac{-\delta}{\beta + \sigma}(\pi_t - \pi_t^*)$$
Where the IS curve is given by:
$$R_t - R_t^* = -\sigma\hat{Y}_t$$

2.1 (5 minutes) Explain what happens if the central bank decreases the target inflation rate from 0.04 to 0.02, using graphs. Assume the action takes place in period 2. You can assume price adjustment takes the form:
$$\pi_t = \pi_{t-1} + f\hat{Y}_{t-1} + Z_t$$
Be sure to label the curve shifts clearly.

6

2.2 (5 minutes) Ignore your answer to 2.1. Explain using a graph what happens to the curve(s) if the central bank responds only to the inflation gap, and does not pay attention to the output gap. Explain the economic intuition behind your answer.
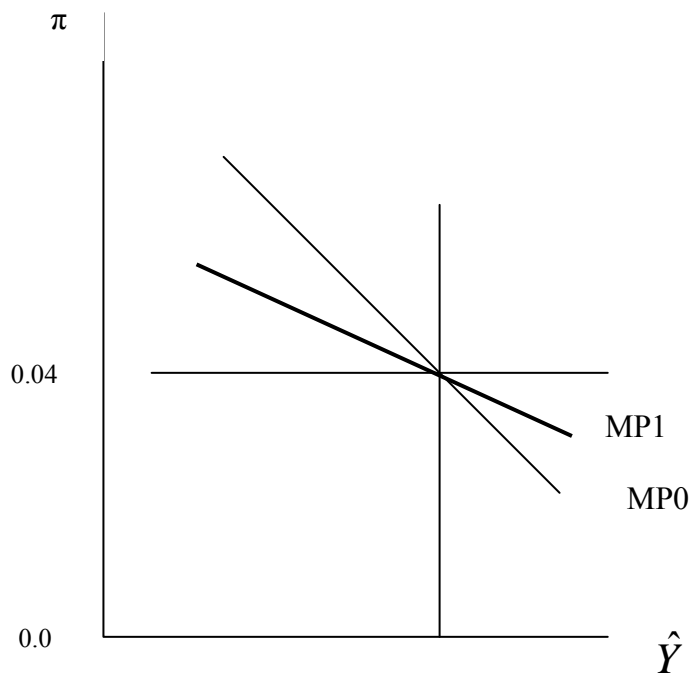
The Taylor rule becomes:
$$r_t = \pi_t + \delta(\pi_t - \pi_t^*) + R_t^*$$

The macroeconomic policy curve then changes from:
$$\hat{Y}_t = \frac{-\delta}{\beta + \sigma}(\pi_t - \pi_t^*)$$

To:
$$\hat{Y}_t = \frac{-\delta}{\sigma}(\pi_t - \pi_t^*)$$

The MP curve becomes flatter, which means that reductions in the target inflation rate would induce much larger negative output gaps; and increases in the target inflation rate would induce larger positive output gaps.

2.3 (5 minutes) Compare the impact of an oil shock in the case where the Taylor rule is conventionally defined, and when it is defined as in 2.2. A graph or graphs will be useful.

π

0.04

0.0

MP1

MP0

$\hat{Y}$

$\hat{Y}_{IT}$ $\hat{Y}_{TR}$
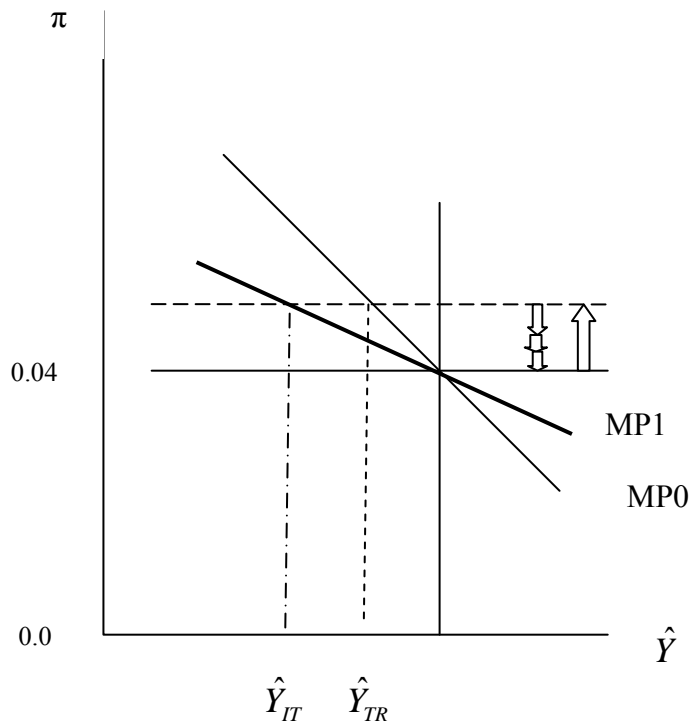
With the standard Taylor rule, output gap falls to $\hat{Y}_{TR}$, and eventually returns to 0. With solely inflation targeting, output gap falls to $\hat{Y}_{IT}$, which is a larger negative because the central bank does not weight at all the output gap in its rule.

3. (5 minutes) Suppose using a growth accounting equation, the labor share of total income is 2/3, and the capital share is 1/3, then show which outcome will have a bigger effect on GDP growth: either 1 percentage acceleration in labor force growth, a 2 percentage point acceleration in capital stock accumulation, or a 2/3 percentage point acceleration in TFP growth. Show your work!

The growth equation is given by
$$\Delta Y / Y = \Delta A / A + (2/3)(\Delta N / N) + (1/3)(\Delta K / K)$$

For a one percentage point acceleration in labor force growth:
$$\Delta Y / Y = (2/3) \times (\Delta N / N) = (2/3) \times (0.01) = 0.0067$$
For a one percentage point acceleration in capital stock growth:
$$\Delta Y / Y = (1/3) \times (\Delta K / K) = (1/3)(0.02) = 0.0067$$
For a one percentage point acceleration in capital stock growth:
$$\Delta Y / Y = \Delta A / A = 0.0067$$
So each option yields the same growth rate.

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