

Optional Quiz Answers Spring 1999

True, False, Uncertain. (Briefly explain in the space below). 4 points each.

1. An endogenous variable in a macro model is explained by other variables in the model.
True.
2. As the unemployment rate declines to lower rates, employers tend to offer higher wages to attract increasingly scarce workers.
False. The price-setting relation is actually upward-sloping because as unemployment falls the markup increases
3. Increased government direct purchases (for example, planes or construction of schools) should have the same short-run impact on national employment and output growth as an equal-sized cut in personal income taxes.
False. The multiplier for G is larger than the multiplier for T because G has a direct effect on output while T only affects output through its effect on disposable income.
4. If the central bank increases its purchases of Treasury securities from the banking sector, interest rates tend to rise because demand for securities is higher.
False. Open market purchases of securities reduce the money supply, creating an excess demand for money. The interest rate rises in order to motivate agents to reduce their holdings of money and increase their holdings of bonds (moving up along the money demand curve)
5. Rising exports from the United States simply substitute for or reduce world output (outside the United States) without any significant benefit.
False. Higher exports from the United States will increase equilibrium income, which increase imports from other countries, which is a benefit to those countries in the form of higher output.

Multiple Choice. (circle all that apply). 5 points each

1. Assume that the goal of the government and the central bank is to raise the investment share of GDP in order to expand long-run productivity growth. The following policy mix achieves this goal.
 - a. Government increases spending (holding taxes constant). Central banks sells bonds in an open market operation.
 - b. Government increases spending (holding taxes constant). Central banks buys bonds in an open market operation.
 - c. Government decreases spending (holding taxes constant). Central banks sells bonds in an open market operation.
 - d. **Government decreases spending (holding taxes constant). Central banks buys bonds in an open market operation.**

Lower government spending shifts the IS curve to the left. Open-market purchase shifts LM curve right so output is unchanged, but interest rate is lower. The composition of output has changed to include more investment as the interest rate has been reduced.

2. What is the probable short-run impact of a spontaneous (exogenous) rise in global demand for US exports on key values for the economy?
- US real GDP rises by slightly less than the export increase.
 - US interest rates rise.**
 - US imports rise.**
 - Federal tax collections fall.

Higher demand for our exports shifts IS to the right by the change in exports times the multiplier. Interest rates increase and output increases. Higher output increases imports. Taxes depend positively on output, so they also rise.

Brief Explanations.

Question 1. (5 points each)

Let u_t denote the unemployment rate, u_n denote the natural rate of unemployment, and Π_t denote the rate of inflation. Consider the following results from OLS estimation of the modified Phillips curve $\Delta\Pi_t = -\alpha(u_t - u_n)$. T-ratios are reported beneath coefficient estimates.

$$\Delta\Pi_t = \begin{matrix} 0.08 & - & 0.75 & * & u_t \\ 0.15 & & 4.00 & & \end{matrix}$$

- a. What does NAIRU stand for?

Non-accelerating Inflation Rate of Unemployment.

- b. What is your estimate of NAIRU from the above OLS results?

$u_n = 10.6$ percent (simply ratio of intercept to slope coefficient)

- c. If the central bank wants to reduce inflation by 2 percentage points within one year, what will be the rate of unemployment?

$$u_t = u_n - \Delta\Pi_t / \alpha = 10.6 + 2 / 0.75 = 14.2$$

Question 2. (5 points)

List four of the most important economic factors influencing the aggregate level of consumption.

Income	Taxes	Expectations
Real interest rates	Demographics	
Wealth	Psychology	

Long Question. (50 points)

Build a basic model of an economy from the following description:

1. **Business**
- | | |
|--|--------|
| For each \$100 of revenue (GDP) they receive, firms have costs and profits | GDP |
| \$75 wages | W |
| \$25 profit | Profit |
| They buy new plant and equipment equal to profits each year, plus | I |
| \$50 extra (less) for each 1 percentage point the interest rate is below | r |
| (above) 5 percent. | |

Hint: the interest rate (r) enters the equations as a whole number like 4, 5, or 6 not 0.04, 0.05, 0.06

2. Consumers

Pay a flat of 1/3 their gross wages and profits in taxes T
 Buy consumer goods equal to 75% of their after-tax income, except C
 They reduce purchases by \$100 for each 1 percentage point the interest rates exceed 5 percent (and symmetrically raise purchases when rates fall below 5 percent)

3. Government

The government buys \$250 in goods G
 No taxes other than income taxes are collected

4. Foreign buyers and sellers are excluded from the economy

- a. Write out the set of behavioral equations describing each income and spending component of this economy. Reduce the equations by substitution into one another. Write the derived "IS" curve equation of the form $GDP = a_1 + a_2 * r$ and the derived consumption equation of the form $C = b_1 + b_2 * GDP + b_3 * r$

$W = 0.75 * GDP$

$Profit = 0.25 * GDP$

$I = Profit + 50 * (5 - r) = 0.25 * GDP + 50 * (5 - r)$

$C = 0.75 * (1 - 1/3) * (W + Profit) + 100 * (5 - r) = 0.5 * GDP + 100 * (5 - r)$

$G = 250$

$NX = 0$

$GDP = Z = C + I + G + NX = 0.75 * GDP + 150 * (5 - r)$

(IS) $GDP = 1000 + 600 * (5 - r)$

$C = 500 + 400 * (5 - r)$

- b. Assume the central bank initially sets the interest rate at 5 percent. Solve the equations to produce equilibrium output (GDP), consumption (C), investment (I), and government deficit (T-G).

$GDP = 1000, C = 500, G = 250, I = 250, T = 1000/3$ implies $T - G = 83.3$

Now add a money demand equation to the model, replacing the assumption that the central bank directly sets interest rates. Consumers desire money balances (Md) equal to their spending (C), minus \$50 for each 1 percentage point rates exceed (fall below) 5 percent.

- c. Combine your prior consumption equation and your new money demand equation. Reduce by substitution to the form: $Md = c_1 + c_2 * GDP + c_3 * r$. Now write the "LM" curve in the form: $GDP = d_1 + d_2 * r + d_3 * Md$,

$Md = C + 50 * (r - 5) = 0.5 * GDP - 150 * (r - 5)$

(LM) $GDP = 2 * Md + 300 * (r - 5)$

- d. Assume the central bank now sets the money supply at \$950. All values in the economy must change so money demand equals money supply. Solve your simultaneous IS and LM equations to produce the equilibrium interest rate r and GDP.

(IS) $GDP = 1000 + 600 * (5 - r)$

(LM) $GDP = 1900 - 300 * (5 - r)$

$GDP = 1600, r = 4$