

MIDTERM EXAM SOLUTIONS

True, False, Uncertain

1. An exogenous variable in a macro model is dependent on the values of other variables in the model.

FALSE. Exogenous variables are determined outside of the model.
2. All unemployment is involuntary.

FALSE. Using Roger's framework, only people willing to work at the prevailing wage without jobs are involuntarily unemployed. Other people without jobs but unwilling to work at prevailing wages are voluntarily unemployed.
3. For any given level of expected price inflation, there is a reliable linkage in the US economy between the rate of increase in wages and the rate of unemployment.

TRUE. This is just the modified Phillips curve, which described the data well.
4. All types of government spending—purchases of planes, construction of schools, or social security benefit payments, for example—should have the same short-run impact on national employment and output growth.

FALSE. Government spending like social security payments is simply a transfer from one individual to another, and should not increase the productive capacity of the economy.
5. If the central bank keeps interest rates unchanged, an increase of G (government purchases) shifts the IS curve to the right by roughly the value of G .

FALSE. An increase in G should shift the IS curve right by the change in G times the multiplier.
6. Productivity growth in the US, and most major industrial nations, has been more rapid in the past 20 years than in the prior twenty years.

FALSE. Productivity growth in most major industrial nations has slowed down in the last 20 years.
7. In Landlockia, the central bank decides to sell bonds to the public, the government reacts at the same time increasing its spending to keep employment constant. As a consequence of these policies the interest rate in Landlockia falls.

FALSE. Selling bonds to the public reduces the money supply shifting the LM curve to the left while higher government spending shifts the IS curve to the right. Both of these actions increase equilibrium interest rates.
8. A decrease in government expenditures is always good for investment (assume taxes remain constant).

UNCERTAIN. Lower government spending reduces equilibrium output by shifting the IS curve to the left. Lower output reduces investment. On the other hand, lower interest rates will spur investment. It is not clear which effect will dominate without more information about the structure of the economy.
9. If a country exports goods but does not import any then GDP has to be at least as large as exports.

TRUE. Net exports here are simply exports as imports are zero. As the other components of GDP are strictly positive, the statement is true.

10. As workers wage demands become less sensitive to the unemployment rate the cost of disinflation decreases.

FALSE. As workers wage demands become less sensitive to the unemployment rate it takes a larger increase in the unemployment rate to reduce wages (and thus prices).

Multiple Choice

1. During the past thirty years, US population growth has averaged what percent per year?
 - A. 0.5%
 - B. 1.2%**
 - C. 2.0%
 - D. 3.3%
 - E. 4.1%

2. During the past thirty years, US real GDP growth has averaged what percent per year?
 - A. 0.5%
 - B. 1.2%
 - C. 2.0%
 - D. 3.3%**
 - E. 4.1%

3. When considering the “capital” factors supporting long-run GDP growth, which do economists appropriately count?
 - A. Factory equipment**
 - B. Pollution abatement devices
 - C. Research knowledge**
 - D. The value of homes and factories**
 - E. The value of public highways and bridges**
 - F. The value of citizens’ stock and bond portfolios

4. Assume that the goal of the Government and the Central Bank is to keep employment constant while reducing the interest rate in the economy. The following policy mix achieves this goal:
 - A. Government increases its spending (while keeping taxes constant). Central Bank sells bonds in an open market operation.
 - B. Government increases its spending (while keeping taxes constant). Central Bank buys bonds in an open market operation.
 - C. Government reduces its spending (while keeping taxes constant). Central Bank sells bonds in an open market operation.
 - D. Government reduces its spending (while keeping taxes constant). Central Bank buys bonds in an open market operation.**

5. What is the impact of an increase in transactions on equilibrium values in money and bond markets?
 - a. The demand for money increases.**
 - b. The demand for bonds decreases.**
 - c. The demand for bonds increases.
 - d. The equilibrium interest rate increases.**
 - e. The equilibrium interest rate decreases.

Brief explanations

1. An econometrician has estimated a demand equation for consumer durable spending:
Real Consumer Durable Spending (\$) = -405 + .203 x Real After-tax Household Income
Mean values: Durables, 500 ; Income, 4000

What is the estimated average propensity to consume durables?
The average propensity to consume is simply $E[C]/E[Y] = 500/4000 = 0.125$

What is the estimated marginal propensity to consume durables?
The marginal propensity to consume is simply $dC/dY = 0.203$

What is the elasticity of durable spending at the mean values with respect to income?
The elasticity of spending at the mean is simply the ratio of marginal propensity to average propensity
Or $0.203/0.125 = 1.624$.

2. Another econometrician has estimated a different demand equation with the same data:
 $\log(\text{Real Consumer Durable Spending } (\$)) = 100.5 + 1.8 \times \log(\text{Real After-tax Household Income})$
Mean values: Durables, 500 ; Income, 4000

What is the estimated marginal propensity to consume durables?
The hard way to do this is to invert the log specification so you have the following :

$$C = \exp(100.5)Y^{1.8}$$
$$dC/dY = \exp(100.5)Y^{0.8}(1.8)$$

Another way to do this to multiply the elasticity times the average propensity to consume so the mpc is simply $1.8 * 0.125 = 0.225$.

What is the elasticity of durable spending with respect to income?
The elasticity of durable spending is simply $d\log(C)/d\log(Y) = 1.8$

Talk to your TA about the relative merits of each approach.

3. Explain why the price of a previously purchased 2-year zero-coupon bond drops when market rates of interest rise. A 2-year zero-coupon bond pays you \$1000 two years from now and nothing until then.

As interest rates rise future cash flows are worth less to you, so the price of future cash flows falls. As the price of a security is simply cash flows times their price, and the only cash flows from the bond are in two years, the price of the bond falls.

Compare this with a 3-year zero-coupon bond (which pays you \$1000 three years from now and nothing until then). Which price will fall more? Explain your answer.

The three year bond's price will fall more because when interest rates increase the price of cash flows two years from now falls less than the price of cash flows three years from now.
4. Briefly summarize the different motivations to hold money; explain why each may or may not be sensitive to the level of income or interest rates; show why the LM curve has the slope and shape indicated by theory (and your prior explanations.)

Speculative demand refers to money holdings related to speculation about future interest rates. If you think interest rates will rise (and consequently bond prices will fall) you may want to reduce your holdings of bonds to avoid a capital loss. Current interest rates really don't directly matter for speculative, but the difference between current and expected interest rate probably does matter.

Transactions demand refers to money holding related to the need for a medium of exchange in the purchase and sale of goods. Transactions demand only depends on the dollar value of output, and not the interest rate.

Precautionary demand refers to money holdings as a highly liquid form of insurance against negative shocks to your income or wealth. As interest rates increase, the cost of this insurance increases, so you may choose to purchase less of it by reducing your money holdings.

The LM curve is upward-sloping because as output rises, the transactions demand for money increases, which increases equilibrium interest rates in the money market. Consequently higher output leads to higher interest rates, and the curve has a positive slope.

Macro Model Building

A.

Behavioral equations

$$C = (5/6)[(2/3)(W+Int+Div)-Toth]$$

Note 5/6 is the mpc while 2/3 is 1-Tinc and Toth is lump-sum taxes

$$M_c = (1/5)(5/6)[(2/3)(W+Int+Div)-Toth]$$

$$W = 0.7GDP$$

$$Dep = 0.1GDP$$

$$Int = 0.1GDP$$

$$Div = 0.1GDP$$

$$I = 0.2GDP$$

$$M_I = 0.1GDP$$

$$G = 300$$

$$T = (1/3)*(W+Int+Div)+Toth$$

$$X = 200$$

Substitution

$$Z = C+I+G+X-M = C-M_c+I-M_I+G+X$$

$$C-M_c = (4/5)(5/6)[(2/3)(9/10)GDP-Toth] = (2/5)GDP-(2/3)Toth$$

$$I-M_I = 0.1GDP$$

$$Z = 0.5GDP-(2/3)Toth+G+X$$

Impose equilibrium $Z=GDP$

$$GDP = 2(G+X)-(4/3)Toth$$

Note Toth is zero here, implying $GDP = 2(G+X)$

Also note

$$T = (1/3)(9/10)GDP+Toth$$

b.

$$\text{GDP} = 2(300+200) = 1000$$

$$C = 500$$

$$I = 200$$

$$G = 300$$

$$X = 200$$

$$M_c = 100$$

$$M_I = 100$$

$$T = (3/10)\text{GDP} = 300$$

$$\text{Budget Deficit } G-T = 0$$

c.

$$\Delta X = 0$$

$$\Delta G = 75$$

$$\Delta \text{GDP} = 2\Delta G = 150$$

$$\Delta C = (1/2)\Delta \text{GDP} = 75$$

$$\Delta I = (1/5)\Delta \text{GDP} = 30$$

$$\Delta M_c = (1/5)\Delta C = 15$$

$$\Delta M_I = (1/10)\Delta \text{GDP} = 15$$

$$X = 200$$

$$G = 375$$

$$\text{GDP} = 1150$$

$$C = 575$$

$$I = 230$$

$$M_c = 115$$

$$M_I = 115$$

d.

Use equations above

$$\Delta G = 75$$

$$\Delta \text{Toth} = 75$$

$$\Delta X = 0$$

$$\Delta \text{GDP} = 2\Delta G - (4/3)\Delta \text{Toth}$$

$$= 150 - 100 = 50$$

$$\Delta C = (1/2)\Delta \text{GDP} - (5/6)\Delta \text{Toth}$$

$$= 25 - 62.5 = -37.5$$

$$\Delta I = (1/5)\Delta \text{GDP} = 10$$

$$\Delta M_c = (1/5)\Delta C = -7.5$$

$$\Delta M_I = (1/10)\Delta \text{GDP} = 5$$

$$G = 375$$

$$\text{Toth} = 75$$

$$\text{GDP} = 1050$$

$$C = 462.5$$

$$I = 210$$

$$M_c = 92.5$$

$$M_I = 105$$

e.

The balanced budget multiplier is simply derived using $\Delta G = \Delta \text{Toth} = \Delta x$

$$(2-4/3)\Delta x > 0$$

f.

The G multiplier is larger than the Toth multiplier as government spending directly increases output while Toth affects disposable spending, a fraction of which affects output through consumption.