Economics 302-001 Menzie D. Chinn
Spring 2012 Social Sciences 7418
University of Wisconsin-Madison

Midterm 1 Exam Answers

This exam is 70 minutes long, and is worth 70 points. Part I is multiple choice, Part II is a short answer, and Part III is a derivation. The points are allocated in proportion to the time you should spend on each problem. PLACE ALL YOUR ANSWERS IN THE BLUEBOOK.

PART I: Multiple Choice [20 minutes total, 2 points each]. Do NOT explain.

1. Suppose that we modify the IS-LM model in class so that money demand does not depend on the interest rate (i.e. h=0). Which of the following is true?
a) The LM curve is horizontal
b) There is no transactions crowding out
c) Compared to the standard IS/LM model with sloping curves, monetary policy is more effective
d) The LM is vertical
e) both (c) and (d) are true

2. If the GDP deflator is rising by -1% per year, and nominal GDP is rising by 0.5%, then
a) the inflation rate is negative.
b) real GDP growth is negative.
c) real GDP growth is 1.5%.
d) real output is shrinking by 0.5%
e) both (a) and (c) above.

3. A country's Gross Domestic Product
a) measures the total value of goods and services produced by the country's factors of production (land, labor, capital).
b) is the measure of that country's welfare.
c) is a measure of that country's wealth.
d) measures the total value of goods and services produced by factors of production (land, labor, capital) located within the borders of that country.
e) both (b) and (d) above.

4. In the standard IS-LM model with curves neither vertical nor horizontal, a contractionary fiscal policy and a contractionary monetary policy
a) necessarily causes output to decrease.
b) necessarily causes interest rates to rise.
c) necessarily causes interest rates to fall.
d) both (a) and (c) above.
e) none of the above.

5. In the IS-LM model studied in class, what behavioral assumption is necessary to ensure that the IS curve is downward sloping but not vertical?
a) The MPC is not 0
b) The marginal tax rate is not 1
c) Either consumption or investment depends on the interest rate
d) both (a) and (b)
e) both (a) and (c)

6. At the current interest rate, suppose the supply of money is greater than the demand for money. Given this information, we know that:
a. the interest rate will tend to fall.
b. the price of bonds will tend to rise.
c. the supply of bonds is greater than the demand for bonds.
d. the goods market is also in equilibrium.
e. both (a) and (b).

7. The balanced budget multiplier (for t_1=0)
a) is less than zero.
b) is always zero.
c) is one for government spending on goods and services.
d) is zero for government transfers.
e) both (c) and (d) above.

8. Transactions crowding out of income is greater:
a) the less the interest sensitivity of money demand.
b) the greater the interest sensitivity of money demand.
c) the greater the interest sensitivity of investment.
d) the greater the proportion of wealth people desire to hold as bonds.
e) both (a) and (c) above.

9. The money demand curve will shift to the right when which of the following occurs?
a) a reduction in the interest rate
b) an open market sale of bonds by the central bank
c) an increase in the interest rate
d) a decrease in income
e) none of the above

10. If money supply were shown to depend positively on the interest rate, then we would expect to see (relative to the situation with the usual money demand function)
a) a flatter IS curve.
b) a steeper LM curve.
c) a steeper IS.
d) a flatter LM curve.
e) a vertical LM curve.

PART II: Short Answers [15 minutes total]

1. (15 minutes) The CPI is calculated for a fixed market basket. It measures the change in the cost of the market basket from the base year until the current year. An index with the market basket fixed in the first year, like the CPI, is called a Laspeyres index. An alternative index, the Paasche Index, is based on a market basket in the end year. It measures the change in the cost of a market basket fixed in the end year. Suppose that the base is 2010, and further that the market basket contains only two items, wine and cheese, and the quantities consumed in 2010 and 2011 are

	wine	cheese
2010	50 bottles	100 wheels
2011	45 bottles	150 wheels

Suppose that the price of cheese increases from \$1.00 per wheel of cheese in 2010 to \$1.20 per wheel in 2011 and the price of wine increases from \$0.50 per bottle to \$2.00 per bottle.

1.1 (5 minutes) Calculate the value of the Laspeyres index for 2011.

The Laspeyres price index for 2011 is 100*[(cost of base year basket in 2011) / (cost of base year basket in base year)]:

$$Laspeyres_{2011} = 100 \times \left(\frac{100 \times \$1.20 + 50 \times \$2}{100 \times \$1.00 + 50 \times \$.50} \right) = 176$$

1.2 (5 minutes) Calculate the 2011 inflation rate for the Laspeyres index.

Since 2010 is the base year, the Laspeyres price index is normalized to 100 for 2010. So, the rate of inflation using the Laspeyres index is:

$$Inflation = \frac{P_{new} - P_{old}}{P_{old}} = \frac{176 - 100}{100} = .76, \text{ or } 76\%$$

1.3 (5 minutes) Will inflation calculated using the Laspeyres index always exceed inflation calculated with the Paasche index? (Hint: Use standard indifference curve analysis.)

Yes, in general. Consumers will substitute away from goods that are relatively more expensive to goods that are relatively cheaper. Therefore, it will be more expensive to buy the original basket than the new basket and so Laspeyres will exceed Paasche when there is inflation.

PART III: Derivation [35 minutes total]

Suppose the real side of a closed economy was described by the following equations:

$Y = Z$	Equilibrium condition
$Z \equiv C + I + G$	Definition of aggregate demand
$C = c_0 + c_1 Y_D - c_2 i$	Consumption function
$Y_d \equiv Y - T$	Def'n of disposable income

$T = t_0 + t_1 Y$	Tax function
$I = b_0 + b_1 Y - b_2 i$	Investment function
$G = GO_0$	Government purchases spending

Where the standard LM curve is in place, *viz.*, $i = \left(\frac{\mu_0}{h}\right) - \left(\frac{1}{h}\right)\left(\frac{M_0}{P}\right) + \left(\frac{1}{h}\right)Y$

Answer the following questions, showing your work, and "boxing in" your answers.

1. (5 points) Derive the IS curve, with Y as a function of i.

The IS curve is:

$$Y = Z$$
$$Y = C + I + G$$
$$Y = \left[c_0 + c_1\left(Y(1-t_1) - t_0\right) - c_2 i\right] + \left[b_0 + b_1 Y - b_2 i\right] + GO_0$$
$$Y = c_0 + c_1(1-t_1)Y - c_1 t_0 - c_2 i + b_0 + b_1 Y - b_2 i + GO_0$$

Let $\Lambda_0 = c_0 - c_1 t_0 + b_0 + GO_0$

$$Y - c_1(1-t_1)Y - b_1 Y = \Lambda_0 - (c_2 + b_2)i$$
$$Y\left[1 - c_1(1-t_1) - b_1\right] = \Lambda_0 - (c_2 + b_2)i$$
$$Y = \left[\frac{1}{1 - c_1(1-t_1) - b_1}\right]\left(\Lambda_0 - (c_2 + b_2)i\right)$$

2. (5 points) Solve for equilibrium income.

Plugging in i from the given LM equation to the above IS expression gives the intersection:

$$Y\left[1 - c_1(1-t_1) - b_1\right] = \Lambda_0 - (c_2 + b_2)i$$
$$Y\left[1 - c_1(1-t_1) - b_1\right] = \Lambda_0 - (c_2 + b_2) \times \left[\left(\frac{\mu_0}{h}\right) - \left(\frac{1}{h}\right)\left(\frac{M_0}{P}\right) + \left(\frac{1}{h}\right)Y\right]$$
$$Y\left[1 - c_1(1-t_1) - b_1 + (c_2 + b_2)/h\right] = \Lambda_0 - (c_2 + b_2) \times \left[\left(\frac{\mu_0}{h}\right) - \left(\frac{1}{h}\right)\left(\frac{M_0}{P}\right)\right]$$
$$Y_0 = \left(\frac{1}{1 - c_1(1-t_1) - b_1 + (c_2 + b_2)/h}\right) \times \left\langle \Lambda_0 - (c_2 + b_2) \times \left[\left(\frac{\mu_0}{h}\right) - \left(\frac{1}{h}\right)\left(\frac{M_0}{P}\right)\right]\right\rangle$$

Let

$$\hat{\gamma} \equiv \left(\frac{1}{1 - c_1(1-t_1) - b_1 + (c_2 + b_2)/h}\right)$$

3. (5 points) What is the lump sum tax multiplier in this economy? Be sure to show your work.

Substitute out for Λ_0, and take a total differential:

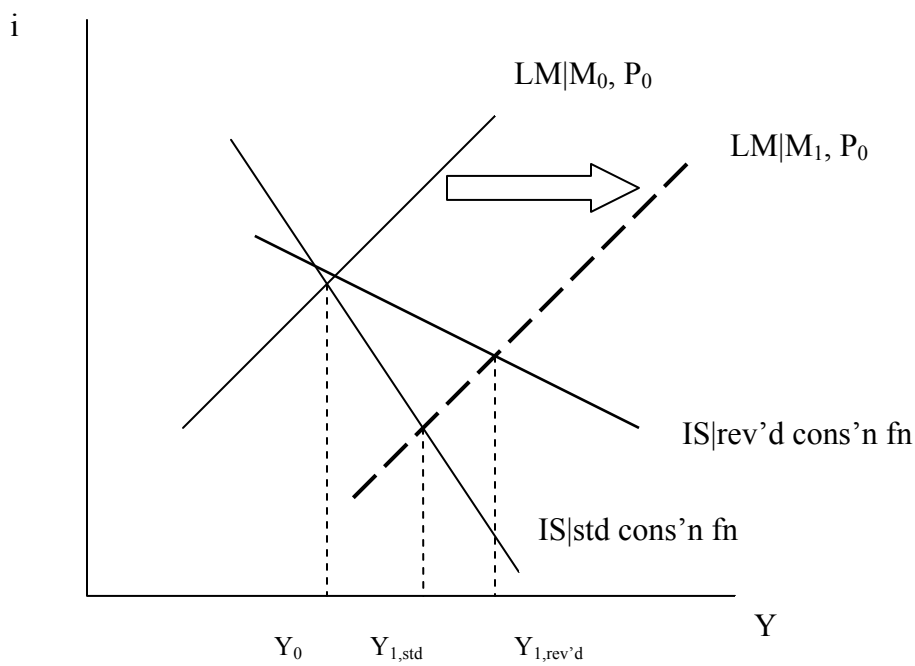
$$Y_0 = \hat{\gamma}\left\langle [c_0 - c_1 t_0 + b_0 + GO_0] - (c_2 + b_2) \times \left[\left(\frac{\mu_0}{h} \right) - \left(\frac{1}{h} \right) \left(\frac{M_0}{P} \right) \right] \right\rangle$$

$$\Delta Y = \hat{\gamma}\left\langle [\Delta c_0 - c_1 \Delta t_0 + \Delta b_0 + \Delta GO] - (c_2 + b_2) \times \left[\Delta\left(\frac{\mu_0}{h} \right) - \left(\frac{1}{h} \right) \Delta\left(\frac{M_0}{P} \right) \right] \right\rangle$$

$$\Delta Y = \hat{\gamma}\langle - c_1 \Delta t_0 \rangle$$

$$\frac{\Delta Y}{\Delta t_0} = -\hat{\gamma} c_1$$

4. (10 points) Is monetary policy more, or less, effective in this model as compared to the model with a standard consumption function where consumption depends only on disposable income. Be sure to *explain* the economics of your answer, using a *diagram*.



The slope of the IS curve is flatter than in the standard case; it is $-\frac{1 - c_1(1 - t_1) - b_1}{c_2 + b_2}$, as compared to $-\frac{1 - c_1(1 - t_1) - b_1}{b_2}$. Hence, an increase in government spending will increase income from Y_0 to $Y_{1,rev'd}$, instead of $Y_{1,std}$. The reason monetary policy is more effective in this model is because there are

now two channels for output to affect (consumption and investment), instead of one (investment).

5. (10 points) Is fiscal policy more, or less, effective in this as compared to the model with a standard consumption function. Be sure to *explain* the economics of your answer, using *equations.*

Recall the solution for equilibrium income:

$$Y_0 = \hat{\gamma}\left\langle [c_0 - c_1 t_0 + b_0 + GO_0] - (c_2 + b_2) \times \left[\left(\frac{\mu_0}{h} \right) - \left(\frac{1}{h} \right) \left(\frac{M_0}{P} \right) \right] \right\rangle$$

Take the total differential:

$$\Delta Y = \hat{\gamma}\left\langle [\Delta c_0 - c_1 \Delta t_0 + \Delta b_0 + \Delta GO] - (c_2 + b_2) \times \left[\Delta \left(\frac{\mu_0}{h} \right) - \left(\frac{1}{h} \right) \Delta \left(\frac{M_0}{P} \right) \right] \right\rangle$$

Set all changes in autonomous spending to zero, with the exception of government spending. Also hold monetary policy to be constant.

$$\Delta Y = \left(\frac{1}{1 - c_1(1 - t_1) - b_1 + (c_2 + b_2)/h} \right) \times [\Delta GO]$$

$$\frac{\Delta Y}{\Delta GO} = \left(\frac{1}{1 - c_1(1 - t_1) - b_1 + (c_2 + b_2)/h} \right) < \left(\frac{1}{1 - c_1(1 - t_1) - b_1 + b_2/h} \right)$$

In this case, there are two interest sensitive components of aggregate demand, so when interest rates rise due to increased transaction demand for money, then two components of aggregate demand are crowded out.

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