

Economics 132.03
Principles of Macroeconomics
Spring 2009

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<http://www2.bc.edu/~irelandp/ec132.html>

Final Exam

This exam has 12 questions on 5 pages; before you begin, please check to make sure your copy has all 12 questions and all 5 pages. Each of the 12 questions will receive equal weight in determining your overall exam score. You can work on the questions in any order, but please be sure to keep your answers to all of the parts of a specific question together in your exam book.

1. Macroeconomists sometimes think about the determinants of a nation's standard of living with the help of an "aggregate production function" such as

$$Y = AF(L,K,H,N),$$

where Y denotes real GDP, L the number of workers, K the stock of physical capital, H the stock of human capital, N the stock of natural resources, and A the stock of technological knowledge.

- a. What does it mean to say that holding the stock of technological knowledge fixed, the aggregate production function has the property of constant returns to scale?
- b. Assuming that this aggregate production function has this property of constant returns to scale, rewrite the equation from above as one that shows how productivity (output per worker) depends on four determinants: physical capital per worker, human capital per worker, natural resources per worker, and the stock of technological knowledge.
- c. The British economist Thomas Robert Malthus (1766-1834) famously predicted that because natural resources are limited, population growth would inevitably lead to declining standards of living, perhaps to the point that societies are doomed to suffer from chronic poverty. Explain *briefly* (no more than a sentence or two), how Malthus' reasoning is reflected in your equation from part (b) above.
- d. Thankfully, Malthus' prediction has proven to be far too pessimistic; instead of declining towards poverty, living standards in many countries around the world have grown enormously over the past 200 years. According to your equation from part (b) above, what economic factors allow for rising productivity and living standards, even as supplies of natural resources dwindle over time?

2. In 1980, the nominal interest rate in the US economy was 10 percent and the inflation rate was 8 percent. In 1990, the nominal interest rate was 7 percent and the inflation rate was 3 percent.
 - a. Assuming that the nominal interest rates quoted above apply to both borrowing and saving, during which year was it more costly in real terms to borrow: 1980 or 1990?
 - b. During which year was it more rewarding in real terms to save: 1980 or 1990?

3. During the first three months of 2009, the number of American workers counted by the Bureau of Labor Statistics as being employed decreased by 2,451,000 (that is, by almost 2 1/2 million) yet, over the same period, the number of American workers counted by the BLS as being unemployed increased by only 2,053,000 (that is, by just a little more than 2 million).
 - a. Explain *briefly* (no more than a sentence or two) how these two numbers can be consistent with one another.
 - b. In light of the two statistics given above, would you say that the rise in the unemployment rate from 7.2 percent to 8.5 percent during the first three months of 2009 overstates or understates the severity of the recession as felt by US workers?
 - c. If the US labor market begins to recover later this year, which would you expect to be larger in magnitude: the size of the increase in the number of workers who are counted as employed or the size of the decrease in the number of workers who are counted as unemployed?

4. Consider an economy in which people hold all of their money in the form of deposits and therefore do not hold currency. Suppose that all banks in this economy hold 10% of their deposits as reserves. And suppose that in this economy, the central bank decides to conduct an open market operation in which it purchases \$100 in government bonds.
 - a. Will this open market operation work to increase or decrease the money supply?
 - b. Once the entire process through which the banking system accepts additional deposits and makes new loans as a result of this open market operations comes to an end, by how much will the total amount of reserves have changed?
 - c. Once the entire process through which the banking system accepts additional deposits and makes new loans as a result of this open market operations comes to an end, by how much will the total money supply have changed?
 - d. Once the entire process through which the banking system accepts additional deposits and makes new loans as a result of this open market operations comes to an end, by how much will the total amount of deposits have changed?
 - e. Once the entire process through which the banking system accepts additional deposits and makes new loans as a result of this open market operations comes to an end, by how much will the total amount of loans have changed?

5. Suppose that the Federal Reserve decides to conduct monetary policy by setting a target Res^* for reserves, conducting open market operations to supply Res^* dollars in reserves to the banking system, and then accepting whatever outcome for the federal funds rate works to equate that fixed (inelastic) supply of reserves with banks' demand for reserves.
- Draw a supply-and-demand diagram for the market for reserves that shows how the federal funds rate gets determined under this monetary policy strategy.
 - Suppose that the Federal Reserve continues to follow this "reserve targeting" strategy, but decides to conduct another open market operation that increases the fixed supply of reserves from Res^* to a larger amount Res^{**} . Does this open market operation work to raise the federal funds rate, lower the federal funds rate, or keep the federal funds rate unchanged?
 - What happens to the total money supply (currency plus deposits) after this open market operation: does it go up, go down, or stay the same?
6. Suppose that at the beginning of the business day, the First National Bank's balance sheet looks like this:

First National Bank	
Assets	Liabilities
Reserves \$10 Loans \$90 Other assets \$10	Deposits \$100 Shareholder's equity \$10

- What reserve ratio has the bank chosen?
- If, during the business day, the bank experiences no problems with its loans but experiences a \$50 deposit outflow, that is, a situation in which the bank's depositors ask to withdraw \$50 from their accounts, is the bank "illiquid" or "insolvent?"
- Suppose that the bank borrows \$45 in the "federal funds market" to cope with this deposit outflow. Is it borrowing from another bank or from the Federal Reserve?
- Draw a diagram similar to the one above that shows what the bank's balance sheet looks like after it has experienced the \$50 deposit outflow as in part (b) and borrowed \$45 as in part (c).

7. This question asks you to use microeconomic supply and demand analysis applied to the market for money to consider the long-run effects of a **decrease** in the money supply.
- To begin, draw a diagram with the quantity of money measured in dollars on the x-axis and the “goods price of money” measured as $1/P$, where P is the economy-wide price level, on the y-axis. Then draw in a demand curve for money.
 - Assuming for simplicity that the Federal Reserve is able to fix the money supply at some initial level M^* , draw in the supply curve for money.
 - Show what happens in the graph when the Federal Reserve acts to decrease the money supply to a new, lower level M^{**} .
 - What happens to the price level P as a result of this decrease in the money supply?
8. Suppose that the money supply is \$100, the velocity of money is 4, and real GDP is 200.
- What is nominal GDP?
 - What is the price level (the GDP deflator)?
 - Assuming that the velocity of money is constant, what will nominal GDP equal if the Fed acts to increase the money supply to \$200?
 - Assuming that the velocity of money is constant and that “money is neutral in the long run,” what will real GDP equal in the long run if the Fed acts to increase the money supply to \$200?
 - Still assuming that the velocity of money is constant and that money is neutral in the long run, what will the price level equal in the long run if the Fed acts to increase the money supply to \$200?
9. Suppose that two countries have before-tax real interest rates, inflation rates, and tax rates on nominal interest income as follows:

Country	A	B
Before-tax real interest rate	4%	4%
Inflation rate	0%	4%
Tax rate on nominal interest income	50%	50%

- Find the before-tax nominal interest rates in countries A and B.
- Find the after-tax nominal interest rates in countries A and B.
- Find the after-tax real interest rates in countries A and B.
- Notice that both countries have the same before-tax real interest rates and the same tax rates on nominal interest income. In which country are the incentives (rewards) for private saving stronger: country A with low inflation or country B with high inflation?

10. For each part of this question, please indicate whether the fact mentioned helps explain why, in the aggregate demand/aggregate supply diagram: (i) the aggregate demand curve slopes down, (ii) the long-run aggregate supply curve is vertical, or (iii) the short-run aggregate supply curve slopes up.
- Firms and workers negotiate wages based on their price expectations, then those wages remain “sticky” for a period of time.
 - Money is neutral in the long run.
 - Some firms set their individual prices based on their expectations of the prices of all goods and services that they think will prevail economywide, then those prices remain “sticky” for a period of time.
 - When the real value of monetary wealth rises, some consumers buy more goods and services.
 - When the real value of monetary wealth rises, other consumers buy more bonds.
11. For each part of this question, please indicate whether the event works initially (that is, in the short run) in the aggregate demand/aggregate supply diagram to shift the (i) aggregate demand curve, (ii) the long-run aggregate supply curve, or (iii) the short-run aggregate supply curve.
- Expectations of future inflation rise, so that employers have to pay higher wages.
 - Housing prices rise rapidly, as they did in the US during the first half of the current decade.
 - The Federal Reserve lowers its target for the federal funds rate.
 - Business owners become less confident about future prospects for the US economy.
 - The US Congress and President pass a “stimulus package” that calls for large increases in government purchases.
12. Suppose that the economy starts in a long-run equilibrium.
- Draw the aggregate demand/aggregate supply diagram to illustrate this initial state of the economy, showing the aggregate demand curve together with both the short-run and the long-run aggregate supply curves.
 - Now suppose that stock prices fall sharply, as they have in the US over the past year. Use the diagram to show what happens to output and the price level in the short run.
 - Suppose that there are no changes in monetary or fiscal policy. If the decline in the stock market turns out to be only temporary, so that equity prices soon return to their previous levels, what will happen in the diagram to bring output back to its natural rate? What happens to the price level in the long run as a result?
 - If there are no changes in monetary or fiscal policy, but the fall in stock prices turns out to be permanent, what will happen in the diagram to bring output back to its natural rate? What happens to the price level in the long run in this case?