

Economics 132.03
Principles of Macroeconomics
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<http://www2.bc.edu/~irelandp/ec132.html>

Solutions to Second Midterm Exam

1. Suppose that you are an investment advisor and, after checking the latest interest rates in the bond market, you collect the following information:

Issuer	Maturity Date	Interest Rate (per year)
US Government	December 2008	1.75%
US Government	December 2028	4.50%
General Motors	February 2038	11.00%
General Electric	February 2038	6.25%
State of Massachusetts	December 2028	3.25%

Explain briefly (no more than a sentence or two for each case) which of these bonds you would recommend, and why, to a client who tells you:

- a. "I'm saving for retirement, so I won't need the money for many years, but above all I don't want to risk losing my money."

An investor who wants to minimize risk ought to buy a US Government bond; but if the money won't be needed for awhile, he or she can earn a higher return by buying the long-term government bond. He or she should buy the US Government bond that matures in December 2028.

- b. "I'm saving to buy a new house. I may need the money next year, and I don't want to take any risk either."

Again, the investor who wants to minimize risk ought to buy a US Government bond; but if the money is needed next year, he or she should probably buy the short-term bond. He or she should buy the US Government bond that matures in December 2008.

- c. "I'm in a high federal income tax bracket and would really benefit from a tax break on the income from my savings."

Although municipal bonds, issued by state and local governments, offer lower interest rates, their interest payments are exempt from the federal income tax. This investor should buy the bond issued by the State of Massachusetts.

- d. "I want to aim for a high return and don't care if that means taking on a lot of risk."

This investor should buy the bond issued by General Motors, since it pays the highest interest rate, even though it has the highest default risk.

- e. "I want a decent return and am willing to tolerate some risk, but not too much risk."

This investor should buy the bond issued by General Electric, which is a bit riskier than the US Government bond, but less risky than the General Motors bond, and still pays a decent interest rate.

2. Consider a closed economy in which GDP equals \$15 billion, consumption equals \$9 billion, government purchases equal \$2 billion, and tax revenue equals \$1 billion. Use this information to answer the following questions (*note*: if you show your calculations and use the correct formulas, we can give you partial credit even if you make a mistake with the arithmetic):
- a. What is investment equal to in this economy?

In a closed economy, net exports are zero, so that the national income accounting identity implies

$$Y = C + I + G \text{ or } I = Y - C - G.$$

Plugging in the numbers that are given yields

$$I = \$15 \text{ billion} - \$9 \text{ billion} - \$2 \text{ billion} = \$4 \text{ billion}.$$

- b. What is national saving equal to in this economy?

In a closed economy, national savings equals $Y - C - G$, which, as shown above, also equals investment. The answer that national saving equals \$4 billion therefore follows immediately.

- c. What is public saving equal to in this economy?

Using

$$\text{National Saving} = S = I = Y - C - G = (Y - C - T) + (T - G) = \text{Private Saving} + \text{Public Saving}$$

one can use the numbers that are given to calculate

$$\text{Public Saving} = T - G = \$1 \text{ billion} - \$2 \text{ billion} = -\$1 \text{ billion}.$$

Public saving is negative because the government is running a budget deficit.

- d. What is private saving equal to in this economy?

Again, plugging in the numbers that are given,

$$\text{Private Saving} = Y - C - T = \$15 \text{ billion} - \$9 \text{ billion} - \$1 \text{ billion} = \$5 \text{ billion.}$$

- e. What are net exports equal to in this economy?

In a closed economy, imports, exports, and net exports are always zero.

3. Suppose that after the 2008 elections, the new President and Congress act to cut government spending and, by doing so, eliminate the current federal government budget deficit.
- a. Does this change in policy shift the demand curve or the supply curve in the market for loanable funds?

This change in policy increases public saving, by making public saving zero instead of negative. Since saving relates to the supply of loanable funds, the supply curve for loanable funds shifts.

- b. Use a supply-and-demand diagram for loanable funds to show in which direction the relevant curve shifts.

The graph should show the supply curve for loanable funds shifting to the right: there are more funds supplied at any given interest rate.

- c. Does the interest rate rise or fall as a result of this change in policy?

The interest rate falls.

- d. What happens to private investment as a result of this change in policy?

The equilibrium quantity of loanable funds increases, and so does investment. Another way to describe this is to say that as the interest rate falls, households buy more new houses and firms buy more new capital equipment so that, again, private investment rises.

- e. What effect would this policy have on the productivity of US workers?

Private investment adds to the stock of physical capital and thereby raises the productivity of US workers.

4. Suppose that you are the CEO of a large corporation, and one of your vice presidents finds an investment project that costs \$100 million today, but promises to pay off \$200 million 7 years from now.
- a. Write down a formula for the present value of the \$200 million that your firm stands to receive from the project 7 years from now, assuming that the interest rate is 10 percent per year (*note*: all you need to do for this part is to write down the formula, since actually

computing the numerical value of this present value isn't possible without the help of a calculator).

Present value of \$200 million received 7 years from now = $(\$200 \text{ million}) / (1+0.10)^7$

- b. Suppose the present value from part (a) turns out to be greater than \$100 million. Should you use your corporation's funds to undertake the project?

Yes.

- c. Suppose that the interest rate falls to 5 percent per year between the time that the vice president alerts you to the project and the time at which you actually have to make the decision of whether to undertake the project. Would that change the answer that you gave in part (b) above: yes, no, or maybe?

No, the answer will not change. If the interest rate falls, the present value will go up even more. If the project deserves to be funded at the 10 percent interest rate, it will also deserve to be funded at the lower interest rate.

5. Legend has it that Peter Minuit, a Dutch official working in the colony of New Netherland, which stretched along the Northeast US coastline from what is now Rhode Island down to what is now New Jersey, purchased the island of Manhattan from a group of Native Americans 382 years ago, in 1626, for the equivalent of \$24. Assuming that those \$24 were invested at an interest rate of 7 percent per year, write down a formula that shows how much money the Native American sellers would have today, if they took advantage of compounding by leaving all of the money in the bank, earning interest over time on the previous years' interest payments as well as the original amount deposited (*note*: again, all you need to do here is to write down the formula, since actually computing the numerical value isn't possible without the help of a calculator).

Future Value in 382 Years of \$24 received Today (i.e., in 1626) = $\$24 \times (1+0.07)^{382}$

6. Please answer these short-answer questions:
- a. Some insurance company executives worry that once a driver buys automobile insurance, he or she will become a less careful driver, more likely to have an accident. Are they describing the problem of *adverse selection* or the problem of *moral hazard*?

Moral hazard.

- b. Some insurance company executives worry that drivers who tend to drive less carefully are more likely to buy automobile insurance than drivers who tend to drive more safely. Are they describing the problem of *adverse selection* or the problem of *moral hazard*?

Adverse selection.

- c. Some investment advisors argue that stock prices tend to move randomly and are impossible to predict. Do these advisors believe in the *efficient markets hypothesis* or in *market irrationality*?

The efficient markets hypothesis.

- d. Some investment advisors argue that waves of optimism or pessimism can push stock prices above or below their true intrinsic values, and that savers can profit by buying undervalued stocks. Do these advisors believe in the *efficient markets hypothesis* or in *market irrationality*?

Market irrationality.

- e. Some investment advisors point out that when a firm's future prospects improve, the price of that firm's stock usually rises right away, when the news is released, and not later on, when the firm's profits actually do improve. Does this fact support the *efficient markets hypothesis* or the theory of *market irrationality*?

The efficient markets hypothesis.

7. Consider a very simple economy in which there are only 20 people of age 16 or over. Eight are working at jobs, two do not have jobs but are actively looking, six are full-time students who are not looking for jobs and have not done so at any time in the past month, and four are retired people who are not looking for jobs and have not done so at any time in the past month. Using the same definitions employed by the Bureau of Labor Statistics, please answer the following questions (*note*: if you show your calculations and use the correct formulas, we can give you partial credit even if you make a mistake with the arithmetic).
- a. How large is the labor force in this economy?

The labor force consists of ten people: the eight people who are employed and the two people that are unemployed, that is, who don't have jobs but are actively looking.

- b. What is the unemployment rate?

$$\text{Unemployment Rate} = (\text{Unemployed Workers})/(\text{Labor Force}) \times 100 = (2/10) \times 100 = 20\%$$

- c. What is the labor force participation rate?

$$\text{Labor Force Participation Rate} = (\text{Labor Force})/(\text{Total Adult Population}) \times 100 = (10/20) \times 100 = 50\%$$

8. Consider each of the following labor-market developments. In each case, indicate whether the event raises or lowers the natural rate of unemployment, and whether that effect arises because of a change in the amount of frictional unemployment or because of a change in the amount of structural unemployment.

- a. More firms start paying “efficiency wages.”

This increases the natural rate of unemployment by increasing the amount of structural unemployment.

- b. The internet makes it easier for firms to advertise their job openings and for unemployed workers to find job openings.

This decreases the natural rate of unemployment by decreasing the amount of frictional unemployment.

- c. Labor unions successfully organize workers in new industries.

This increases the natural rate of unemployment by increasing the amount of structural unemployment.

- d. More and more consumers switch from Dell and Hewlett-Packard’s laptop computers, and buy Apple’s instead.

This increases the natural rate of unemployment by increasing the amount of frictional unemployment.

- e. Government training programs help unemployed people who lost their jobs in declining industries to acquire new skills.

This decreases the natural rate of unemployment by decreasing the amount of frictional unemployment.

9. Draw a supply-and-demand diagram for the labor market to show what happens when the government sets the minimum wage above the equilibrium wage; then use that diagram to answer the following questions:

Please see the diagram on the next page.

- a. What happens to the wages paid to workers who remain employed?

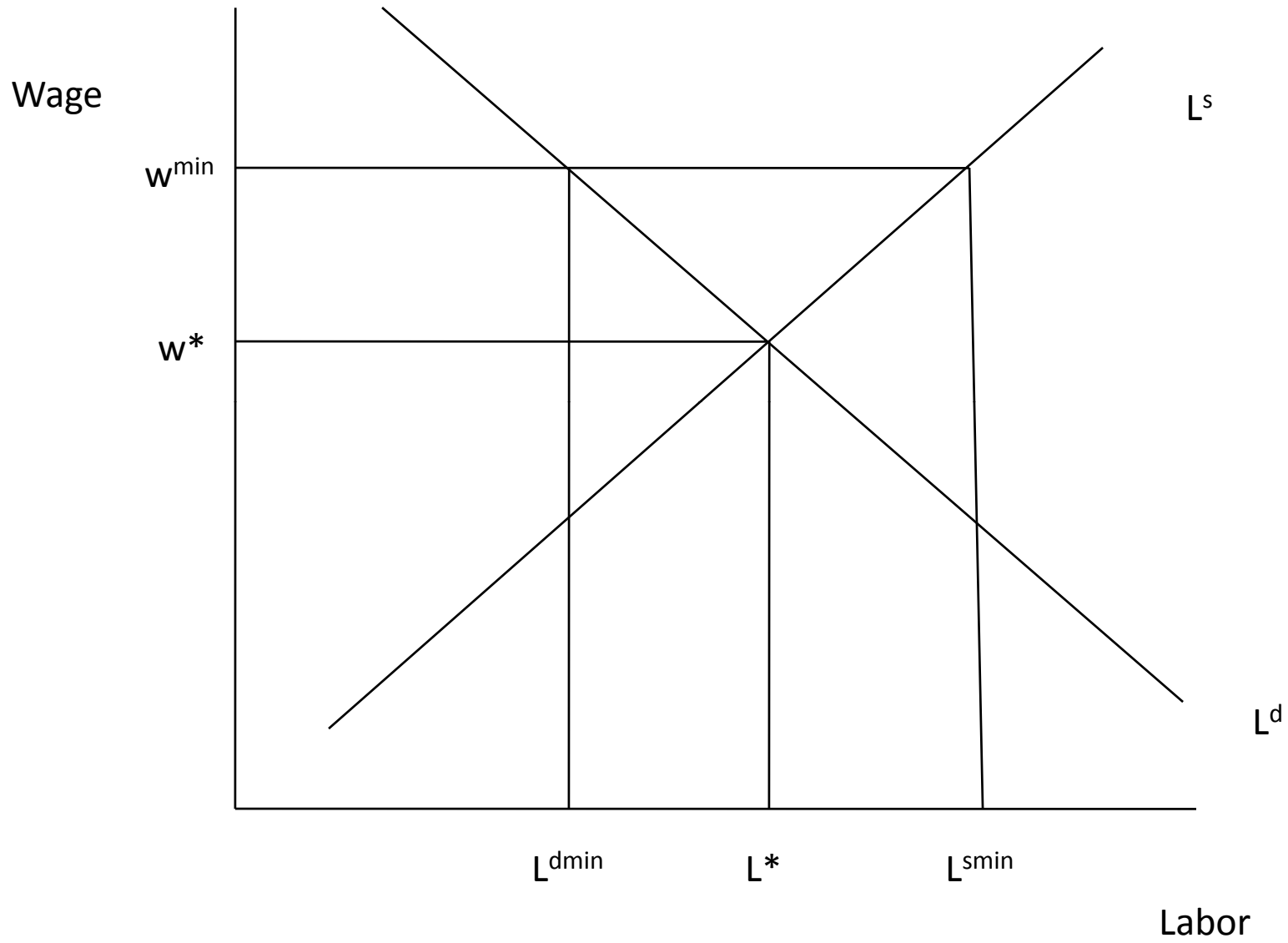
The wage rises from w^* to w^{\min} .

- b. What happens to the number of workers who are actually employed?

Employment falls from L^* to L^{\min} .

- c. What happens to the number of workers who would like to work at the prevailing wage?

The number of workers who would like to work rises from L^* to L^{\min} .



- d. What happens to the number of workers who would be classified by the Bureau of Labor Statistics as unemployed?

The number of workers who would be classified as unemployed rises from zero to $L^{smin} - L^{dmin}$.

10. Consider an economy in which the following assets are available:

Asset	Dollar Value Outstanding
Currency	\$7
Demand Deposits	\$3
Savings Deposits	\$20
Money Market Mutual Funds	\$8
Time Deposits (Certificates of Deposit)	\$11
Short Term Government Bonds	\$21
Stock Market Mutual Funds	\$50

- a. What is the value of M1 for this economy? (Notes: if you show your calculations and use the correct formulas, we can give you partial credit even if you make a mistake with the arithmetic. Also, please assume that if a particular asset from the actual US economy is not shown above, then there is none of that asset available in this economy.)

M1 = Currency + Demand Deposits = \$7 + \$3 = \$10.

- b. What is the value of M2 for this economy?

M2 = M1 + Savings Deposits + Money Market Mutual Funds + Time Deposits = \$10 + \$20 + \$8 + \$11 = \$49.

11. Consider an economy in which, initially, there are no banks. Suppose that one consumer initially holds the economy's entire money supply, in the form of \$100 in currency. Then a new bank – call it the First National Bank – opens, and the consumer deposits the entire \$100.

- a. Assuming that the First National Bank has a 100 percent reserve ratio, use a T-account to show what effect this deposit has on the Bank's balance sheet.

First National Bank	
Assets	Liabilities
Reserves \$100	Deposits \$100

- b. Still assuming a 100 percent reserve ratio, explain what effect this deposit will have on the economy's total money supply.

With a 100 percent reserve ratio, the deposit has no effect on the total money supply, it simply means that the money supply is held in the form of deposits instead of currency.

- c. Show how the First National Bank's T-account will look if, instead, it chooses a 10 percent reserve ratio.

First National Bank	
Assets	Liabilities
Reserves \$10 Loans \$90	Deposits \$100

- d. Assuming that many other banks open up, all choosing the same 10 percent reserve ratio, and assuming that every consumer now chooses to hold all of his or her money as deposits instead of currency, explain what effect the initial deposit will eventually have on the total money supply.

Under these assumptions, banks will end up with \$100 in reserves and the money multiplier will equal 10. The total money supply will equal \$1000.

- e. Are consumers as a group wealthier when the banking system chooses a 10 percent reserve ratio?

No. Before the fractional banking system opens, one consumer held \$100 in currency. After the fractional banking system opens, consumers as a group hold \$1000 in deposits, but also owe \$900 to the banks; their wealth remains equal to \$100. In other words, consumers as a group are more liquid but not more wealthy.

12. Suppose that the Federal Reserve conducts an open market operation in which it purchases \$10 million in US Government bonds.

- a. Will this open market operation increase or decrease the money supply?

Since the Fed is purchasing the US Government bonds with "newly printed money," the open market operation will increase the money supply.

- b. If there were no banks in the US economy, by how much will the money supply change?

If there were no banks in the US economy, the change in the money supply would consist entirely of a change in currency and the money supply would increase by \$10 million.

- c. Given that there are banks in the US economy, is the actual change in the money supply likely to be larger or smaller than the answer you gave in part (a) above?

With banks, at least some of the additional \$10 million will be deposited and, because of the money multiplier, the money supply will increase by even more than \$10 million.