

**Finance 30220**  
**Practice Midterm #2**

1) Suppose that you observe the following yield curve:

Term	Annual Yield
90 Day	1.5%
180 Day	2%
1 year	2.25%
2 year	2.75%
3 year	3%
4 year	3.5%
5 year	4.5%

a) Calculate the price of a 90 day T-Bill with \$1000 of face value.

$$i = \left( \frac{1.5}{100} \right) \left( \frac{90}{365} \right) = .0037$$

$$P = \left( \frac{1000}{1.0037} \right) = \$996.31$$

b) Suppose that inflation is expected to be 1.2% over the coming year. Calculate the real return on a 180 day T-Bill.

$$r = i - \pi = 2 - 1.2 = .8\%$$

Or

$$1 + r = \left( \frac{1 + i}{1 + \pi} \right) = \left( \frac{1.02}{1.012} \right) = 1.0079 = .79\%$$

c) Calculate the price of a 3 year T-Note with \$1,000 of face value and a 4% annual interest payment using the current yield curve.

$$P = \frac{40}{1.0225} + \frac{40}{(1.0275)^2} + \frac{1,040}{(1.03)^3} = 39.11 + 37.88 + 951.75 = \$1,028.74$$

d) Assuming a zero liquidity premium, calculate the market's expectation of the 1 year interest rate 3 years from now.

$$1 + i = \frac{(1.035)^4}{(1.03)^3} = 1.05 = 5\%$$

2) Explain the difference between the following:

a) Savings vs. Investment

Savings represents households shifting their wealth across time by lending or borrowing while investment represents firms purchasing new capital equipment. Savings is the inflow into financial markets while investment is the outflow.

b) Income vs. Wealth

Income is your annual earnings while wealth is the present discounted value of your expected lifetime earnings. Note that consumption decisions are based on wealth while savings decisions are based on income.

c) Money vs. Income

Income represents your compensation for the sale of either labor or capital services. Money is the portion of your income held in a liquid non-interest bearing asset that can be used to buy goods and services.

3) The Acme Widget Co. has the following technology for widgets.

# of Fabricators	# of Widgets (per yr)	MPK	VMPK = P*MPK
1	250	<b>250</b>	<b>500</b>
2	490	<b>240</b>	<b>480</b>
3	610	<b>120</b>	<b>240</b>
4	710	<b>100</b>	<b>200</b>
5	790	<b>80</b>	<b>160</b>
6	850	<b>60</b>	<b>120</b>
7	890	<b>40</b>	<b>80</b>

Fabricators cost \$1000 apiece while the widgets can be sold for \$2 apiece. Fabricators depreciate at a rate of 15% per year and the nominal interest rate is 5%.

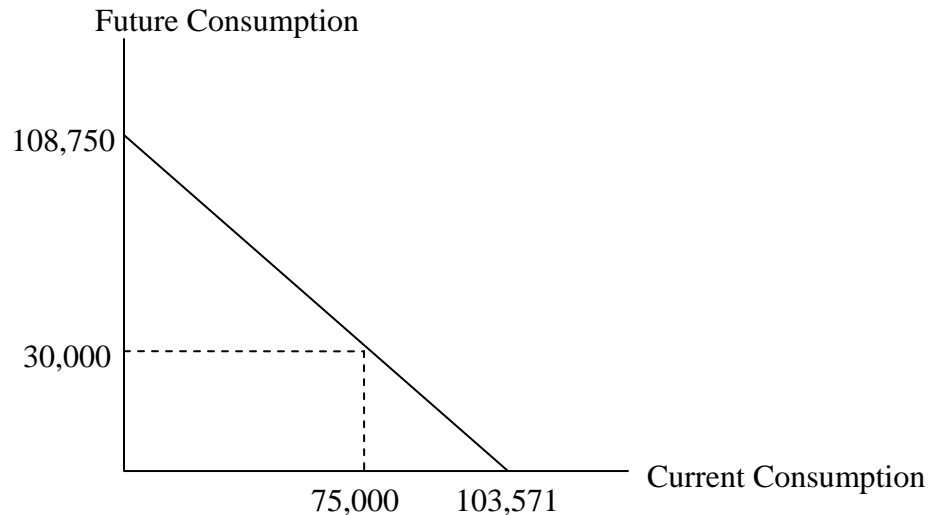
a) Calculate the value marginal product of capital and the user cost.

b) How many fabricators should the widget company purchase?

$$UC = \$1,000(.05 + .15) = 200 \Rightarrow \text{Purchase 4 fabricators}$$

4) Suppose that you work for IBM and you are one year away from retirement. You are currently earning \$75,000 per year, but you expect your retirement income to be \$30,000 per year. You can borrow and lend at 5% per year and there is no inflation. Further, assume that the price level is \$1.

a) Sketch your budget set for spending this year and next year. Be sure to label the relevant points. Would you most likely be a borrower or a lender? Explain.



With a level of current income that is high relative to overall wealth, you will most likely be a saver ( $S > 0$ )

b) How would an increase in the interest rate effect your decision in (a)?

An increase in the interest rate has two potentially offsetting effects:

Substitution effect: Higher interest rates increase the incentive to save – this should increase savings.

Income Effect: Higher interest rates make you, as a saver, wealthier – this should cause you to save less.

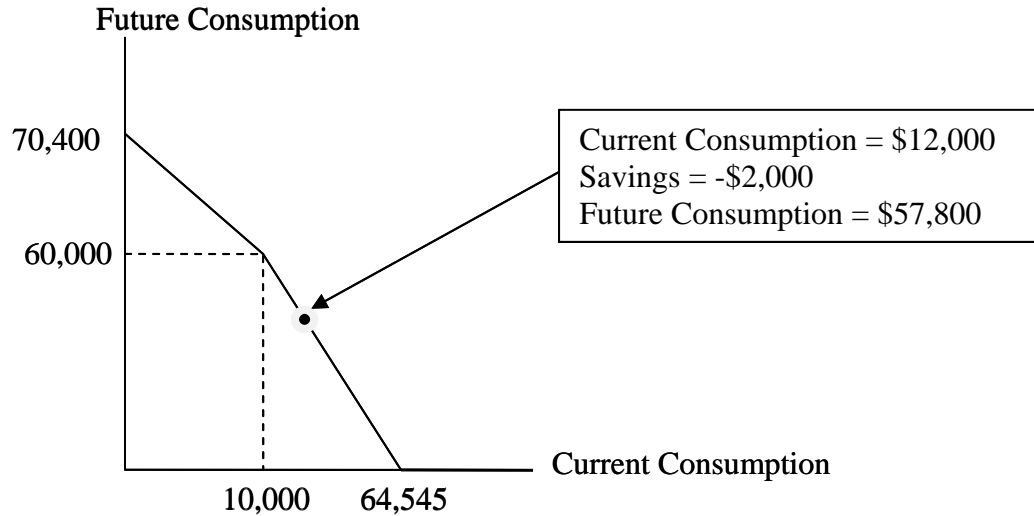
Overall, the impact is ambiguous.

c) Suppose you learn that the government is going to reduce your social security benefits by 10%. How would your savings decision change?

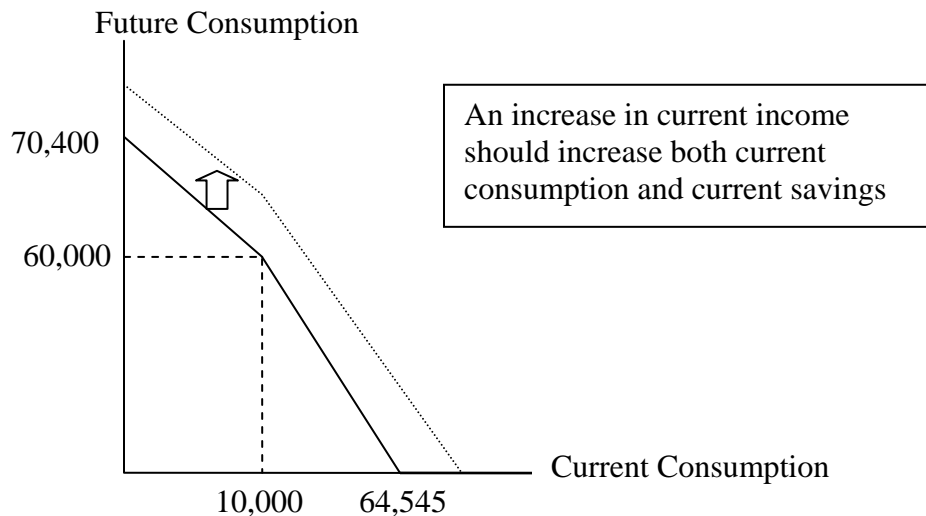
All else equal, if you expect a drop in your future income, your wealth decreases, but current income is unchanged – consumption decreases and savings increases.

5) Suppose that you are currently a senior in college. You earn \$10,000 per year working at the campus bookstore. You expect to earn \$60,000 next year. You can deposit money in a savings account that pays 4% interest per year. You also have a credit card that charges 10% interest on all purchases. (For simplicity, assume that you get charged interest regardless of when you pay the bill). Assume that there is no inflation and that consumer goods cost \$1 apiece.

a) Given the above information, plot out your set of possible choices for current/future spending (**Be careful.....it's not a straight line!**)



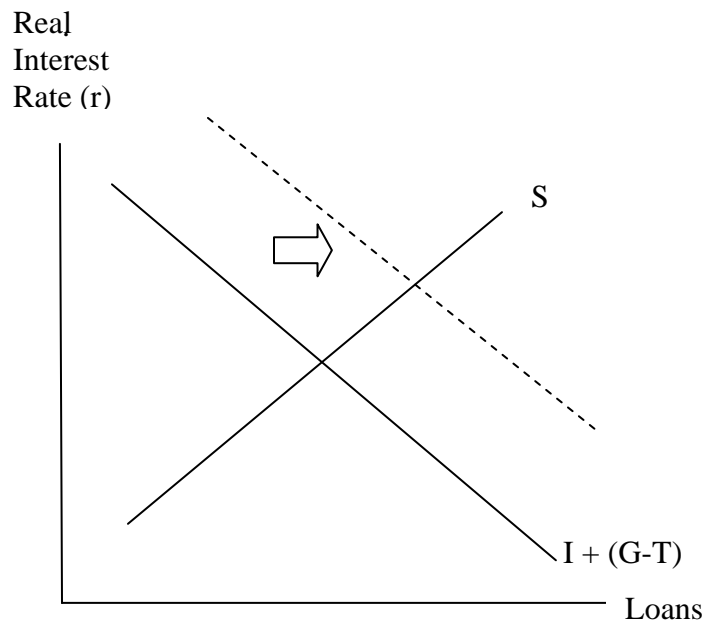
- b) Assuming that your preferences are like most college student's, indicate a likely choice on the above graph for current/future spending.
- c) Suppose that you win \$1,000 in a lottery. Show how this would impact your answers to (a) and (b).



- d) How can consumer savings behavior explain the behavior of interest rates over the business cycle?

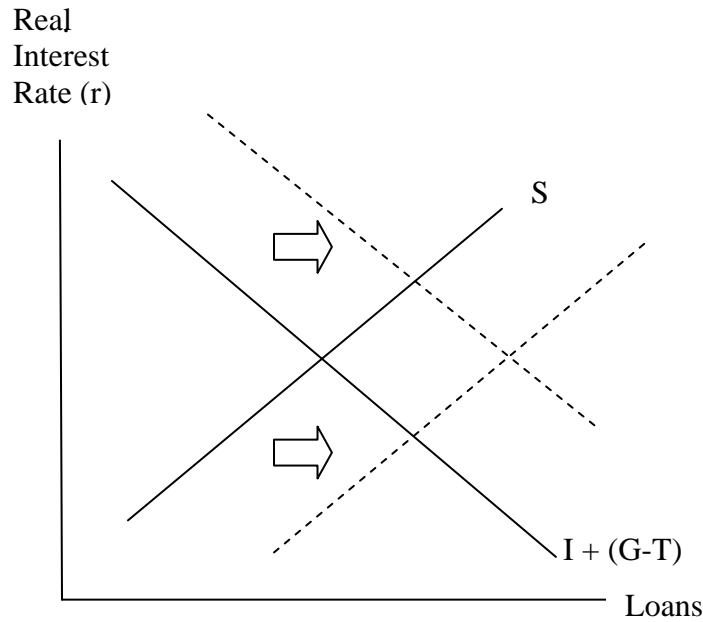
During expansions, households see an increase in their future income and respond by lowering savings today. This drop in savings increases interest rates. Likewise in a recession, households see their incomes falling. They respond by saving more, which causes interest rates to fall.

- 6) Suppose that the government increases spending by \$200B without increasing taxes (i.e. the government runs a \$200B deficit):
- a) Assuming that households view this spending as a “free lunch” (i.e. they don’t believe that they will have to repay this deficit) explain the impact of this deficit on interest rates, consumption, savings, and investment.



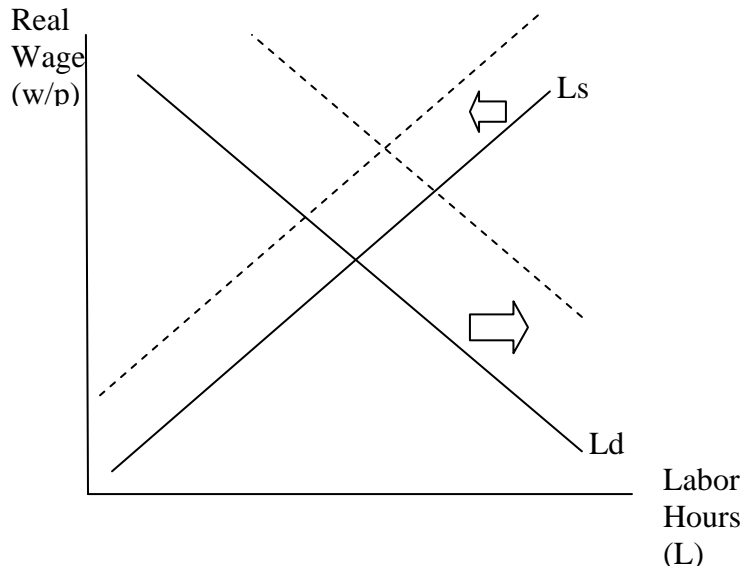
If households don’t recognize that the deficit represents a future tax liability, savings behavior is unaffected and the increase in the demand for loans by the government increases the interest rate.

- b) How would your answer to (a) change if households recognized that the deficit has to be repaid eventually.



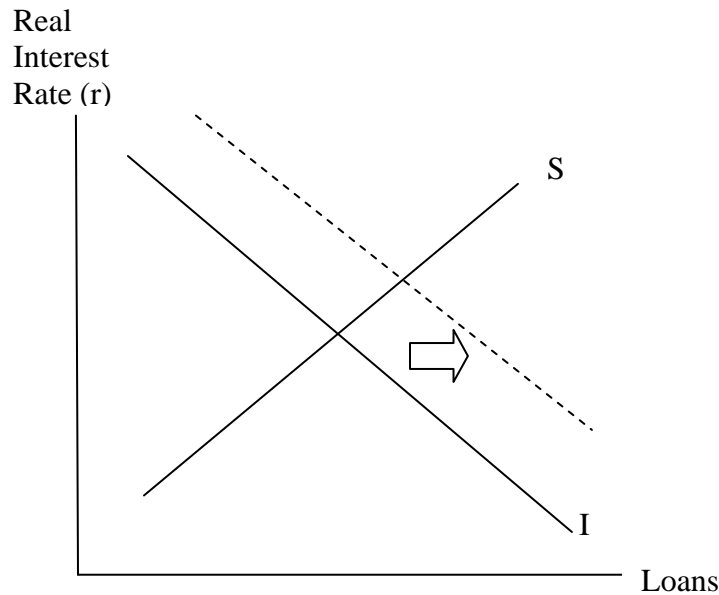
If households recognize the future tax liability, then they increase their savings to prepare for the higher future tax bill. Savings increases by the same amount as the demand for loans and the interest rate is unaffected.

- 7) Suppose that computerization increases average productivity in the US by 5%. This improvement is viewed as a permanent improvement.
- Explain the impact of this news on labor demand and labor supply. What happens to the real wage and total employment?



The increase in productivity increases the demand for labor while the resulting positive impact to household's wealth lowers supply. The effect on employment is ambiguous and the real wage rises.

- b) Explain the impact of this event on GDP, Savings, Investment, and the interest rate.



GDP and income increases. This increase is permanent, so savings behavior is unaffected. The increase in investment demand raises the interest rates. Ultimately, the higher interest rate increases savings.

- 8) Explain the three basic functions a commodity must satisfy to be functional as money.
- Unit of Account: All prices should be written in terms of the commodity that has been deemed money.
  - Store of Value: You should be able to store your wealth in money
  - Medium of Exchange: Everybody is always willing to accept money as payment

- 9) Suppose that the Federal Reserve wishes to increase the money supply. Specifically, it would like to increase the M1 money supply by 5%. We have the following information about the banking sector:

Currency in Circulation: \$500  
Checkable Deposits: \$1,000  
Bank Reserves: \$100

- a) What is the current monetary base? What is the M1 money supply? What is the multiplier?

$$MB = \text{Currency in Circulation} + \text{Bank Reserves} = \$600$$

$$M1 = \text{Currency in Circulation} + \text{Checkable Deposits} = \$1500$$

$$mm = \frac{1 + \frac{C}{D}}{\frac{C}{D} + \frac{R}{D}} = \frac{1 + \frac{500}{1000}}{\frac{500}{1000} + \frac{100}{1000}} = 2.5$$

- b) Given your answer to (a), by how much would the Federal Reserve have to increase the monetary base?

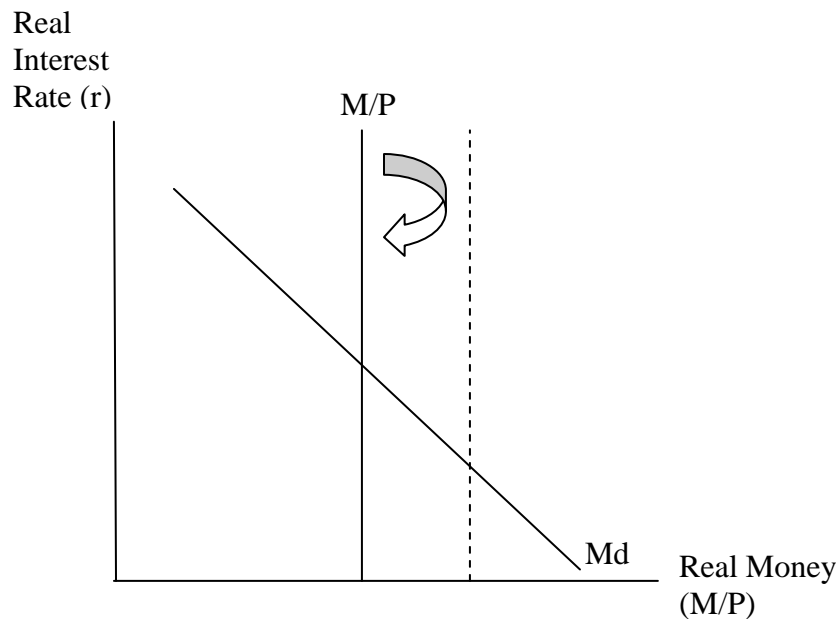
$$\Delta M1 = .05(1,500) = \$75$$

$$\Delta MB = \frac{\Delta M1}{mm} = \frac{75}{2.5} = \$30$$

- c) What policy tools does the Federal Reserve have at its disposal to increase the monetary base?

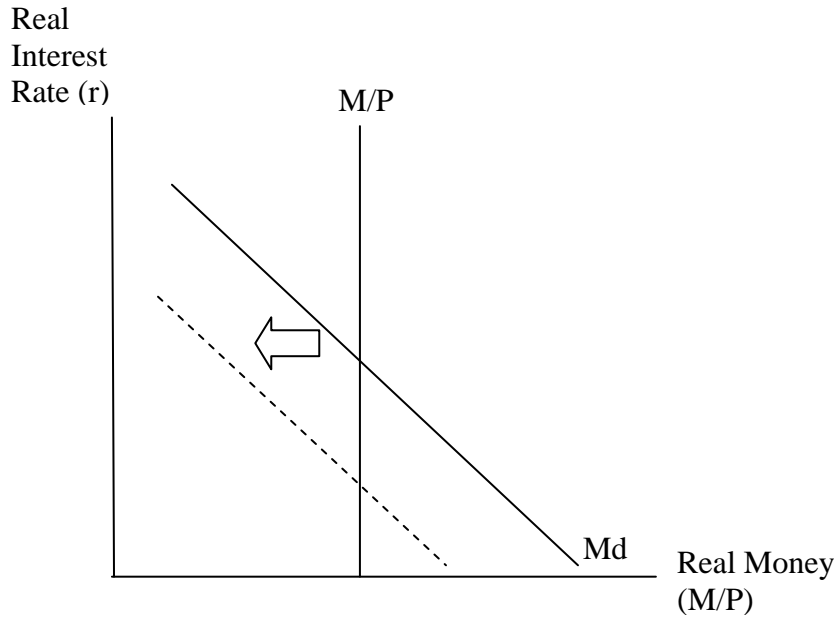
- Open Market Operations
- Reserve Requirement
- Discount Rate

- d) What impact would this 5% increase in the monetary base have on the economy in the short run/long run?



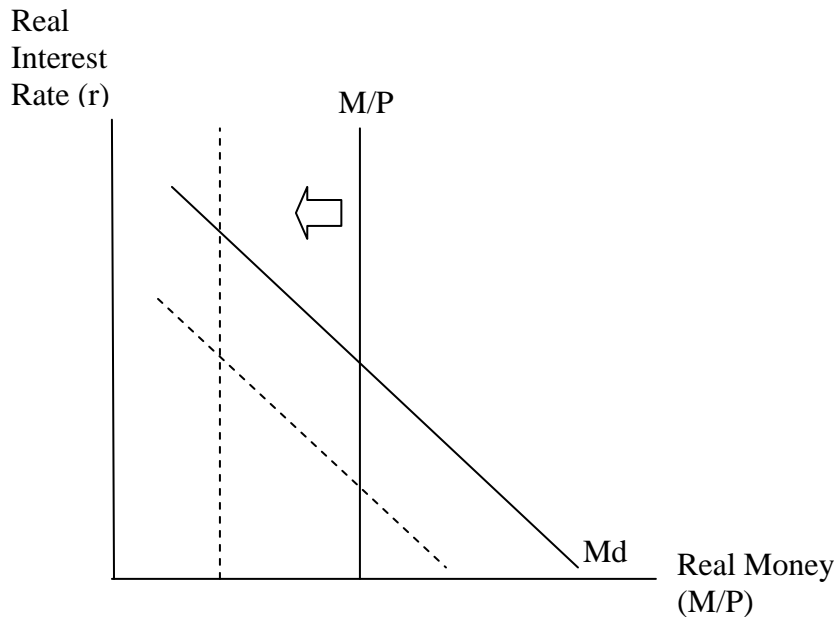
In the short run, prices are fixed, interest rates fall and output/employment increase. In the long run, prices rise by an equal 5% and employment/output/interest rates return to their initial levels.

- 10) Suppose that the availability of online banking dramatically lowers the demand for money.
- a) Explain the impact of this drop in demand in the short run.



The short run effect of a drop in the demand for money will be a drop in the interest rate. Note that this drop in the interest rate stimulates consumption and investment. The rise in the demand temporarily increases supply (the demand for labor increases which raises the real wage and employment).

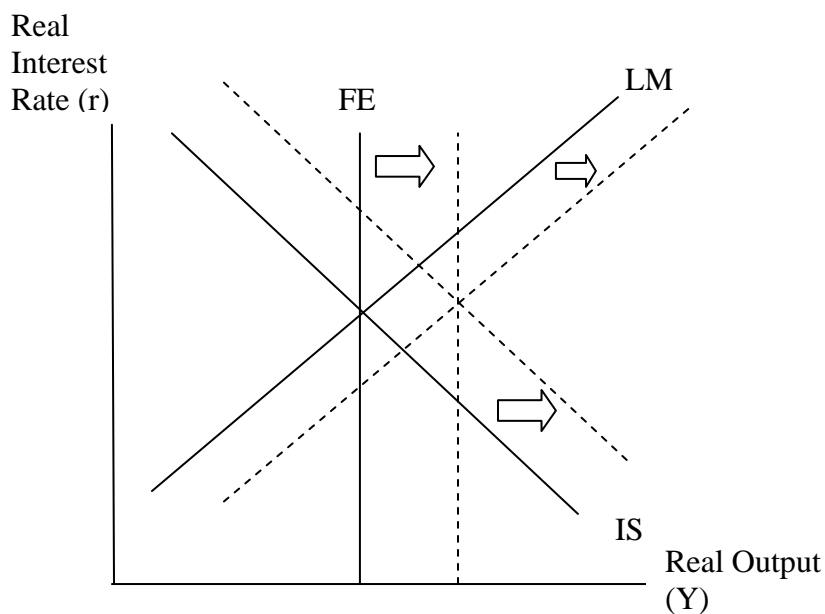
b) What will the long run impact be?



In the long term, prices rise which lowers the real supply of money and raises the interest rate.

- 11) Suppose that the economy experiences a permanent increase in productivity. Analyze the short term/long term effects IS-LM-FE framework.

A permanent increase in productivity raises the level of output produced by any combination of labor and capital as well as increases employment (demand for labor increases). Therefore, the FE curve shifts to the right. The increased demand for capital raises investment demand and shifts the IS curve to the right. The short term effect is higher interest rates and increased output. The long term price effect depends on the magnitude of the IS shift and the FE shift. If IS shifts by less than FE, then there is excess capacity and prices must fall. If IS shifts by more than FE, then the economy is operating above capacity and prices must rise. (Drawn below is the case where prices fall)



- 12) Suppose that fears of global terrorism lower corporate investment expenditures. Use the IS-LM-FE framework to analyze short term long term economic impact on employment, output, interest rates and prices.

The drop in corporate investment represents a drop in demand and the IS curve shifts to the left. The short term effect is lower interest rates and output. Since the economy is below the full employment level of output, prices fall (LM shifts right). This causes interest rates to fall even further and the economy returns to full employment.

