Macro Problem Set 5

Group 5

Question 1

a) Bond is *a legal promise to repay a debt, usually including both the principal amount, which is the amount originally lent, and regular interest payments.*

Principal amount is *the amount originally lent*

Principal amount= $1000

Term of a bond is *the length of time before the debt it represents is fully paid*

Term = 3 Years

Coupon rate is *the promised interest rate when a bond is issued.*

Coupon rate = (1060-1000)/1000 *100% = 6%

Coupon payment *pays interest annually equals the coupon rate times the principal amount of the bond.*

Coupon payment = $60

Question 1

Bond's price depends on prevailing interest rate.

Bond price $\times$ 1.03 = $1060

Bond price = 1029.1262 = $1029

Bond price $\times$ 1.08 = $1060

Bond price = $ 981

Bond price $\times$ 1.10 = $1060

Bond price = $963

Question 1

c) Negative news or events surrounding the issuing company can significantly impact the bond price, causing it to fall below its face value even if the market interest rate equals the coupon rate. The prices of bonds depend on the expectations of the prospects of the bond in the market.

1) Poor Financial Performance: If a company experiences a decline in earnings below anticipated levels, a reduction in revenues, or shows signs of financial instability, investors are likely to view the company as riskier. This perception of heightened risk can subsequently cause the price of the company's bonds to decrease.
2) Changes in Industry Outlook: Adverse changes in the industry or sector in which the company operates can impact the company's prospects and affect the bond price. For example, unfavorable regulatory changes or technological disruptions can lead to negative market sentiment and a decline in bond prices.
3) In conclusion, uncertainty that the bond will be able to fulfil its future payments might result to unwillingness of investors to buy the bond at face value.

Question 2

Shares in Brothers Grimm Inc,. manufacturer of gingerbread houses, are expected to pay a dividend of $5.50 in one year and to sell for $99.00 per share at that time. How much should you be willing to pay today per share of Grimm:

(a) : If the safe rate of interest is 5.1 percent and you believe that investing in Grimm carries no risk?

Answer: Share value(current)*(1+interest rate) = Share value at end of term

Share value(current)*(1+5.1/100) = 5.50+99.00

Share value(current) = (5.50+99)/(1+5.1/100)

Share value(current) = $99.42

Question 2

(b) : If the safe rate of interest is 10.1 percent and you believe that investing in Grimm carries no risk?

Answer: Share value(current)*(1+interest rate) = Share value at end of term

Share value(current)*(1+10.1/100) = 5.50+99.00

Share value(current) = (5.50+99)/(1+10.1/100)

Share value(current) = $94.92

Question 2

(c) : If the safe rate of interest is 5.1 percent but your risk premium is 2 percent?

Answer: Share value(current)*(1+interest rate%+Risk premium%) = Share value at end of term

Share value(current)*[1+(5.1+2)/100] = 5.50+99.00

Share value(current) = (5.50+99)/[1+(5.1+2)/100]

Share value(current) = $97.58

Question 2

(d) : Repeat parts (a) – (c), assuming that Grimm is not expected to pay a dividend but the expected price is unchanged.

For (a)

Answer: Share value(current)*(1+interest rate) = Share value at end of term

Share value(current)*(1+5.1/100) = 99.00

Share value(current) = (99)/(1+5.1/100)

Share value(current) = $94.20

Question 2

(d) : Repeat parts (a) – (c), assuming that Grimm is not expected to pay a dividend but the expected price is unchanged.

For (b)

Answer: Share value(current)*(1+interest rate) = Share value at end of term

Share value(current)*(1+10.1/100) = 99.00

Share value(current) = 99/(1+10.1/100)

Share value(current) = $89.92

Question 2

(d) : Repeat parts (a) – (c), assuming that Grimm is not expected to pay a dividend but the expected price is unchanged.

For (c)

Answer: Share value(current)*(1+interest rate%+Risk premium%) = Share value at end of term

Share value(current)*[1+(5.1+2)/100] = 99.00

Share value(current) = 99/[1+(5.1+2)/100]

Share value(current) = $92.44

Question 3

Your financial investments consist of U.S. government bonds maturing in 10 years and shares in a start-up company doing research in pharmaceuticals. How would you expect each of the following news items to affect the value of your assets? Explain.
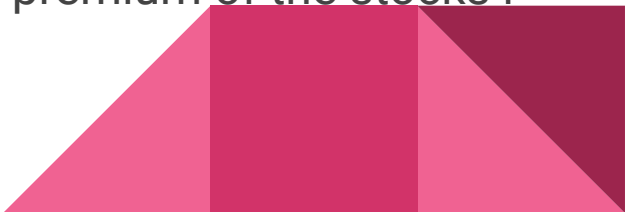
(a): Interest rates on newly issued government bonds rise.

Answer: When interest rates on newly issued government bonds rise, the value of current bonds will naturally decrease, as the interest rate given pales in comparison. The same goes to the price of my shares, as the relative value would decrease as compared to the new bond. As such, value of my assets will drop.

Question 3

(b): Inflation is forecasted to be much lower than previously expected. (Hint: Recall the Fisher effect from Chapter 6. Measuring the Price Level and Inflation.) Assume for simplicity that this information does not affect your forecast of the dollar value of the pharmaceutical company's future dividends and stock price.

Answer: As inflation forecasted is lower than previously expected, the nominal interest rate of the bonds currently in my possession will rise. As such, increasing the value of the bonds, naturally increasing my assets as well. A lower inflation rate also makes the market less volatile, lowering the risk premium of the stocks i hold, increasing the value, thus increasing my assets.

Question 3:

(c) : Large swings in the stock market increase financial investors' concerns about market risk. (Assume that interest rates on newly issued government bonds remain unchanged.)

As shown from question 2, Share value(current)*(1+interest rate%+Risk premium%) = Share value at end of term

Therefore, Share value(current) = (Share value at end of term)/1+interest rate%+Risk Premium%)

As such, the current share value and the risk premium has an inverse relationship.

With the market risk increasing, risk premiums have to be higher, thus reducing the current share value of existing bonds. As the value of my bonds decrease, my assets decrease as well.

With interest rates on government bonds remaining unchanged, there will not be a change in my current bond prices since the relative interest rate of my bonds still stay the same.

Overall, there will be a decrease in my assets.

Question 4

You have $1,000 to invest and are considering buying some combination of the shares of two companies. DonkeyInc and ElephantInc. Shares of DonkeyInc will pay a 10 percent return if the Democrats are elected, an event you believe to have a 40 percent probability; otherwise, the shares pay a zero return. Shares of ElephantInc will pay 8 percent if the Republicans are elected (a 60 percent probability), zero otherwise. Either the Democrats or the Republicans will be elected.

a) If your only concern is maximizing your average expected return, with no regard for risk, how should you invest your $1,000?

With no regards for risk : Putting **all** $1000 in **either** DonkeyInc or ElephantInc

Average expected return for DonkeyInc = 10% x 40% = 4%

Average expected return for ElephantInc = 8% x 60% = 4.8%

Thus, I would invest all my $1000 in ElephantInc as the average expected return is higher at 4.8%, as compared to the lower 4% for DonkeyInc.

Question 4

b) What is your expected return if you invest $500 in each stock? (Hint: Consider what your return will be if the Democrats win and if the Republicans win; then weight each outcome by the probability that event occurs.)

Returns if Democrats win (DonkeyInc, 10% return) = $500 x 10% = $50

Returns if Republicans win (ElephantInc, 8% return) = $500 x 8% = $40

Average expected return (DonkeyInc with 40% probability, ElephantInc with 60% probability)

= $50 x 40% + $40 x 60%

= $44

Average rate of return = ($44/$1000) x 100% = 4.4%

Question 4

c) The strategy of investing $500 in each stock does not give the highest possible average expected return. Why might you choose it anyway?

I would choose it anyways because this strategy ensures that I would earn at least some returns regardless of whether Democrats or Republicans win. The lower risk compensates the lower average expected return. It is a way of diversifying my investments.

Question 4

d) Devise an investment strategy that guarantees at least a 4.4 percent return, no matter which party wins.

Let $x be the amount invested in DonkeyInc (10% return if Democrats win), and $(1000-x) be the amount invested in ElephantInc (8% return if Republicans win).

Returns if Democrats win : $x(10%) = $0.1x   Returns if Republican wins : $(1000-x)(8%) = $0.08(1000-x)

For 4.4% return, $1000(4.4%) = $44

For at least 4.4% return,

0.1x ≥ 44   0.08(1000-x) ≥ 44

x ≥ 440   80-0.08x ≥ 44

                                                      450 ≥ x

450 ≥ x ≥ 440

Therefore, the investment strategy would be to invest between $440 to $450 in DonkeyInc ($440 and $450 included), and the remaining of the $1000 in ElephantInc. One example would be investing $445 in DonkeyInc and $555 in ElephantInc.

Question 4

e) Devise an investment strategy that is riskless – that is, one in which the return on your $1,000 does not depend at all on which party wins.

Let $x be the amount invested in DonkeyInc (10% return if Democrats win), and $(1000-x) be the amount invested in ElephantInc (8% return if Republicans win).

Returns if Democrats win : $x(10%) = $0.1x   Returns if Republicans win : $(1000-x)(8%) = $0.08(1000-x)

For the returns to not depend at all on which party wins, the returns if Democrat win should equal to the returns if Republicans win.

0.1x = 0.08 (1000-x)

0.1x = 80 - 0.08x

0.18x = 80

x = 444.44 $1000 - $x = $555.56

Thus, I should invest $444.44 in DonkeyInc, and $555.56 in ElephantInc for a riskless strategy.

My returns would be 0.1 (444.44) = $44.44

Question 5

How do each of the following transactions affect (1) the trade surplus or deficit and (2) capital inflows or outflows for the United States? Show that in each case, the identity that the trade balance plus net capital inflows equals zero applies.

<u>What determines trade surplus/deficit?</u>

Net Exports (NX): Difference between the value of goods and services exported by a country and value of these goods and services imported by the country

<u>What determines net capital inflows?</u>

Net Capital Inflows (KI): Capital inflows less capital outflows

At any time, **NX + KI = 0**

a. A U.S. exporter sells software to Israel. She uses the Israeli shekels received to buy stock in an Israeli company.

When a U.S. exporter sells software to Israel; U.S.' NX = $$x$$

U.S. exporter buys stock in an Israel company; U.S.' KI = $-x$

U.S.' NX + KI = $x + $-x = $0

b. A Mexican firm uses proceeds from its sale of oil to the United States to buy U.S. government debt.

Mexican firm sells oil to the U.S; U.S.' NX = $-x$

Mexican firm buys U.S. government debt; U.S.' KI = $$x$$

U.S.' NX + KI = $-x + $x = $0

C. A mexican firm uses proceeds from its sale of oil to the U.S. to buy oil drilling equipment from a U.S. firm.

Mexican firm sells oil to the U.S.; U.S.' NX = $-x$

Mexican firm buys drilling equipment from a U.S. firm; U.S.' NX = x

Capital inflows are purchases of domestic assets by foreign households and firms. As there is no capital inflow or outflow here, U.S.' KI = 0.

U.S.' NX = x - x = $0

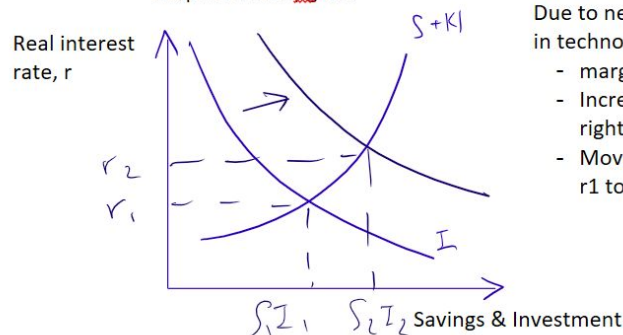[Note from the above that the sum of NX = $-x$ and NX = x is NX = $0.

Therefore, KI + NX = $0

Question 6

Use a diagram like Figure 11.4 (solid lines only) to show the effects of each of the following on the real interest rate and capital investment of a country that is a net borrower from abroad.
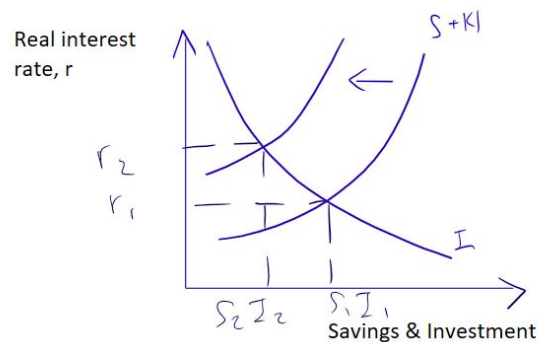
Graph 11.4 on pg 137

Due to new investments as a result of improvement in technology,
- marginal productivity of capital increase
- Increase demand for investment funds, rightward shift of demand curve
- Movement up saving supply curve, higher r from r1 to r2, higher level of saving/ investment

Net borrower -> Net capital inflow is positive -> S+KI > S

When government budget deficit rises:
- Public savings decrease, National savings S decrease, S+KI = supply of funds for Investments decrease, leftward shift of supply curve
- Movement along investment curve, higher r from r1 to r2, lower level of savings & investment
- Private investment is **crowded out**

Question 7

Use a diagram like Figure 11.4 (solid lines only) to show the effects of each of the following on the real interest rate and capital investment of a country that is a net borrower from abroad.

When domestic citizens save more:
- S+KI increases, S+KI provides supply for investment, rightward shift of supply curve
- Movement along investment curve, lower r from r1 to r2, higher levels of savings and investments
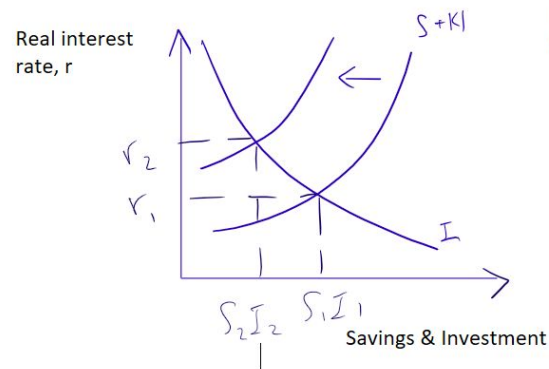
Foreign investors believe that riskiness of lending to country increased:
- Decreased capital inflow
- Foreigners less willing to buy domestic assets
- Domestic savers more willing to buy foreign assets
- KI decreases, S+KI, decreases, leading to leftward shift of supply curve
- Movement along investment curve, higher r from r1 to r2, lower level of savings & investment

Question 8

A country's domestic supply of saving, domestic demand for saving for purposes of capital formation, and supply of net capital inflows are given by the following equations:

$$S = 1,800 + 2,000r$$

$$I = 2,000 - 4,000r$$

$$KI = -100 + 6,000r$$

Where S = saving, I = demand for saving for capital formation,

KI = supply of net capital inflows, r = real interest rate

Question 8a.

Assuming that the market for saving and investment is in equilibrium, find national saving, capital inflows, domestic investment, and the real interest rate.

Recall **equilibrium: S + KI = I**. Substituting the values in:

$$1{,}800 + 2{,}000r - 100 + 6{,}000r = 2{,}000 - 4{,}000r$$

$$2{,}000r + 6{,}000r + 4{,}000r = 2{,}000 + 100 - 1{,}800$$

$$12{,}000r = 300$$

r = 0.025 (2.50%)

Question 8a.

Next, substitute the interest rate into the equations to find S, I, and KI.

$$S = 1,800 + 2,000(0.025) = 1,850$$

$$I = 2,000 - 4,000(0.025) = 1,900$$

$$KI = -100 + 6,000(0.025) = 50$$

Question 8b.

Repeat part (a), assuming that desired national saving declines by 120 at each value of the real interest rate. What effect does a reduction in domestic saving have on capital inflows?

After the decline, **S = (1,800 - 120) + 2,000r**

Substitute into the equation S + KI = I

1,680 + 2,000r -100 + 6,000r = 2,000 - 4,000r

12,000r = 420

r = 0.035 (3.5%)

A **reduction in domestic saving** will **increase real interest rate**.

When r = 0.035 (3.5%), S = 1,680 + 2,000(0.035) = **1,750**

KI = -100 + 6,000(0.035) = **110**

I = 2,000 - 4,000(0.035) = **1,860**

A **reduction in domestic saving** will:

1. **Increase real interest rate**.
2. **Increase capital inflows.**
3. **Decrease investment.**

The increase in KI will supplement the savings for domestic investment.

Question 8c.

Concern about the economy's macroeconomic policies causes capital inflows to fall sharply so that now KI = -700 + 6,000r. Repeat part a. What does a reduction in capital inflows do to domestic investment and the real interest rate?

Substituting in the new KI into S + KI = I

1,800 + 2,000r - 700 + 6,000r = 2,000 - 4,000r

12,000r = 900 [New equilibrium]

r = 0.075 (7.5%)

When r = 0.075, I = 2,000 - 4,000(0.075) = 1,700

A **reduction in capital inflows KI increases the domestic real interest rate** and **decreases domestic investment**.