

CB3044 Introduction to Financial Markets

Exercises

1. A commercial banking system is usually regulated by central banks. For instance, the ECB requires holding minimum reserves for banks located in the Euro area. How do central banks affect reserves in a banking system? Which actions are recommended and why? Can reserve requirements influence money supply and hence inflation in the economy?

Central banks inject reserves into the banking system either by open market operations or by discount lending. In the case of open market operations, both the holdings of securities of central banks and their reserves go up, leading to an expansion of reserves in the banking sector. Through discount lending, central banks increase reserves by making discount loans to banks which also increases liquidity in the banking system. Thus, central banks can increase or decrease money supply in the system and influence the inflation rate.

2. Explain briefly how the Federal Reserve would implement an expansionary monetary policy by adjusting the discount rate.

When Fed reduces the discount rate

- => The interest rates in the economy generally decrease
- => Encourage borrowing from banks
- => Business / households spending and investments generally increase
- => Stimulate economic growth
- => An expansionary monetary policy

3. How does the Fed control Fed funds rate?

The Federal Reserve cannot directly control interest rates on fed funds. It can and does indirectly influence them by adjusting the level of reserves available to banks in the financial system. The Fed can increase the amount of money in the system by buying securities, thus lowering interest rates. Alternatively, the Fed can remove reserves by selling securities, and then interest rates will increase. In reality, the forces of supply and demand set the interest rates in competitive markets.

4. Why do people invest in stocks? Is stock a riskier investment than bonds? Why or why not? How is preferred stock similar to bonds? To common stock?

Ownership of a share of stock represents a certain amount of ownership of a company. Apart from this, investors earn returns from stock in two ways: by paid dividends on stock and by the gain from stock price increase. Stock is riskier rather than bonds because dividends are not guaranteed. In addition, they have lesser priority than bonds in times of financial difficulties for the company. Preferred stocks receive fixed dividends like bonds do throughout their lifetime. Preferred stocks usually have unlimited lifetime like common stocks.

5. Stock A is currently trading at \$3.10/\$3.15. At what price should you place your sell order if you want to sell the stock A immediately?

\$3.10

6. Stock B closes at \$41.5 today, and it pays a dividend yield is 0.9 last year. What is the dividend yield?

Div yield = $0.9 / \$41.5 = 2.17\%$

7. What is the settlement cycle in HK stock market?

T+2

8. What does a 1-for-5 rights issue mean?

Rights issue give existing shareholders the right to buy new shares issued by the listed company, at a discount price. A 1-for-5 rights means for every 5 shares that an investor owns, he is entitled to purchase one newly-issued share, at the specific price announced during the rights offer.

9. What is QDII?

QDII allows institutional investors (such as funds, banks, insurance companies, asset management companies) in the mainland China to invest in offshore market. The qualified II are allowed to invest in stocks and fixed income products in HK, and other approved markets within the specific quota that it has acquired.

10. Discuss the difference between white and yellow IPO application forms in HK.

If you want to apply for the IPO yourself and have the allotted shares issued in your own name, you should use the white IPO application form. If you want to apply through your stock broker and have the shares under the name of the broker, you should use the yellow form.

11. If a 15-year bond is to mature in the next 3 months, is it a money market instrument?

Money market securities are securities that are issued for less than one year. So, although the bond has only three months to maturity, it is still considered to be a capital market security as it was originally issued for 15 years.

12. What cost advantages does the money market have over the banking sector?

The banking industry is subject to more regulations and governmental costs than the money markets. For instance, commercial banks have interest-rate ceilings, limited interest payments on deposits, etc. Though some of these regulations have been eliminated, banks still face more restrictions than money markets. Thus, the money market has relative advantage in cost effectiveness.

13. What are the main purposes of money markets? Why is there a need for money markets?

The well-developed secondary market for money market instruments makes the money market an ideal place for a firm or financial institution to “warehouse” surplus funds until they are needed. Similarly, the money markets provide a low-cost source of funds to companies, the government and intermediaries that need a short-term infusion of funds. These are the main purposes of money markets. Money markets are needed because revenues and expenses occur at different times. At times when there is no cash inflow but corporations and the government need funds quickly, money markets provide an efficient, low-cost means of borrowing cash.

14. Why are T-bills a favorable MM instrument for US govt? For investors?

T-bills have virtually zero default risk because even if the government ran out of money, it could simply print more to redeem them when they mature. The risk of unexpected changes in inflation is also low because of the short term to maturity. The market for T-bills is extremely deep and liquid. But as expected for a risk-free security, the interest rate earned on them is among the lowest in the economy.

15. Why do businesses use MM?

Businesses both invest and borrow in the money markets. They borrow to meet short-term cash flow needs, often by issuing commercial paper. They invest in all types of money market securities as an alternative to holding idle cash balances.

16. Calculate the discount yield and investment yield on the purchase of 91-day T-bill, if the face value is \$3,000 and purchase price is \$2,900.

Discount yield = $[(3,000 - 2,900)/3,000] \times (360/91) = 13.18\%$
Investment yield = $[(3,000 - 2,900)/2,900] \times (365/91) = 13.79\%$

17. What would be the discount yield and investment yield if a Treasury bill was purchased for \$9,360 maturing in 270 days for \$10,000?

$$\begin{aligned}\text{Discount yield} &= (10,000 - 9,360)/10,000 \times 360/270 \approx 8.53\% \\ \text{Investment yield} &= (10,000 - 9,360)/9,360 \times 360/270 \approx 9.24\%\end{aligned}$$

18. Calculate the price of a 180-day T-bill purchased at a 5% discount rate if the T-bill has a face value of \$5,000.

$$\begin{aligned}0.05 &= (5,000 - x)/5,000 \times 360/180 \\ X &= \$4,875\end{aligned}$$

19. Suppose you want to earn an discount yield of 2.5%. What would be the most you would pay for a 182-day Treasury bill that pays \$10,000 at maturity?

$$\begin{aligned}0.025 &= (10,000 - x)/10,000 \times 360/182 \\ X &= \$9,873.61\end{aligned}$$

20. How does the after-tax yield on a \$1,000,000 municipal bond with a coupon rate of 8%, paying interest annually, versus the yield of a \$1,000,000 corporate bond with a coupon rate of 10% paying interest annually? Assume that you are in the 25% tax bracket.

$$\begin{aligned}\text{Yield on municipal bond} &= 8\% \text{ (coupon payments: tax-exempt)} \\ \text{After-tax yield of corporate bond} &= 10\% (1-25\%) = 7.5\%\end{aligned}$$

21. Contrast investors' use of capital markets with their use of MM.

Investors use capital markets for long-term investment purposes. They use money markets, which have lower yields, primarily for temporary or transaction purposes.

22. What is interest rate risk?

The risk that a bond's price will change due to changes in market interest rates is called interest rate risk.

23. What are convertible bonds?

Convertible bonds are bonds that may be exchanged for another security of the issuing firm (e.g. common stock) at the discretion of the bond holder. If the market value of the securities the bond holder receives with the conversion exceeds the market value of the bond, the bond holder will return the bonds to the issuer in exchange for the new securities and make a profit. As a result, conversion is an attractive feature to bond holders. It gives the bond holder an investment opportunity that is not available with nonconvertible bonds. As a result, the yield on a convertible bond is lower than a nonconvertible bond.

24. What is the difference between GO and Revenue bonds?

General obligation bonds do not have specific assets pledged as security or a specific source of revenue allocated for their repayment. Revenue bonds, by contrast, are backed by the cash flow of a particular revenue-generating project.

25. Bond TTM has \$1,000 par value and pays 4.5% annual coupons. It matures in 18 years and is currently priced at \$837.59. What is its YTM?

$$837.59 = 45 \left[\frac{1 - \frac{1}{(1 + YTM)^{18}}}{YTM} \right] + \frac{1,000}{(1 + YTM)^{18}}$$

By trial-and-error, YTM = 6%

26. Roadside Markets has a 5.5% coupon bond outstanding that matures in 23 years. The bond pays interest annually. What is the market price of the bond if the face value is \$1,000 and the yield to maturity is 4.8%?

$$\text{Bond price} = 55 \left[\frac{1 - \frac{1}{(1 + 4.8\%)^{23}}}{4.8\%} \right] + \frac{1,000}{(1 + 4.8\%)^{23}} = \$1,096.23$$

27. Without any calculations, rank the interest rate risk of the following bonds from lowest to highest.

Bond A: 20-year zero coupon
 Bond B: 10-year 8% annual coupon
 Bond C: 15-year 6% annual coupon
 Bond D: 5-year 8% annual coupon
 Bond E: 20-year 4% annual coupon

Bond D < Bond B < Bond C < Bond E < Bond A

28. You own a convertible bond with face value of \$1,000, coupon rate of 6%, and with annual payments for 5 years. It is priced at \$1,100 now. The bond can be converted into 25 shares of common equity (currently trading at \$45 per share). What will be the best option for the investor—to convert the bonds or to sell them?

Conversion value = $25 \times 45 = 1,125$ vs 1,100

⇒ It's worthwhile to make the conversion

29. What are discount points in a US mortgage loan?

Discounts points is paid initially in order to enjoy a reduced mortgage rate. If the borrower plans to hold on to the loan long enough for the value of the reduced interest rate to exceed the up-front cost of the discount points, it is a good idea to elect to pay them.

30. You have a 25-year mortgage loan of \$4,000,000 with monthly interest of 0.7%. How much do you need to repay every month?

$$4,000,000 = C \left[\frac{1 - \frac{1}{(1 + 0.7\%)^{25 \times 12}}}{0.7\%} \right]$$

$$C = 31,939.97$$

31. You just bought a property of 4 million and you want to apply for a 50% LTV mortgage at 6.9% interest. Equal payments are to be made at the end of each month for thirty years. What is the monthly repayment?

Monthly interest = $6.9\% / 12 = 0.575\%$

$$\text{Loan amount} = 4,000,000 \times 50\% = 2,000,000 = C \left[\frac{1 - \frac{1}{(1 + 0.575\%)^{30 \times 12}}}{0.575\%} \right]$$

$$C = \$13,172.00$$

32. Are investors of the last tranche CMO subject to higher prepayment risk? Default risk?

Investors of the last tranche CMO are subject to lower prepayment risk and higher default risk.

33. Following are the investment strategies you could take on Stock B.

Strategy 1	Buy a call on Stock B
Strategy 2	Buy a put on Stock B
Strategy 3	Write a call on Stock B
Strategy 4	Write a put on Stock B
Strategy 5	Buy Stock B
Strategy 6	Short the futures on Stock B
Strategy 7	Long the futures on Stock B

(a) If you are confident that Stock B will go up in the coming months, which strategy can you take?

Strategy 1, Strategy 5, Strategy 7

(b) If you are confident that Stock B will go down in the coming months, which strategy can you take?

Strategy 2, Strategy 6

34. Explain briefly what the implied volatility of a stock option is.

Implied volatility is calculated from the option price and is used to measure whether the option is expensive relative to other options on the same underlying asset.

35. You wrote a call option with exercise price of \$25 and premium of \$3. What are your maximum gain and maximum loss?

max gain = 3
max loss = unlimited

36. You bought a put option with exercise price of \$50 and premium of \$5. What are your maximum gain and maximum loss?

max gain = 45
max loss = -5

37. You wrote a put option with exercise price of \$60 and premium of \$9. What is your maximum gain and maximum loss?

max gain = 9
max loss = -51

38. You bought a call option with exercise price of \$120 and premium of \$10.5. What are your maximum gain and maximum loss?

max gain = unlimited
max loss = -10.5

39. If you write a put option today, what does it mean?

You receive the option premium from the option buyer today.
At expiry, the option buyer has the right to sell the underlying asset to you at the strike price.

40. You bought one lot of HSI futures at 30,000. If the settlement price of the futures is 30,200. What is your P&L?

$P\&L = 200 \times 50 = 1,000$