

Chapter 11

The Money Markets

■ Answers to End-of-Chapter Questions

1. The money markets can be characterized as having securities that trade in one year or less, are of large denomination, and are very liquid.
2. 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.
3. Banks have higher costs than the money market owing to the need to maintain reserve requirements. The lower cost structure of the money markets, coupled with the economies of scale resulting from high volume and large-denomination securities, allows for higher interest rates.
4. Term securities have a specific maturity date. Demand securities can be redeemed at any time. A six-month certificate of deposit is a term security. A checking account is a demand security.
5. Following the Great Depression, regulators were primarily concerned with stopping banks from failing. By removing interest-rate competition, bank risk was substantially reduced. The problem with these regulations was that when market interest rates rose above the established interest-rate ceiling, investors withdrew their funds from banks.
6. The U.S. government sells large numbers of securities in the money markets to support government spending. Over the past several decades, the government has spent more each year than it has received in tax revenues. It makes up the difference by borrowing. Part of what it borrows comes from the money markets.
7. 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.

8. Asset-backed commercial paper (ABCP) played a role in the subprime mortgage crisis of 2008. ABCPs are short-term securities with more than half having maturities of 1 to 4 days. Average maturity is 30 days. ABCPs differ from conventional commercial paper as it is backed by collateral. In 2004-2007, the collateral was mostly securitized mortgages. The majority of sponsors of the ABCPs were given good ratings by major rating agencies. However, the quality of the pledged collateral was usually poorly understood.
When the quality of the subprime mortgages used to secure the ABCP was called into question in 2007-2008, it triggered a run on ABCPs. ABCPs unlike commercial bank deposits did not have deposit insurance. The problems extended to money market mutual funds, which found that issuers of ABCPs had exercised their option to extend maturities at low rates. Withdrawals from money market mutual funds threatened to cause them to “to break the buck” where a dollar held in the fund can only be redeemed at something less than a dollar, say 90 cents. In September 2008, the government had to set up a guarantee program to prevent the collapse of the money market mutual fund market and to allow for an orderly liquidation of the ABCP holdings.
9. The Eurodollar market consists of banks that accept deposits and make loans in currencies other than those in their own country. The modern Eurodollar market evolved from special circumstances of the post-World War II international finance system. Early in this period, many foreigners found it convenient to deposit dollar balances with banks in Europe.
The primary reason for the expansion of the Eurodollar market is that it reduces the costs of international trade by offering traders an efficient means of economizing on transaction balances in a world where most trade is denominated and transacted in U.S. dollars. Since Eurodollar deposits are located outside the U.S., they are not subject to reserve requirements set by the Federal Reserve.
10. Treasury bills are usually viewed as the most liquid and least risky of securities because they are backed by the strength of the U.S. government and trade in extremely large volumes.
11. In competitive bidding for securities, buyers submit bids. A noncompetitive bidder accepts the average of the rate paid by the competitive bidders.
12. The major money market parties are the U.S. Treasury, The Federal Reserve, commercial banks, money market brokers and dealers, corporations, and other financial institutions such as mutual funds. The U.S. treasury raises significant amounts of funds in the money market when it issues T-bills. T-bills are the most actively traded and liquid of all money market securities. T-bills allow the U.S. Federal Government to raise money to meet unavoidable expenditure needs since tax receipts are concentrated around certain periods but expenditure requirements occur throughout the year. The Federal Reserve is another key player in money markets. The Federal Reserve holds T-bills (as well as T-notes and T-bonds) to conduct open market transactions. It purchases T-bills when it wants to decrease money supply. The Federal Reserve also engages in repurchase agreements and reverse repos to influence short-term interest rates and money supply. The collateral for such repos are made up mostly of T-bills.
13. The Federal Reserve cannot directly set the federal funds rate of interest. It can influence the interest rate by adding funds to or withdrawing reserves from the economy.
14. The 270-day maximum maturity is due to a Securities and Exchange Commission (SEC) rule that securities with a maturity of 270 days and above must register with the SEC and be subject to its regulations for public issuance.

15. When trading is done across borders, there is no guarantee that the counterparty to an international financial transaction is able to pay in the future. So, rather than relying on the ability and creditworthiness of the counterparty, exporters usually require the counterparty to obtain a 'letter of credit' from a well-known bank that will agree to make good the importer's obligation. When the exporter complies with all terms of the transaction, the bank 'accepts' the obligation to make payment to complete the transaction if the importer does not. Because the bank's credit is good, the banker's acceptance can be sold easily in the money markets and when it comes due, the bank will pay, if necessary, if the importer does not.

■ Quantitative Problems

1. What would be your annualized discount rate % and our annualized investment rate % on the purchase of a 182-day Treasury bill for \$4,925 that pays \$5,000 at maturity?

$$\text{Solution: Discount Rate} \quad \Downarrow = \frac{\$5,000 - \$4,925}{\$5,000} \times \frac{360}{182} = 0.02967 = 2.967\%$$

$$\text{Investment Rate} \quad \Downarrow = \frac{\$5,000 - \$4,925}{\$4,925} \times \frac{365}{182} = 0.03054 = 3.054\%$$

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

Solution:

$$\text{Discount rate} = \frac{F - P}{F} \times \frac{360}{n}$$

$$\text{Discount rate} = \frac{10,000 - 9,360}{10,000} \times \frac{360}{270}$$

$$\text{Discount rate} = 0.0853 \approx 8.53\%$$

$$\text{Investment Rate} = \frac{F - P}{P} \times \frac{365}{n}$$

$$\text{Investment Rate} = \frac{10,000 - 9,360}{9,360} \times \frac{365}{270}$$

$$\text{Investment Rate} = 0.0924 \approx 9.24\%$$

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

Solution:

$$\text{Discount rate} = \frac{F - P}{F} \times \frac{360}{n}$$

$$0.025 = \frac{10,000 - x}{10,000} \times \frac{360}{182}$$

$$0.025 = \frac{3,600,000 - 360x}{1,820,000}$$

$$45,500 = 3,600,000 - 360x$$

$$360x = 3,600,000 - 45,500$$

$$x = \frac{3,554,500}{360} = \$9,873.61$$

4. What is the annualized discount rate % and investment rate % on a Treasury bill that you purchase for \$9,900 that will mature in 91 days for \$10,000?

Solution: Discount Rate $\Downarrow = \frac{\$10,000 - \$9,900}{\$10,000} \times \frac{360}{91} = 0.03956 = 3.956\%$

Investment Rate $\Downarrow = \frac{\$10,000 - \$9,900}{\$9,900} \times \frac{365}{91} = 0.04052 = 4.052\%$

5. The price of 182-day commercial paper is \$7,840. If the annualized investment rate is 4.093%, what will the paper pay at maturity?

Solution: Let B = what will be paid at maturity

$$[(B - \$7,840) / (\$7,840)] \times (365 / 182) = 0.04093$$

$$[(B - \$7,840) / (\$7,840)] \times 2.0055 = 0.04093$$

$$(B - \$7,840) \times 2.0055 = 320.89$$

$$B - \$7,840 = 160$$

$$B = \$8,000$$

6. How much would you pay for a Treasury bill that matures in 182 days and pays \$10,000 if you require a 1.8% discount rate?

Solution: Let C = what you would pay

$$[(\$10,000 - C) / (\$10,000)] \times (360 / 182) = 0.018$$

$$[(\$10,000 - C) / (\$10,000)] \times 1.978 = 0.018$$

$$[(\$10,000 - C)] = 0.018 \times \$10,000 \div 1.978$$

$$\$10,000 - C = 91$$

$$C = \$9,909$$

7. The price of \$8,000 face value commercial paper is \$7,930. If the annualized discount rate is 4%, when will the paper mature? If the annualized investment rate % is 4%, when will the paper mature?

Solution: Let N = when the paper matures

Discount Rate:

$$\begin{aligned}
 [(\$8,000 - \$7,930)/\$8,000] \times (360/N) &= 0.04 \\
 (\$70/\$8,000) \times (360/N) &= 0.04 \\
 (\$0.00875) \times (360/N) &= 0.04 \\
 (360/N) &= 0.04 \times (1/\$0.00875) \\
 (360/N) &= 4.571429 \\
 N &= 78.75 = 79 \text{ days}
 \end{aligned}$$

Investment Rate:

$$\begin{aligned}
 [(\$8,000 - \$7,930)/(\$7,930)] \times (365/N) &= 0.04 \\
 (\$70/\$7,930) \times (365/N) &= 0.04 \\
 (365/N) &= 0.04 \times (1/0.008827) \\
 365/N &= 4.53155 \\
 N &= 80.55 = 81 \text{ days}
 \end{aligned}$$

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

Solution:

$$\begin{aligned}
 \text{Discount rate} &= \frac{F - P}{F} \times \frac{360}{n} \\
 0.05 &= \frac{5,000 - x}{5,000} \times \frac{360}{180} \\
 0.05 &= \frac{1,800,000 - 360x}{900,000} \\
 45,000 &= 1,800,000 - 360x \\
 360x &= 1,800,000 - 45,000 \\
 x &= \frac{1,755,000}{360} = \$4,875
 \end{aligned}$$

9. A commercial paper's annualized discount rate is 4.85%. Its face value is \$18,000,000, and it matures in 72 days. What would its price be? What would be its price be if it matures in 125 days?

Solution:

$$\begin{aligned}
 \text{Discount rate} &= \frac{F - P}{F} \times \frac{360}{n} \\
 0.0485 &= \frac{18,000,000 - x}{18,000,000} \times \frac{360}{72} \\
 0.0485 &= \frac{6,480,000,000 - 360x}{1,296,000,000} \\
 62,856,000 &= 6,480,000,000 - 360x \\
 360x &= 6,480,000,000 - 62,856,000
 \end{aligned}$$

$$x = \frac{6,417,144,000}{360} = \$17,825,400$$

$$\text{Discount rate} = \frac{F - P}{F} \times \frac{360}{n}$$

$$0.0485 = \frac{18,000,000 - x}{18,000,000} \times \frac{360}{125}$$

$$0.0485 = \frac{6,480,000,000 - 360x}{2,250,000,000}$$

$$109,125,000 = 6,480,000,000 - 360x$$

$$360x = 6,480,000,000 - 109,125,000$$

$$x = \frac{6,370,875,000}{360} = \$17,696,875$$

10. The annualized yield is 3% for 91-day commercial paper and 3.5% for 182-day commercial paper. What is the expected 91-day commercial paper rate 91 days from now?

Solution: Let A = the expected 91-day rate, 91 days from now.

Assume that the 182-day rate is the average of the current 91-day rate and the expected 91-day rate.

$$(3 + A) / 2 = 3.5$$

$$3 + A = 7$$

$$A = 4$$

11. In a Treasury auction of \$2.1 billion par value 91-day T-bills, the following bids were submitted:

Bidder	Bid Amount	Price
1	\$500 million	\$0.9940
2	\$750 million	\$0.9901
3	\$1.5 billion	\$0.9925
4	\$1 billion	\$0.9936
5	\$600 million	\$0.9939

If only these competitive bids are received, who will receive T-bills, in what quantity, and at what price?

Bidders 1, 4, and 5 will receive T-bills in the amount requested all at .9936.

12. If the Treasury also received \$750 million in non-competitive bids, who will receive T-bills, in what quantity, and at what price?

Solution: All competitive bids are accepted at the highest yield paid to competitive bids. Thus, all \$750 million will be accepted at .9936.