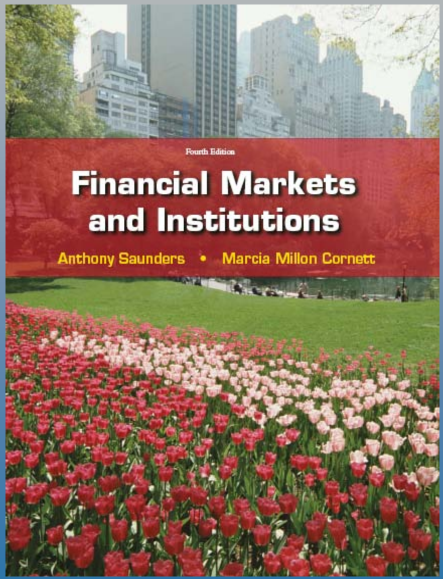
Chapter Five

Money Markets



Money Markets

- Liquid funds flow between short-term borrowers and lenders through **money markets**
- Money markets involve **debt instruments** with **original maturities of one year or less**
- Money market debt
  - issued by high-quality (i.e., low default risk) economic units that require short-term funds
  - purchased by economic units that have excess short-term funds
- Money market instruments have **active secondary markets**

Money Market Yields

- Some money market instruments are bought and sold on a discount basis (e.g., Treasury bills and commercial paper)
- **Discount yields (*i_{dy}*)** use a 360-day year

$$i_{dy} = \frac{(P_f - P_0)}{P_f} \times \frac{360}{h}$$

P_f = the face value of the security

P_0 = the discount price of the security

h = the number of days until maturity

Money Market Yields

- Compare discount securities to U.S. Treasury bonds with **bond equivalent yields (*i_{bey}*)**

$$i_{dy} = \frac{(P_f - P_0)}{P_0} \times \frac{365}{h}$$

- Convert bond equivalent yields into **effective annual returns (*EAR*)**

$$EAR = \left(1 + \frac{i_{bey}}{365/h}\right)^{365/h} - 1$$

Money Market Yields

- Money market securities that pay interest only at maturity use **single-payment yields (i_{spy})** (e.g., jumbo CDs and fed funds)
  - since i_{spy} uses a 360 day year, compare to bonds by converting to a 365 day year

$$i_{bey} = i_{spy}(365/360)$$

  - to convert a single-payment yield to an **effective annual return**

$$EAR = \left(1 + i_{spy}\frac{365/360}{365/h}\right)^{365/h} - 1$$

Money Market Instruments

- Treasury bills (T-bills)
- Federal funds (fed funds)
- Repurchase agreements (repos or RP)
- Commercial paper (CP)
- Negotiable certificates of deposit (CD)
- Banker acceptances (BA)

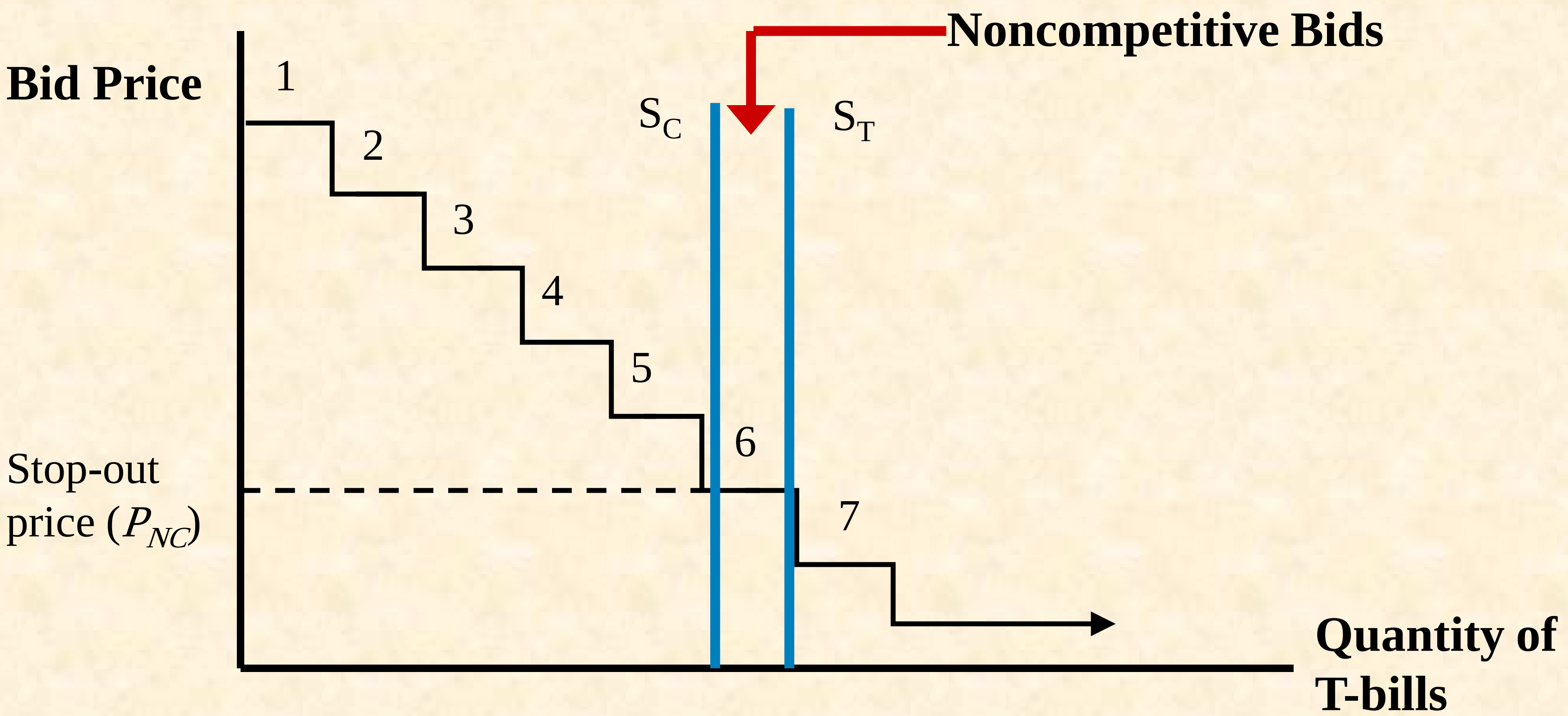
Treasury Bills (T-Bills)

- **T-Bills** are short-term debt obligations issued by the U.S. government
- The Federal Reserve buys and sells T-bills to implement monetary policy
- T-bills are virtually default risk free, are highly liquid, and have little interest rate risk

T-Bill Auctions

- 13- and 26-week T-bills are auctioned weekly
- Bids are submitted by government securities dealers, financial and nonfinancial corporations, and individuals
- Bids can be competitive or noncompetitive
  - competitive bids specify the bid price and the desired quantity of T-bills
  - noncompetitive bidders get preferential allocation and agree to pay the lowest price of the winning competitive bids

T-Bill Auctions



The Secondary Market for T-Bills

- The secondary market for T-bills is the largest of any U.S. money market instrument
- 22 primary dealers "make" a market in T-bills by buying the majority sold at auction and by creating an active secondary market
  - primary dealers trade for themselves and for customers
  - T-bill purchases and sales are book-entry transactions conducted over Fedwire
- T-Bills are sold on a discount basis

T-Bill Prices

- T-Bill prices can be calculated from quotes (e.g., from *The Wall Street Journal*) by rearranging the discount yield equation

$$P_0 = P_f - \left[i_{T-Bill}(dy) \times \frac{h}{360} \times P_f \right]$$

- Or by rearranging the bond equivalent yield equation

$$P_0 = \frac{P_f}{1 + \left(\dfrac{h}{365 / i_{T-Bill}(bey)} \right)}$$

Federal Funds

- The **federal funds (fed funds) rate** is the target rate in the conduct of monetary policy
- Fed fund transactions are short-term (mostly overnight) unsecured loans
- Banks with excess reserves lend fed funds, while banks with deficient reserves borrow fed funds
- Fed funds are single-payment loans and thus use single-payment yields

Repurchase Agreement

- A **repurchase agreement (repo or RP)** is the sale of a security with an agreement to buy the security back at a set price in the future
- Repos are short-term collateralized loans (typical collateral is U.S. Treasury securities)
- A reverse repurchase agreement is the opposite side of a repo (i.e., it is the purchase of a security with an agreement to sell it back in the future)

Repurchase Agreement

- The **yield on repurchase agreements (*i_{RA}*)** uses a 360-day year like the discount rate, but uses the current price in the denominator like the bond equivalent yield

$$i_{RA} = \frac{(P_f - P_0)}{P_0} \times \frac{360}{h}$$

P_f = the repurchase price of the security

P_0 = the selling price of the security

h = the number of days until the repo matures

Commercial Paper

- **Commercial paper (CP)** is the largest money market in terms of dollars outstanding
- CP is unsecured short-term corporate debt issued to raise short-term funds (e.g., for working capital)
- Generally sold in large denominations (e.g., $100,000 to $1 million) with maturities between 1 and 270 days
- CP is usually sold to investors indirectly through brokers and dealers (approximately 85% of the time)
- CP is usually held by investors until maturity and has no active secondary market
- Yields are quoted on a discount basis (like T-bills)

Negotiable Certificate of Deposit

- A **negotiable certificate of deposit (CD)** is a bank-issued time deposit that specifies the interest rate and the maturity date
- CDs are bearer instruments and thus are salable in the secondary market
- Denominations range from $100,000 to $10 million; $1 million being the most common
- Often purchased by money market mutual funds with pools of funds from individual investors

Banker's Acceptance

- A **Banker's Acceptance (BA)** is a time draft payable to a seller of goods with payment guaranteed by a bank
- Used in international trade transactions to finance trade in goods that have yet to be shipped from a foreign exporter (seller) to a domestic importer (buyer)
- Foreign exporters prefer that banks act as payment guarantors before sending goods to importers
- Banker's acceptances are bearer instruments and thus are salable in secondary markets

Money Market Participants

- The U.S. Treasury
- The Federal Reserve
- Commercial banks
- Money market mutual funds
- Brokers and dealers
- Corporations
- Other financial institutions
- Individuals

International Money Markets

- U.S. dollars held outside the U.S. are tracked among multinational banks in the **Eurodollar market**
- The rate offered for sale on Eurodollar funds is the **London Interbank Offered Rate (LIBOR)**
- **Eurodollar Certificates of Deposits** are U.S. dollar denominated CDs held in foreign banks
- **Eurocommercial paper (Euro-CP)** is issued in Europe and can be in local currencies or U.S. dollars