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Module 2

Introduction to Money Markets

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MONEY-MARKET INSTRUMENTS

Money-Market Instruments: Very liquid short-term (overnight to under a year) debt and monetary instruments.

- Treasury bills comprise most of the market
- Other instruments:
  - Certificates of Deposit (CD's)
  - Commercial Paper
  - Repurchase Agreements (Repos)
  - Fed Funds
- Relatively risk-free
- However money market funds were bailed out by Fed in 2008 crises. Why?

CERTIFICATES OF DEPOSIT (CD)

CD: Short- or medium-term deposit in a bank or savings & loan for a stated time period.

- Usually pays fixed rate of interest
- FDIC-insured
- Euro-dollar CDs: deposits outside US, paying US$

COMMERCIAL PAPER

Commercial Paper: Short-term, unsecured, unregistered, discounted, and negotiable promissory note sold by one company or bank to meet immediate cash needs.

- Usually purchased by investors with short-term idle cash

REPURCHASE AGREEMENTS (REPOS)

Repo: Contract in which Investor sells a security, such as Treasury Bills, and agrees to buy them back at a specified time and price.

- Buyer earns interest comparable to money market rates
- Essentially a secured loan
- Banks are restricted to dealing in Treasury and agency issues only while other firms can repo nearly any security

FED FUNDS (INTERBANK LOANS & DEPOSITS)

Federal Funds: Funds in excess of the reserve requirements that banks deposit in Federal Reserve Banks.

- Member banks may lend reserves to one another
- Federal Funds Rate: interest rate on overnight loans between banks
- Rate may vary from institution to institution & from day to day

MONEY MARKET INSTRUMENTS

Products

- Treasury bills
- Treasury notes
- Certificates of Deposit (Transferable)
- Commercial paper
- Short-term bonds (1 year left to maturity)
- Asset backed securities

Markets

- Usually discounted paper
- Earn discount over period to maturity
- Many instruments with 30, 60, 90 day terms
- Flexibility increased by repurchase/resale
- Agreements for period required

MONEY MARKET RETURNS

- Money market instruments are designed to be short-term & reflect income to be earned in form of a discount from value at maturity
- A $100,000 US Treasury Bill issued for 90 days sells at price less than $100,000
- Increase in value over 90 days represents interest income appropriate at date of initial sale

MONEY MARKET RETURNS

- As long as instrument is held to maturity, yield on instrument is exactly as calculated at date of original purchase

- If instrument is sold before maturity, recalculation of price reflects new market interest yield requirements & governs new price over balance of term to maturity

MONEY MARKET RETURNS

- Short-term investments which are generally issued at a discount
  - Investor invests less than face value of security with expectation of receiving face value back at maturity

- Example: a $1 million security paying 8 percent in interest with 2 months until maturity would be bought at:
  - $1,000,000 – [(0.08)/(2/12) ($1,000,000)] = $986,666.67
  - Face value (proceeds on maturity) = $1,000,000

MONEY MARKET RETURNS

- Nominal rate – based on security's face value
- Yield – actual return on investment if held to maturity
  - Different types of yield – all are annualized

$$\text{Money Market Yield} = \left(\frac{\text{Face Value} - \text{Purchase Price}}{\text{Purchase Price}}\right)\left(\frac{360}{\text{\# days to maturity}}\right)$$

$$\text{Bond Equivalent Yield} = \left(\frac{\text{Face Value} - \text{Purchase Price}}{\text{Purchase Price}}\right)\left(\frac{365}{\text{\# days to maturity}}\right)$$

$$\text{Discount Basis Yield} = \left(\frac{\text{Face Value} - \text{Purchase Price}}{\text{Face Value}}\right)\left(\frac{360}{\text{\# days to maturity}}\right)$$

MONEY MARKET RETURNS

- Pure discount instruments such as US T-bills are quoted on a bank discount basis, or the discount basis yield
- Yield on bank discount basis is not a meaningful measure of investors' returns because the yield:
  - Is on the face value, not the purchase price
  - Uses 360 days and not 365 days
  - Uses simple interest and thus ignores the opportunity to earn interest on interest (compound interest)

MONEY MARKET RETURNS: EXAMPLE

1. Calculate the bank discount yield of a T-bill with a purchase price of $98,800 and 183 days to maturity.
2. Calculate the holding period return and effective annual yield of a T-bill with a purchase price of $98,800 and 183 days to maturity of which:

$$r_{BD} = (D/F) * (360 / t)$$

r_{BD} = annualized yield on bank discount basis

F = face value of the T-bill

D = dollar discount = F – P (P is the purchase price)

t = days to maturity

MONEY MARKET RETURNS: SOLUTION

1. Calculate the bank discount yield of T-bill with a purchase price of $98,800 with 183 days to maturity

   $r_{BD} = (D/F) * (360 / t)$, so

   $r_{BD} = (\$1{,}200 / \$100{,}000) * (360 / 183) = 2.36\%$

2. Calculate the holding period return and effective annual yield of T-bill with a purchase price of $98,800 with 183 days to maturity

   HPY = (P1 – P0 + D1) / P0, so

   HPY = (100 – 98.8 + 0) / 98.8 = 1.215%

   EAY = (1 + HPY)^(365 / t) – 1, so

   EAY = (1 +0.01215)^(365 /183) – 1 = 2.438%

   Note the effective annual yield is higher than the bank discount yield

DISCUSSIONS

- Why have interest rates remained low by historical standards?
- What have been the effects of low interest rates on investor strategies