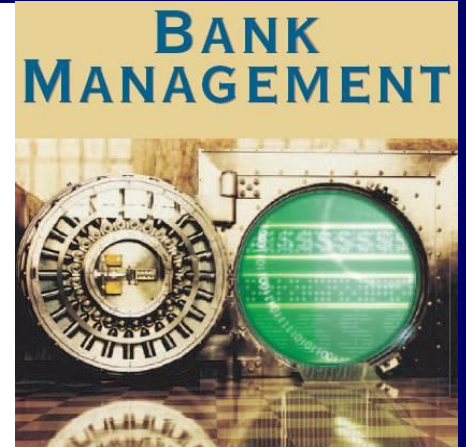


Managing the Investment Portfolio

Lecture 13



The Investment Portfolio

- **Most banks concentrate their asset management efforts on loans**
 - **Managing investment securities is typically a secondary role, especially at smaller banks**
- **Historically, small banks have purchased securities and held them to maturity**

The Investment Portfolio

- **Large banks, in contrast, not only buy securities for their own portfolios, but they also:**
 - **Manage a securities trading account**
 - **Manage an underwriting subsidiary that helps municipalities issue debt in the money and capital markets**

The Investment Portfolio

- **Historically, bank regulators have limited the risk associated with banks owning securities by generally:**
 - **Prohibiting banks from purchasing common stock (for income purposes)**
 - **Limiting debt instruments to investment grade securities**
- **Increasingly, banks are pursuing active strategies in managing investments in the search for higher yields**

Dealer Operations and the Securities Trading Account

- **When banks purchase securities, they must indicate the underlying objective for accounting purposes:**
 - **Held-to-Maturity**
 - **Trading**
 - **Available-for-Sale**

Dealer Operations and the Securities Trading Account

- **Held to Maturity**
 - **Securities purchased with the intent and ability to hold to final maturity**
 - **Carried at historical (amortized) cost on the balance sheet**
 - **Unrealized gains and losses have no impact on the income statement**

Dealer Operations and the Securities Trading Account

- **Trading:**
 - **Securities purchased with the intent to sell them in the near term**
 - **Carried at market value on the balance sheet with unrealized gains and losses included in income**

Dealer Operations and the Securities Trading Account

- **Available for Sale:**
 - **Securities that are not classified as either held-to-maturity securities or trading securities**
 - **Carried at market value on the balance sheet with unrealized gains and losses included as a component of stockholders' equity**

Dealer Operations and the Securities Trading Account

- Banks perform three basic functions within their trading activities:
 - Offer investment advice and assistance to customers managing their own portfolios
 - Maintain an inventory of securities for possible sale to investors
 - Their willingness to buy and sell securities is called *making a market*
 - Traders speculate on short-term interest rate movements by taking positions in various securities

Dealer Operations and the Securities Trading Account

- Banks earn profits from their trading activities in several ways:
 - When making a market, they price securities at an expected positive spread
 - Bid
 - Price the dealer is willing to pay
 - Ask
 - Price the dealer is willing to sell
 - Traders can also earn profits if they correctly anticipate interest rate movements

Objectives of the Investment Portfolio

- **A bank's investment portfolio differs markedly from a trading account**
 - **Objectives of the Investment Portfolio**
 - **Safety or preservation of capital**
 - **Liquidity**
 - **Yield**
 - **Credit risk diversification**
 - **Help in manage interest rate risk exposure**
 - **Assist in meeting pledging requirements**

Objectives of the Investment Portfolio

- **Accounting for Investment Securities**
 - **FASB 115 requires security holdings to be divided into three categories**
 - **Held-to-Maturity (HTM)**
 - **Trading**
 - **Available-for-Sale**
 - **The distinction between investment motives is important because of the accounting treatment of each**

Objectives of the Investment Portfolio

- **Accounting for Investment Securities**
 - **A change in interest rates can dramatically affect the market value of a security**
 - **The difference between market value and the purchase price equals the unrealized gain or loss on the security; assuming a purchase at par:**
 - **Unrealized Gain/Loss =**
Market Value – Par Value

Objectives of the Investment Portfolio

- **Accounting for Investment Securities**
 - **Assume interest rates increase and bond prices fall:**
 - **Held-to-Maturity Securities**
 - **There is no impact on either the balance sheet or income statement**
 - **Trading Securities**
 - **The decline in value is reported as a loss on the income statement**
 - **Available-for-Sale Securities**
 - **The decline in value reduces the value of bank capital**

Objectives of the Investment Portfolio

- **Safety or Preservation of Capital**
 - **A primary objective of the investment portfolio is to preserve capital by purchasing securities when there is only a small risk of principal loss.**
 - **Regulators encourage this policy by requiring that banks concentrate their holdings in investment grade securities, those rated Baa (BBB) or higher.**

Objectives of the Investment Portfolio

■ Liquidity

- Commercial banks purchase debt securities to help meet liquidity requirements
- Securities with maturities under one year can be readily sold for cash near par value and are classified as liquid investments
 - In reality, most securities selling at a premium can also be quickly converted to cash, regardless of maturity, because management is willing to sell them

Investment Portfolio for a Hypothetical Commercial Bank

■ Liquidity

Current Date: September 30, 2005

Purchase Date	Book Value	Description	Annual Coupon Income	Market Value
12/15/95	\$4,000,000	\$4,000,000 par value U.S. Treasury note at 11%, due 11/15/08	\$440,000	\$4,099,000
10/15/95	2,000,000	\$2,000,000 par value Federal National Mortgage Association bonds at 8.75%, due 10/15/10	175,000	1,824,000
6/6/99	500,000	\$500,000 par value Allegheny County, PA, A-rated general obligations at 5.15%, due 3/1/11	25,750	482,500
10/1/94	1,000,000	\$1,000,000 par value State of Illinois Aaa-rated general obligations at 11%, due 10/1/19	110,000	1,190,000

Objectives of the Investment Portfolio

■ Yield

- To be attractive, investment securities must pay a reasonable return for the risks assumed
- The return may come in the form of price appreciation, periodic coupon interest, and interest-on-interest
- The return may be fully taxable or exempt from taxes

Objectives of the Investment Portfolio

■ Diversify Credit Risk

- The diversification objective is closely linked to the safety objective and difficulties that banks have with diversifying their loan portfolios
- Too often loans are concentrated in one industry that reflects the specific economic conditions of the region
- Investment portfolios give banks the opportunity to spread credit risk outside their geographic region and across different industries

Objectives of the Investment Portfolio

- **Help Manage Interest Rate Exposure**
 - **Investment securities are very flexible instruments for managing a bank's overall interest rate risk exposure**
 - **Banks can select terms that meet their specific needs without fear of antagonizing the borrower**
 - **They can readily sell the security if their needs change**

Objectives of the Investment Portfolio

- **Pledging Requirements**
 - **By law, commercial banks must pledge collateral against certain types of liabilities.**
 - **Banks that borrow via repurchase agreements essentially pledge part of their government securities portfolio against this debt**
 - **Public deposits**
 - **Borrowing from the Federal Reserve**
 - **Borrowing from FHLBs**

Composition of the Investment Portfolio

- **Money market instruments with short maturities and durations include:**
 - **Treasury bills**
 - **Large negotiable CDs**
 - **Bankers acceptances**
 - **Commercial paper**
 - **Repurchase agreements**
 - **Tax anticipation notes.**

Composition of the Investment Portfolio

- **Capital market instruments with longer maturities and duration include:**
 - **Long-term U.S. Treasury securities**
 - **Obligations of U.S. government agencies**
 - **Obligations of state and local governments and their political subdivisions labeled municipals**
 - **Mortgage-backed securities backed both by government and private guarantees**
 - **Corporate bonds**
 - **Foreign bonds**

Characteristics of Taxable Securities

■ Money Market Investments

- Highly liquid instruments which mature within one year that are issued by governments and large corporations
- Very low risk as they are issued by well-known borrowers and a active secondary market exists
- Banks purchase money market instruments in order to meet liquidity and pledging requirements and earn a reasonable return

Characteristics of Taxable Securities

- **Capital Market Investments**
 - **Consists of instruments with original maturities greater than one year**
 - **Banks are restricted to “investment grade” securities, those rated Baa (BBB) or above; i.e., no junk bonds**
 - **If banks purchase non-rated securities, they must perform a credit analysis to validate that they are of sufficient quality relative to the promised yield**

▪

Money Market Investments

- **Repurchase Agreements (Repos)**
 - **A loan between two parties, with one typically either a securities dealer or commercial bank**
 - **The lender or investor buys securities from the borrower and simultaneously agrees to sell the securities back at a later date at an agreed-upon price plus interest**
 - **Essentially are collateralized federal funds transactions**

Money Market Investments

- **Repurchase Agreements (Repos)**
 - **The minimum denomination is generally \$1 million, with maturities ranging from one day to one year**
 - **The rate on one-day repos is referred to as the overnight repo rate and is quoted on an add-on basis assuming a 360-day year**
 - **$\$ \text{ Interest} = \text{Par Value} \times \text{Repo Rate} \times \text{Days}/360$**
 - **Longer-term transactions are referred to as term repos and the associated rate the term repo rate**

Money Market Investments

■ Treasury Bills

- **Marketable obligations of the U.S. Treasury that carry original maturities of one year or less**
- **They exist only in book-entry form, with the investor simply holding a dated receipt**
- **Investors can purchase bills in denominations as small as \$1,000, but most transactions involve much larger amounts**

Money Market Investments

■ Treasury Bills

- Each week the Treasury auctions bills with 13-week and 26-week maturities
 - Investors submit either competitive or noncompetitive bids
 - With a competitive bid, the purchaser indicates the maturity amount of bills desired and the discount price offered
 - Non-competitive bidders indicate only how much they want to acquire

Money Market Investments

■ Treasury Bills

- Treasury bills are purchased on a discount basis, so the investor's income equals price appreciation
- The Treasury bill discount rate is quoted in terms of a 360-day year:

$$DR = \frac{FV - P}{FV} \times \frac{360}{N}$$

■ Where

- DR = Discount Rate
- FV = Face Value
- P = Purchase Price
- N = Number of Days to Maturity

Money Market Investments

■ Treasury Bills Example:

- A bank purchases \$1 million in face value of 26-week (182-day) bills at \$990,390. What is the discount rate and effective yield?

- The discount rate is:

$$DR = \frac{\$1,000,000 - \$990,390}{\$1,000,000} \times \frac{360}{182} = 1.90\%$$

- The true (effective) yield is:

$$\text{Effective Yield} = \left[1 + \frac{\$1,000,000 - \$990,390}{\$990,390} \right]^{(365/182)} - 1 = 1.956\%$$

Money Market Investments

- **Certificates of Deposit**
 - **Dollar-denominated deposits issued by U.S. banks in the United States**
 - **Fixed maturities ranging from 7 days to several years**
 - **Pay yields above Treasury bills.**
 - **Interest is quoted on an add-on basis, assuming a 360-day year**

Money Market Investments

■ Eurodollars

- Dollar-denominated deposits issued by foreign branches of banks outside the United States
- The Eurodollar market is less regulated than the domestic market, so the perceived riskiness is greater.

Money Market Investments

- **Commercial Paper**
 - **Unsecured promissory notes issued by corporations**
 - **Proceeds are use to finance short-term working capital needs**
 - **The issuers are typically the highest quality firms**
 - **Minimum denomination is \$10,000**
 - **Maturities range from 3 to 270 days**
 - **Interest rates are fixed and quoted on a discount basis**
 - **Small banks purchase large amounts of commercial paper as investments**

Money Market Investments

■ Bankers Acceptances

- A draft drawn on a bank by firms that typically are importer or exporters of goods
- Has a fixed maturity, typically up to nine months
- Priced as a discount instrument like T-bills

Capital Market Investments

- **Treasury Notes and Bonds**
 - **Notes have a maturity of 1 - 10 years**
 - **Bonds have a maturity greater than 10 years**
 - **Most pay semi-annual coupons**
 - **Some are zeros or STRIPS**
 - **Sold via closed auctions**
 - **Rates are quoted on a coupon-bearing basis with prices expressed in thirty-seconds of a point, \$31.25 per \$1,000 face value**

Capital Market Investments

■ Treasury STRIPS

- Many banks purchase zero-coupon Treasury securities as part of their interest rate risk management strategies
- The U.S. Treasury allows any Treasury with an original maturity of at least 10 years to be “stripped” into its component interest and principal pieces and traded via the Federal Reserve wire transfer system.
- Each component interest or principal payment constitutes a separate zero coupon security and can be traded separately from the other payments

Capital Market Investments

■ Treasury STRIPS Example

- Consider a 10-year, \$1 million par value Treasury bond that pays 9 percent coupon interest semiannually (\$45,000 every six months)
- This security can be stripped into 20 separate interest payments of \$45,000 each and a single \$1 million principal payment, or 21 separate zero coupon securities.



Capital Market Investments

- **U.S. Government Agency Securities**
 - **Composed of two groups**
 - **Members who are formally part of the federal government**
 - **Federal Housing Administration**
 - **Export-Import Bank**
 - **Government National Mortgage Association (Ginnie Mae)**

Capital Market Investments

- **U.S. Government Agency Securities**
 - **Composed of two groups**
 - **Members who are government-sponsored agencies**
 - **Federal Home Loan Mortgage Corporation (Freddie Mac)**
 - **Federal National Mortgage Association (Fannie Mae)**
 - **Student Loan Marketing Association (Sallie Mae)**
 - **Default risk is low even though these securities are not direct obligations of the Treasury; most investors believe there is a moral obligation.**
 - **These issues normally carry a risk premium of about 10 to 100 basis points.**

Federal Status of U.S. Government Agency Securities

Agency	Full Faith and Credit of the U.S. Government	Authority to Borrow from the Federal Treasury	Interest on Bonds Generally Exempt from State and Local Taxes
Farm Credit System	No	Yes—\$260 million revolving line of credit.	Yes
Farm Credit System Financial Assistance Corporation (FCSFAC)	Yes	Yes—FCSFAC began issuing bonds in late 1988.	Yes
Federal Home Loan Banks (FHLB)	No	Yes—the Treasury is authorized to purchase up to \$4 billion of FHLB securities.	Yes
Federal Home Loan Mortgage Corporation (Freddie Mac)*	No	Yes—indirect line of credit through the FHLBs.	No
Federal National Mortgage Association (FNMA) (Fannie Mae)*	No	Yes—at FNMA request the Treasury may purchase \$2.25 billion of FNMA securities.	No
Financing Corporation (FICO)	No	No	Yes
Student Loan Marketing Association (Sallie Mae)	Not since 1/9/82	Yes—at its discretion the Treasury may purchase \$1 billion of Sallie Mae obligations.	Yes
United States Postal Service†	Guarantee may be extended if Postal Service requests and Treasury determines this to be in the public interest.	Yes—the Postal Service may require the Treasury to purchase up to \$2 billion of its obligations.	Yes
Resolution Funding Corporation (RefCorp)	No	No	Yes
Farmers Home Administration†(FmHA)	Yes	No	No
Federal Financing Bank (FFB)	Yes	Yes—FFB can require the Treasury to purchase up to \$5 billion of its obligations. The Treasury Secretary is authorized to purchase any amount of FFB obligations at his or her discretion.	Yes
General Services Administration†(GSA)	Yes	No	Yes
Government National Mortgage Association†(GNMA)	Yes	No	No
Maritime Administration Guaranteed Ship Financing Bonds issued after 1972	Yes	No	No
Small Business Administration (SBA)	Yes	No	No, with exceptions
Tennessee Valley Authority (TVA)	No	Yes—up to \$150 million.	Yes
Washington Metropolitan Area Transit Authority (WMATA) Bonds	Yes	No	No, except for states involved in the interstate compact

Capital Market Investments

- **Callable Agency Bonds**
 - **Securities issued by government-sponsored enterprises in which the issuer has the option to call the bonds prior to final maturity**
 - **Typically, there is a call deferment period during which the bonds cannot be called**
 - **The issuer offers a higher promised yield relative to comparable non-callable bonds**
 - **The present value of this rate differential essentially represents the call premium**

Capital Market Investments

- **Callable Agency Bonds**
 - **Banks find these securities attractive because they initially pay a higher yield than otherwise similar non-callable bonds**
 - **The premium reflects call risk**
 - **If rates fall sufficiently, the issuer will redeem the bonds early, refinancing at lower rates, and the investor gets the principal back early which must then be invested at lower yields for the same risk profile**

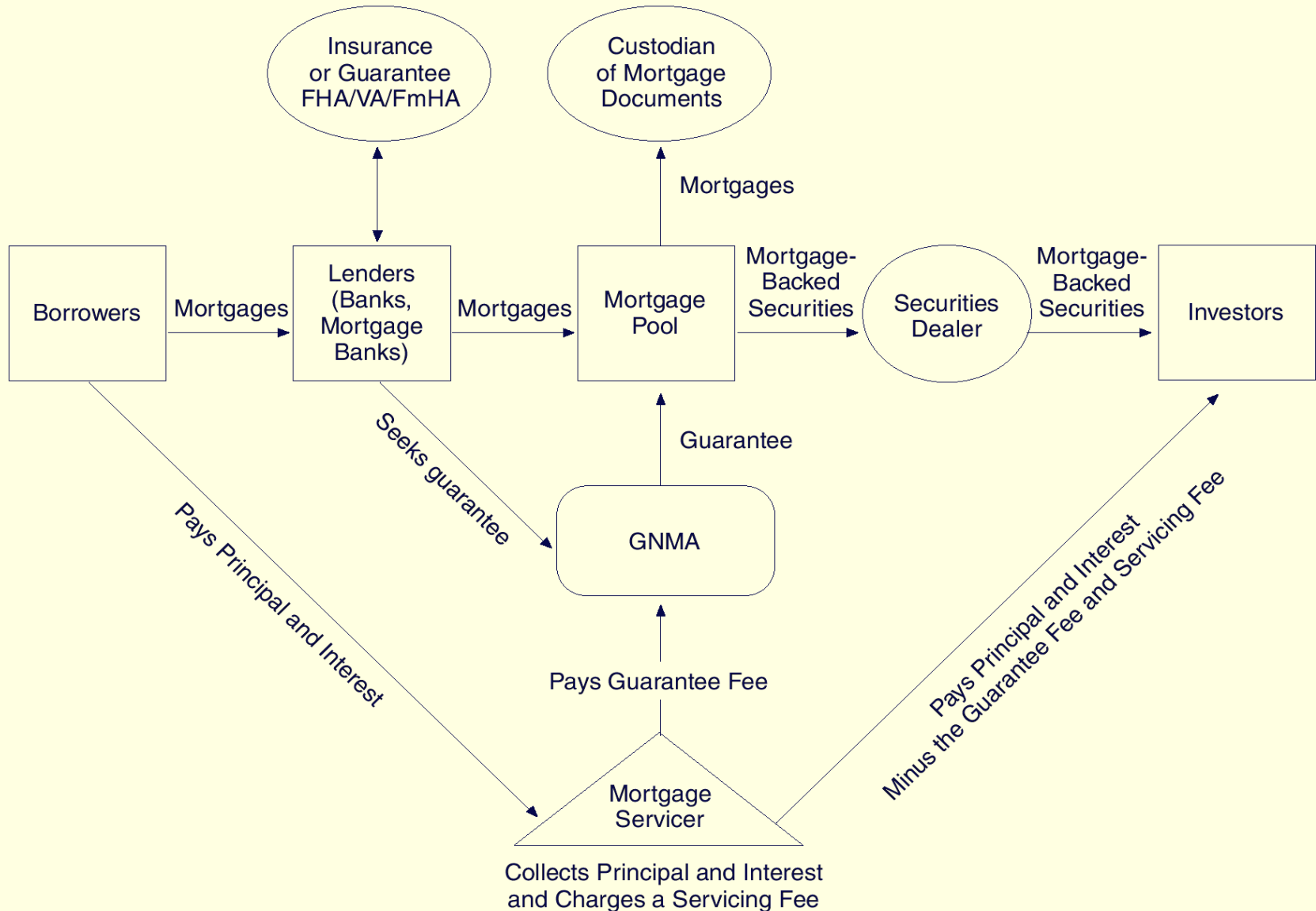
Capital Market Investments

- **Conventional Mortgage-Backed Securities (MBSs)**
 - Any security that evidences an undivided interest in the ownership of mortgage loans
 - The most common form of MBS is the pass-through security
 - Even though many MBSs have very low default risk, they exhibit unique interest rate risk due to prepayment risk
 - As rates fall, individuals will refinance

Capital Market Investments

- **GNMA Pass-Through Securities**
 - **Government National Mortgage Association (Ginnie Mae)**
 - **Government entity that buys mortgages for low income housing and guarantees mortgage-backed securities issued by private lenders**

Structure of the GNMA Mortgage-Backed Pass-Through Security Issuance Process



Capital Market Investments

- **FHLMC**
 - **Federal Home Loan Mortgage Corporation (Freddie Mac)**
- **FNMA securities**
 - **Federal National Mortgage Association (Fannie Mae)**
- **Both are:**
 - **Private corporations**
 - **Operate with an implicit federal guarantee**
 - **Buy mortgages financed largely by mortgage-backed securities**

Capital Market Investments

- **Privately Issued Pass-Through**
 - **Issued by banks and thrifts, with private insurance rather than government guarantee**

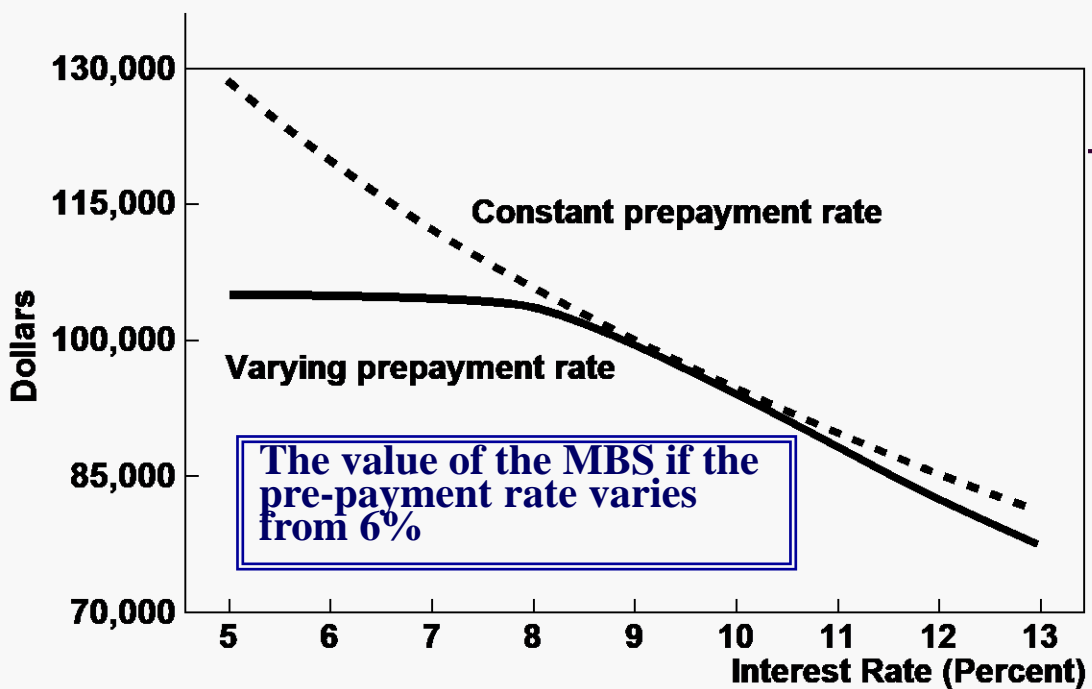
Prepayment Risk on Mortgage-Backed Securities

- Borrowers may prepay the outstanding mortgage principal at any point in time for any reason
- Prepayments generally occur because of fundamental demographic trends as well as movements in interest rates
 - Prepayments typically increase as interest rates fall and slow as rates increase
- Forecasting prepayments is not an exact science

Prepayment Risk on Mortgage-Backed Securities

- **Example:**
 - **Current mortgage rates are 8% and you buy a MBS paying 8.25%**
 - **Because rates have fallen, you paid a premium to earn the higher rate**
 - **With rates only .25% lower, it is unlikely individuals will refinance**
 - **If rates fall 3%, there will be a large increase in prepayments due to refinancing**
 - **If the prepayments are fast enough, you may never recover the premium you paid**

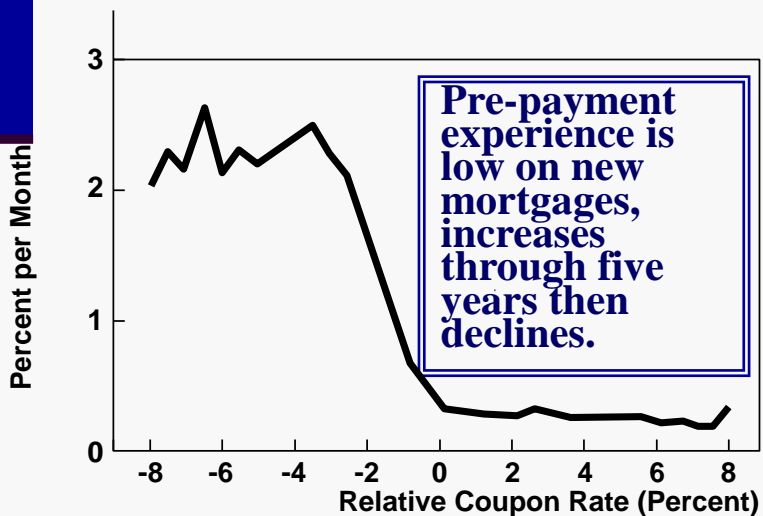
**A. The Interest Sensitivity of Mortgage Pass-Throughs
(Dollar Value of \$100,000 Share in a Mortgage Pool)**



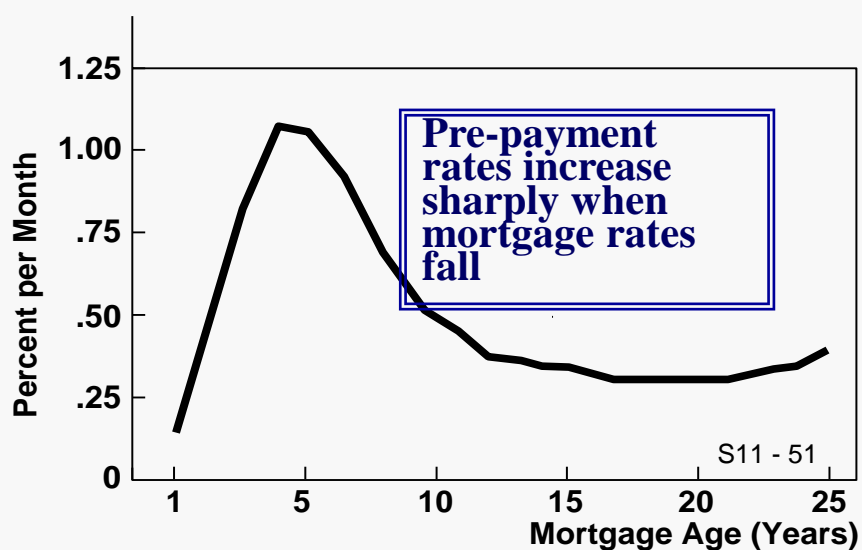
Measures the value of the MBS if the prepayment rate remains at 6% regardless of the level of mortgage rates.

The value of the MBS if the pre-payment rate varies from 6%

B. The Effect of Relative Coupon on the Prepayment Rate



C. The Effect of Mortgage Age on the Prepayment Rate



Unconventional Mortgage-Backed Securities

- **Collateralized Mortgage Obligations (CMOs)**
 - **Security backed by a pool of mortgages and structured to fall within an estimated maturity range (tranche) based on the timing of allocated interest and principal payments on the underlying mortgages**
 - **Tranche:**
 - **The principal amount related to a specific class of stated maturities on a collateralized mortgage obligation. The first class of bonds has the shortest maturities**

Unconventional Mortgage-Backed Securities

- **Collateralized Mortgage Obligations (CMOs)**
 - **CMOs were introduced to circumvent some of the prepayment risk associated with the traditional pass-through security**
 - **CMOs are essentially bonds**
 - **An originator combines various mortgage pools to serve as collateral and creates classes of bonds with different maturities**

Unconventional Mortgage-Backed Securities

- **Collateralized Mortgage Obligations (CMOs)**
 - **The first class, or tranche, has the shortest maturity**
 - **Interest payments are paid to all classes of bonds but principal payments are paid to the first tranche until they have been paid off**
 - **After the first tranche is paid, principal payments are made to the second tranche, etc**

Unconventional Mortgage-Backed Securities

■ Types of CMOs

■ Planned Amortization Class CMO (PAC)

- A security that is retired according to a planned amortization schedule, while payments to other classes of securities are slowed or accelerated
- Least risky of the CMOs
- Objective is to ensure that PACs exhibit highly predictable maturities and cash flows

■ Z-Tranche

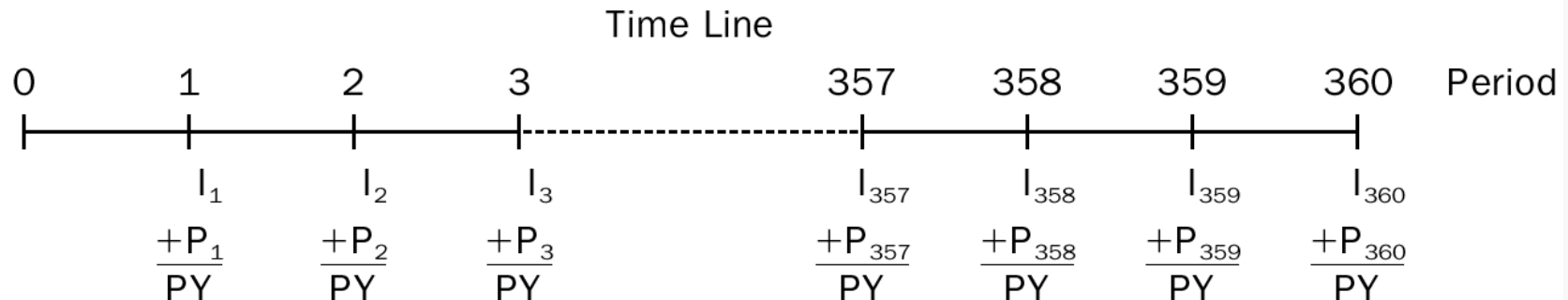
- Final class of securities in a CMO, exhibiting the longest maturity and greatest price volatility
- These securities often accrue interest until all other classes are retired

Unconventional Mortgage-Backed Securities

- **CMOs' Advantages over MBS Pass-Throughs**
 - **Some classes (tranches) exhibit less prepayment risk; some exhibit greater prepayment risk**
 - **Appeal to investors with different maturity preferences by segmenting the securities into maturity classes**

Unconventional Mortgage-Backed Securities

- Stripped Mortgage-Backed Securities
 - More complicated in terms of structure and pricing characteristics
 - Example:
 - Consider a 30 year, 12% fixed-rate mortgage
 - There will be 30 x 12 (360) payments (principal plus interest)
 - Loan amortization means the principal only payments are smaller in the beginning:
 $P_1 < P_2 < \dots < P_{360}$
 - Interest only payments decrease over time:
 $I_1 > I_2 > \dots > I_{360}$



Features of Pass-Through, Government, and Corporate Securities

	Pass-Throughs	Treasuries	Corporates	Stripped Treasuries
Credit risk	Generally high grade; range from government guaranteed to A (private pass-throughs).	Government guaranteed.	High grade to speculative.	Backed by government securities.
Liquidity	Good for agency issued/guaranteed pass-through.	Excellent.	Generally limited.	Fair.
Range of coupons (discount to premium)	Full range.	Full range.	Full range for a few issuers.	Zero coupons (discount securities).
Range of maturities	Medium and long term (fast-paying and seasoned pools can provide shorter maturities than stated).	Full range.	Full range.	Full range.
Call protection	Complex prepayment pattern; investor can limit through selection variables, such as coupon seasoning, and program.	Noncallable (except certain 30-year bonds).	Generally callable after initial limited period of 5 to 10 years.	Noncallable.
Frequency of payment	Monthly payments of principal and interest.	Semiannual interest payment.	Semiannual interest (except Eurobonds, which pay interest annually).	No payments until maturity.
Average life	Lower than for bonds of comparable maturity; can only be estimated due to prepayment risk.	Estimate only for small number of callable issues; otherwise, known with certainty.	Minimum average life known, otherwise a function of call risk.	Known with certainty.
Duration/interest rate risk	Function of prepayment risk; can only be estimated; can be negative when prepayment risk is high.	Unless callable, a simple function of yield, coupon, and maturity; is known with certainty.	Function of call risk; can be negative when call risk is high.	Known with certainty; no interest rate risk if held to maturity.
Basis for yield quotes	Cash flow yield based on monthly prepayments and constant CPR assumption (usually most recent three-month historical prepayment experience).	Based on semiannual coupon payments and 365-day year.	Based on semi-annual coupon payments and 360-day year of twelve 30-day months.	Bond equivalent yield based on either 360- or 365-day year depending on sponsor.
Settlement	Once a month.	Any business day.	Any business day.	Any business day.

Asset-Backed Securities

- **Conceptually, an asset-backed security is comparable to a mortgage-backed security in structure**
- **The securities are effectively “pass-throughs” since principal and interest are secured by the payments on the specific loans pledged as security**
- **Two popular asset-backed securities are:**
 - **Collateralized automobile receivables (CARS)**
 - **CARDS**
 - **Securities backed by credit card loans to individuals**

Other Investments

- **Corporate and Foreign Bonds**
 - **At the end of 2004, banks held \$560 billion in corporate and foreign bonds**
- **Mutual Funds**
 - **Banks have increased their holdings in mutual funds to over \$25 billion in 2004**
 - **Mutual fund investments must be marked-to-market and can cause volatility on the values reported on the bank's balance sheet**

Characteristics of Municipal Securities

- **Municipals are exempt from federal income taxes and generally exempt from state or local as well**
- **General obligation**
 - **Principal and interest payments are backed by the full faith, credit, and taxing authority of the issuer**
- **Revenue Bonds**
 - **Backed by revenues generated from the project the bond proceeds are used to finance**
- **Industrial Development Bonds**
 - **Expenditures of private corporations**

Summary of Terms for a Municipal School Bond

Sequoia Union High School District
 \$30,000,000
 General Obligation Bonds Election of 2001
 Dated: May 1, 2002
 Due: July 1, 2003 through July 1, 2031
 Callable: July 1, 2011 at 102.0% of par, declining
 to par as of July 1, 2013
 Winning Bid: Salomon Smith Barney, at
 100.0000, True interest cost (TIC) of 5.0189%
 Other Managers: Bear, Stearns & Co., Inc., CIBC
 World Markets Corp.,

<u>Due Date</u>	<u>Amount</u>	<u>Coupon</u>	<u>Yield</u>
7/1/2003	\$225,000	7.00%	2.00%
7/1/2004	\$520,000	7.00%	2.50%
7/1/2005	\$545,000	7.00%	3.00%
7/1/2006	\$575,000	7.00%	3.25%
7/1/2007	\$605,000	7.00%	3.50%
7/1/2008	\$635,000	7.00%	3.70%
7/1/2009	\$665,000	7.00%	3.80%
7/1/2010	\$700,000	4.00%	3.90%
7/1/2011	\$735,000	4.00%	4.00%
7/1/2012	\$765,000	4.13%	4.13%
7/1/2013	\$800,000	4.25%	4.25%
7/1/2014	\$835,000	4.38%	4.38%
7/1/2015	\$870,000	4.50%	4.50%
7/1/2016	\$910,000	4.60%	4.60%
7/1/2017	\$950,000	4.70%	4.70%
7/1/2018	\$995,000	4.80%	4.80%
7/1/2019	\$1,045,000	4.90%	4.90%
7/1/2020	\$1,095,000	5.00%	5.00%
7/1/2021	\$1,150,000	5.00%	5.00%
7/1/2022	\$1,210,000	5.00%	5.00%
7/1/2023	\$1,270,000	5.00%	5.00%
7/1/2024	\$1,335,000	5.00%	5.00%
7/1/2025	\$1,405,000	5.00%	5.20%
7/1/2026	\$1,480,000	5.00%	5.21%
7/1/2031	\$8,650,000	5.13%	5.21%

Characteristics of Municipal Securities

- **Money Market Municipals**
 - **Municipal notes provide operating funds for government units**
 - **Banks buy large amounts of short-term municipals**
 - **They often work closely with municipalities in placing these securities**
- **Capital Market Municipals**
 - **Includes general obligation bonds and revenue bonds**

Characteristics of Municipal Securities

- **Credit Risk in the Municipal Portfolio**
 - **Until the 1970s, few municipal securities went into default**
 - **Deteriorating conditions in many large cities ultimately resulted in defaults by:**
 - **New York City (1975), Cleveland (1978), Washington Public Power & Supply System (WHOOOPS) (1983)**

Characteristics of Municipal Securities

- **Liquidity Risk**
 - **Municipals exhibit substantially lower liquidity than Treasury or agency securities**
 - **The secondary market for municipals is fundamentally an over-the-counter market**
 - **Small, non-rated issues trade infrequently and at relatively large bid-ask dealer spreads**
 - **Large issues of nationally known municipalities, state agencies, and states trade more actively at smaller spreads**

Characteristics of Municipal Securities

■ Liquidity Risk

- Name recognition is critical, as investors are more comfortable when they can identify the issuer with a specific location
- Insurance also helps by improving the rating and by association with a known property and casualty insurer

Characteristics of Municipal Securities

- **Municipals are less volatile in price than Treasury securities**
 - **This is generally attributed to the peculiar tax features of municipals**
 - **The municipal market is segmented**
 - **On the supply side, municipalities cannot shift between short- and long-term securities to take advantage of yield differences because of constitutional restrictions on balanced operating budgets**
 - **Thus long-term bonds cannot be substituted for short-term municipals to finance operating expenses, and**
 - **Capital expenditures are not financed by ST securities**

Characteristics of Municipal Securities

- **Municipals are less volatile in price than Treasury securities**
 - **The municipal market is segmented.**
 - **On the demand side, banks once dominated the market for short-term municipals**
 - **Today, individuals via tax-exempt money market mutual funds dominate the short maturity spectrum**

Establishing Investment Policy Guidelines

- **Each bank's asset and liability or risk management committee is responsible for establishing investment policy guidelines**
 - **These guidelines define the parameters within which investment decisions help meet overall return and risk objectives**
 - **Because securities are impersonal loans that are easily bought and sold, they can be used at the margin to help achieve a bank's liquidity, credit risk, and earnings sensitivity or duration gap targets**

Establishing Investment Policy Guidelines

- **Investment guidelines identify specific goals and constraints regarding:**
 - **Return Objective**
 - **Composition of Investments**
 - **Liquidity Considerations**
 - **Credit Risk Considerations**
 - **Interest Rate Risk Considerations**
 - **Total Return Versus Current Income**

Active Investment Strategies

- **Portfolio managers can buy or sell securities to achieve aggregate risk and return objectives**
- **Investment strategies can subsequently play an integral role in meeting overall asset and liability management goals**
- **Unfortunately, not all banks view their securities portfolio in light of these opportunities**

Active Investment Strategies

- **Many smaller banks passively manage their portfolios using simple buy and hold strategies**
- **The purported advantages are that such a policy requires limited investment expertise and virtually no management time; lowers transaction costs; and provides for predictable liquidity**

Active Investment Strategies

- **Other banks actively manage their portfolios by:**
 - **Adjusting maturities**
 - **Changing the composition of taxable versus tax-exempt securities**
 - **Swapping securities to meet risk and return objectives**
- **Advantage is that active portfolio managers can earn above-average returns by capturing pricing discrepancies in the marketplace**
- **Disadvantages are:**
 - **that managers must consistently out predict the market for the strategies to be successful, and**
 - **high transactions costs**

The Maturity or Duration Choice for Long-Term Securities

- **The optimal maturity or duration is possibly the most difficult choice facing portfolio managers**
- **It is very difficult to outperform the market when forecasting interest rates**
- **Some managers justify passive buy and hold strategies because of a lack of time and expertise**
- **Other managers actively trade securities in an attempt to earn above average returns**

Passive Maturity Strategies

- **Laddered (or Staggered) maturity strategy**
 - **Management initially specifies a maximum acceptable maturity and securities are evenly spaced throughout maturity**
 - **Securities are held until maturity to earn the fixed returns**

Passive Maturity Strategies

- **Barbell Maturity Strategy**
 - **Differentiates investments between those purchased for liquidity and those for income**
 - **Short-term securities are held for liquidity**
 - **Long-term securities for income**
 - **Also labeled the long and short strategy**

Active Maturity Strategies

- **Active portfolio management involves taking risks to improve total returns by:**
 - **Adjusting maturities**
 - **Swapping securities**
 - **Periodically liquidating discount instruments**
- **To be successful, the bank must avoid the trap of aggressively buying fixed-income securities at relatively low rates when loan demand is low and deposits are high**

Active Maturity Strategies

- **Riding the Yield Curve**
 - **This strategy works best when the yield curve is upward-sloping and rates are stable.**
 - **Three basic steps:**
 - **Identify the appropriate investment horizon**
 - **Buy a par value security with a maturity longer than the investment horizon and where the coupon yield is higher in relationship to the overall yield curve**
 - **Sell the security at the end of the holding period when time remains before maturity**

Riding the Yield Curve Example

Initial conditions and assumptions:

- 5-year investment horizon
- yield curve is upward-sloping,
- 5-year securities yielding 7.6 % and
- 10-year securities yielding 8 %.
- Annual coupon interest is reinvested at 7%.

Period: Year-End	Buy a 5-Year Security		Buy a 10-Year Security and Sell It after 5 Years	
	Coupon Interest	Reinvestment Income at 7%	Coupon Interest	Reinvestment Income at 7%
1	\$7,600	-	\$ 8,000	-
2	7,600	\$ 532	8,000	\$ 560
3	7,600	1,101	8,000	1,159
4	7,600	1,710	8,000	1,800
5	7,600	2,362	8,000	2,486
Total	\$38,000	\$5,705	\$40,000	\$6,005
5	Principal at Maturity = \$100,000		Price at Sale after 5 years = \$101,615 when rate = 7.6%	

Expected Total Return Calculation

$$i_{5yr} = \left[\frac{(100,000 + 38,000 + 5,705)}{100,000} \right]^{1/5} - 1 = 0.0752$$

$$y_{10yr} = \left[\frac{(101,615 + 40,000 + 6,005)}{100,000} \right]^{1/5} - 1 = 0.0810$$

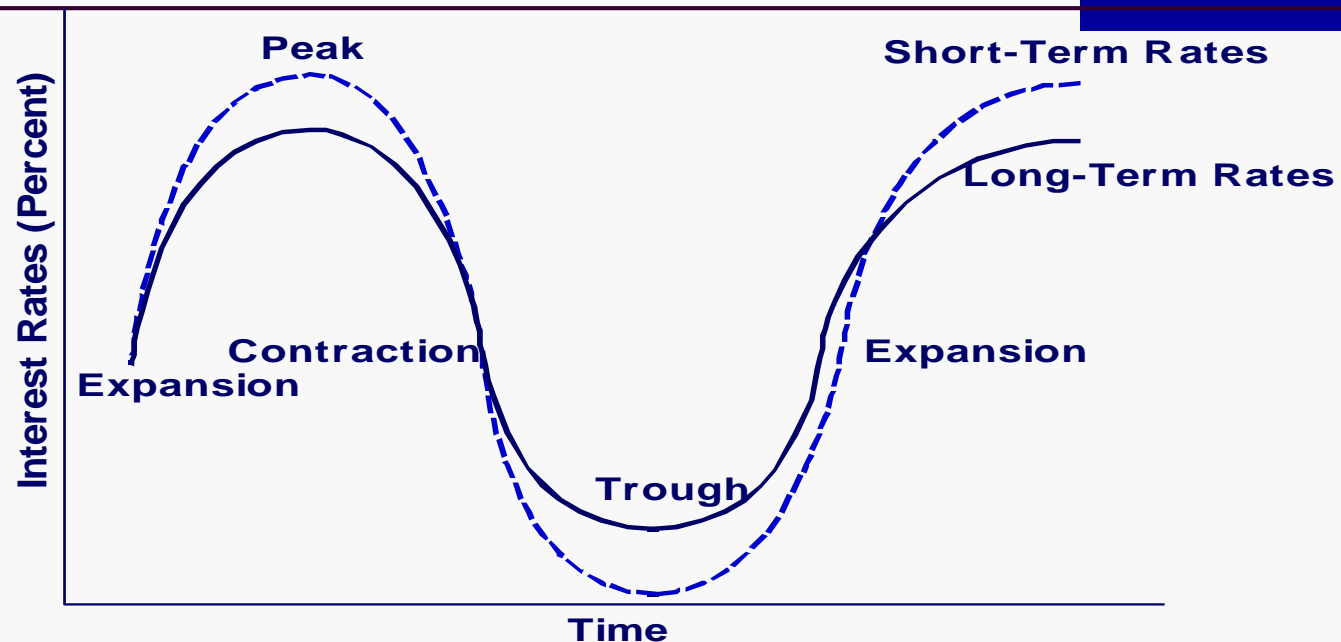
Interest Rates and the Business Cycle

- **Expansion**
 - **Increasing Consumer Spending**
 - **Inventory Accumulation**
 - **Rising Loan Demand**
 - **Federal Reserve Begins to Slow Money Growth**
- **Peak**
 - **Monetary Restraint**
 - **High Loan Demand**
 - **Little Liquidity**

Interest Rates and the Business Cycle

- **Contraction**
 - **Falling Consumer Spending**
 - **Inventory Contraction**
 - **Falling Loan Demand**
 - **Federal Reserve Accelerates Money Growth**
- **Trough**
 - **Monetary Policy Eases**
 - **Limited Loan Demand**
 - **Excess Liquidity**

Interest rates and the Business Cycle



- The inverted U.S. yield curve has predicted these recessions:

Date when 1yr > 10 yr rate	Time until next recession
April 1968	20 months (Dec. 1969)
March 1973	8 months (Nov 1973)
September 1978	16 months (Jan. 1980)
September 1980	10 months (July 1981)
February 1989	17 months (July 1990)
December 2000*	<u>3 months (March 2001)</u>
	12.3 months average

Passive Strategies Over the Business Cycle

- **One popular passive investment strategy follows from the traditional belief that a bank's securities portfolio should consist of primary reserves and secondary reserves**
- **This view suggests that banks hold short-term, highly marketable securities primarily to meet unanticipated loan demand and deposit withdrawals**
- **Once these primary liquidity reserves are established, banks invest any residual funds in long-term securities that are less liquid but offer higher yields**

Passive Strategies Over the Business Cycle

- **A problem arises because banks normally have excess liquidity during contractionary periods when loan demand is declining and the Fed starts to pump reserves into the banking system**
- **Interest rates are thus relatively low.**

Passive Strategies Over the Business Cycle

- Banks employing this strategy add to their secondary reserve by buying long-term securities near the low point in the interest rate cycle
 - Long-term rates are typically above short-term rates, but all rates are relatively low
- With a buy and hold orientation, these banks lock themselves into securities that depreciate in value as interest rates move higher

Active Strategies Over the Business Cycle

- Many portfolio managers attempt to time major movements in the level of interest rates relative to the business cycle and adjust security maturities accordingly
- Some try to time interest rate peaks by following a counter-cyclical investment strategy defined by changes in loan demand and the yield curve's shape

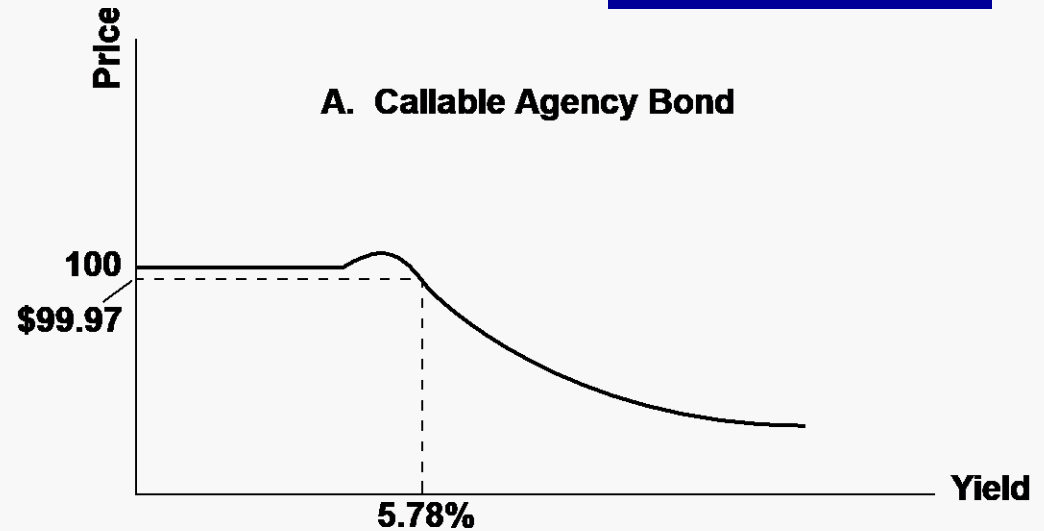
Active Strategies Over the Business Cycle

- **The strategy entails both expanding the investment portfolio and lengthening maturities at the top of the business cycle, when both interest rates and loan demand are high**
 - **Note that the yield curve generally inverts when rates are at their peak prior to a recession**
- **Alternatively, at the bottom of the business cycle when both interest rates and loan demand are low, a bank contracts the portfolio and shortens maturities**

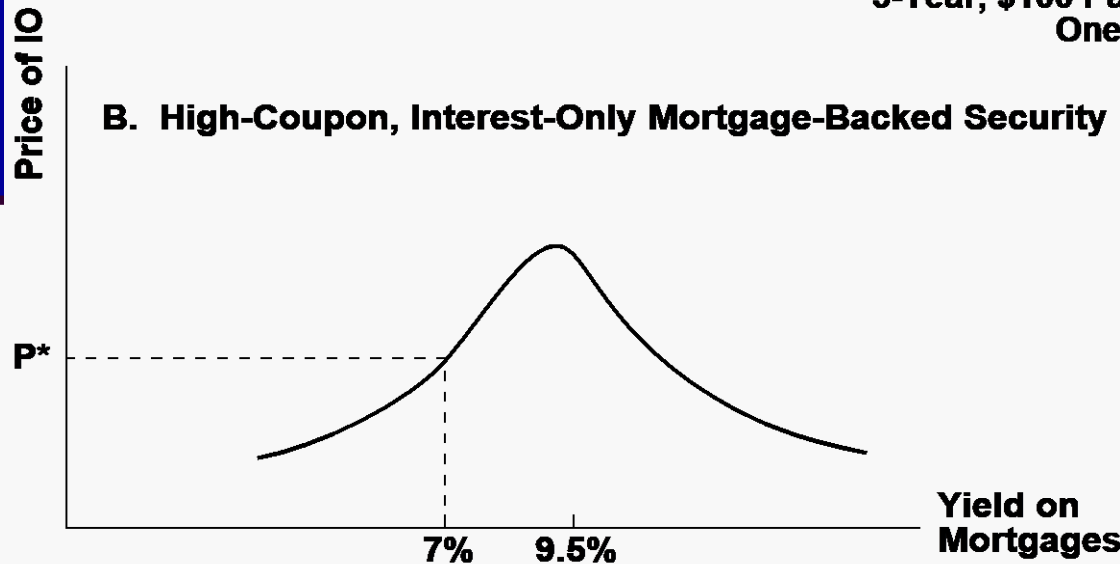
The Impact of Interest Rates on the Value of Securities with Embedded Options

- **Issues for Securities with Embedded Options**
 - **Callable agency securities or mortgage-backed securities have embedded options**
 - **To value a security with an embedded option, three questions must be addressed**
 - **Is the investor the buyer or seller of the option?**
 - **How and by what amount is the buyer being compensated for selling the option, or how much must it pay to buy the option?**
 - **When will the option be exercised and what is the likelihood of exercise?**

Price-Yield Relationship for Securities with Embedded Options



3-Year, \$100 Par Value FHLB Bond, Callable after One Year, Priced at \$99.97



The Roles of Duration and Convexity in Analyzing Bond Price Volatility

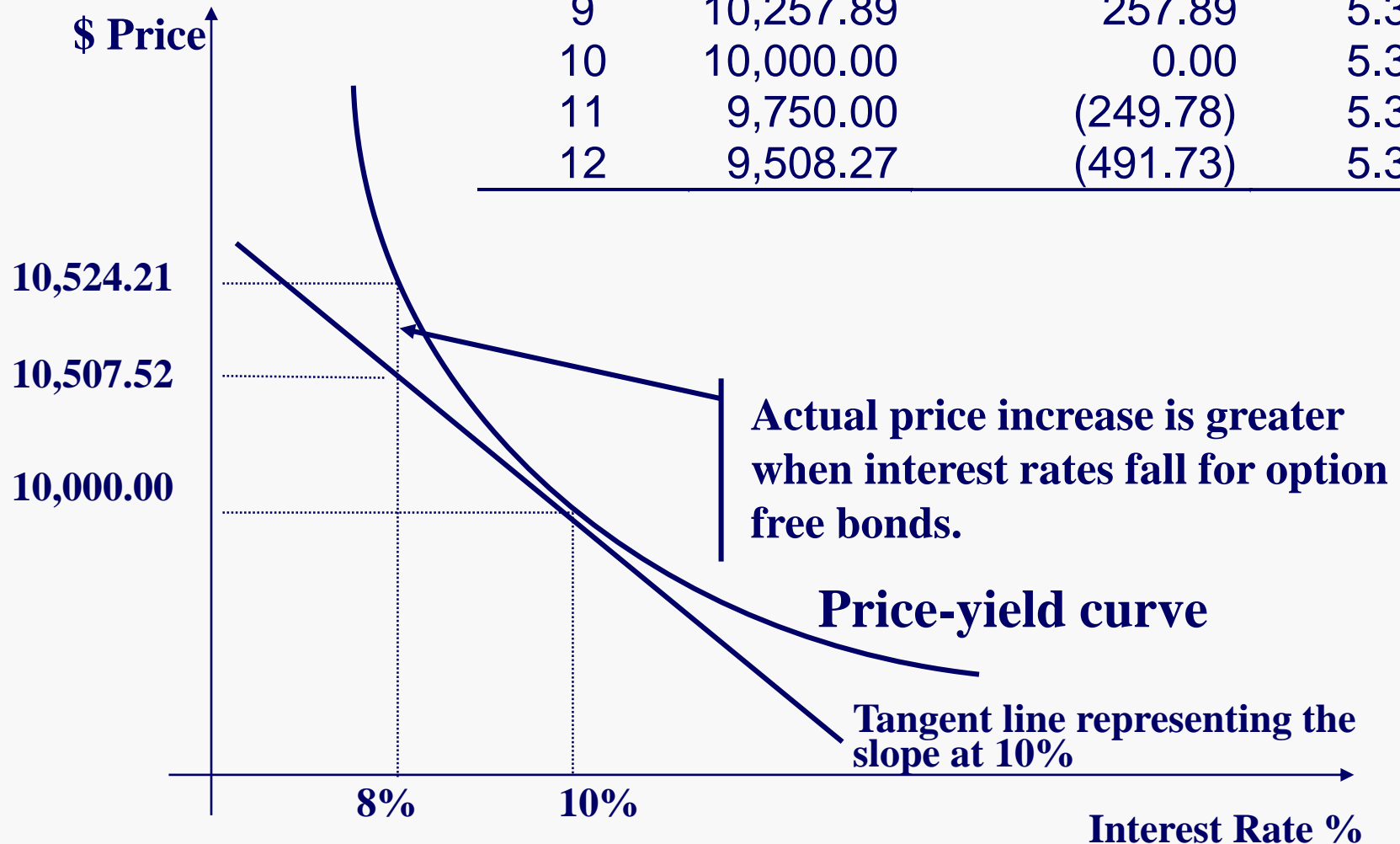
- Recall that the duration for an option-free security is a weighted average of the time until the expected cash flows from a security will be received

$$\text{Duration} \cong - \frac{\frac{\Delta P}{P}}{\frac{\Delta i}{(1+i)}}$$

$$\Delta P \cong - \text{Duration} \left[\frac{\Delta i}{(1+i)} \right] P$$

The Roles of Duration and Convexity in Analyzing Bond Price Volatility

Yield %	Price	Price - \$10,000	Duration
8	10,524.21	524.21	5.349
9	10,257.89	257.89	5.339
10	10,000.00	0.00	5.329
11	9,750.00	(249.78)	5.320
12	9,508.27	(491.73)	5.310



The Roles of Duration and Convexity in Analyzing Bond Price Volatility

- From the previous slide, we can see:
 - The difference between the actual price-yield curve and the straight line representing duration at the point of tangency equals the error in applying duration to estimate the change in bond price at each new yield
 - For both rate increases and rate decreases, the estimated price based on duration will be below the actual price

The Roles of Duration and Convexity in Analyzing Bond Price Volatility

- From the previous slide, we can see:
 - Actual price increases are greater and price declines less than that suggested by duration when interest rates fall or rise, respectively, for option-free bonds
 - For small changes in yield the error is small
 - For large changes in yield the error is large

The Roles of Duration and Convexity in Analyzing Bond Price Volatility

■ Convexity

- The rate of change in duration when yields change
- It attempts to improve upon duration as an approximation of price

$$\Delta \text{Price Due to Convexity} = \text{Convexity}(\Delta i^2) \text{Price}$$

- This is positive feature for buyers of bonds because as yields decline, price appreciation accelerates

The Roles of Duration and Convexity in Analyzing Bond Price Volatility

■ Convexity

- As yields increase, duration for option free bonds decreases, once again reducing the rate at which price declines
- This characteristic is called positive convexity
 - The underlying bond becomes more price sensitive when yields decline and less price sensitive when yields increase

Impact of Prepayments on Duration and Yield for Bonds with Options

- Embedded options affect the estimated duration and convexity of securities
- For example, prepayments will affect the duration of mortgage-backed securities
 - Market participants price mortgage-backed securities by following a 3-step procedure:
 - Estimate the duration based on an assumed interest rate environment and prepayment speed
 - Identify a zero-coupon Treasury security with the same (approximate) duration.
 - The MBS is priced at a mark-up over the Treasury

Impact of Prepayments on Duration and Yield for Bonds with Options

- **The MBS yield is set equal to the yield on the same duration Treasury plus a spread**
 - **The spread can range from 50 to 300 basis points depending on market conditions**
 - **The MBS yields reflect the zero-coupon Treasury yield curve plus a premium**

Total Return Analysis

- **An investor's actual realized return should reflect the coupon interest, reinvestment income, and value of the security at maturity or sale at the end of the holding period**
- **When a security carries embedded options, these component cash flows will vary in different interest rate environments**

Total Return Analysis

- **If rates fall and borrowers prepay faster than originally expected:**
 - **Coupon interest will fall**
 - **Reinvestment income will fall**
 - **The price at sale (end of the holding period) may rise or fall depending on the speed of prepayments**

Total Return Analysis

- **When rates rise**
 - **Borrowers prepay slower**
 - **Coupon income increases**
 - **Reinvestment income increases**
 - **The price at sale may rise or fall**