# CHAPTER 04:
# FIXED INTEREST RATE MORTGAGE LOANS

# Mortgage Interest Rates

- Demand for mortgages is essentially derived demand; without a demand for real estate, the demand for mortgages would not exist.
- What will borrowers pay for the use of funds?
- What are lenders willing to accept for the use of funds?
- Mortgage Funds Supply Factors:  Alternative Investments

# Components of the Mortgage Interest Rate

- Real Rate of Interest
  - Time Preference for Consumption
    - All things being equal, we would rather consume now.
    - Interest is compensation to delay a purchase
  - Production Opportunities in the Economy
    - Competition for funds when there are other investment opportunities
- Inflation Expectation
  - Directly impacts interest rates
- Nominal interest rates
  - Generally expressed on annual basis.

# Components of the Mortgage Interest Rate

- Default Risk
- Interest Rate Risk
  - Anticipated Inflation and Unanticipated Inflation
- Prepayment Risk
- Liquidity Risk
- Legislative Risk
  - Governments periodically change the “rules of the game”. As a lender, you take on the risk that the government may change the laws that will make it more difficult or impossible for you to collect on a debt.

# Components of the Mortgage Interest Rate

$$i_t = r_1 + p_1 + f_1$$

$r_1$ = Real Rate

$p_1$ = Risk Premiums

$f_1$ = Inflation Rate

# Mortgage Loan Terms

- Loan amount
- Loan maturity date
- Interest rate
  - Nominal vs. real
- Periodic payments
  - Effective annual rate of interest
- Constant Payment Mortgage (CPM)

# Loan Amortization Patterns

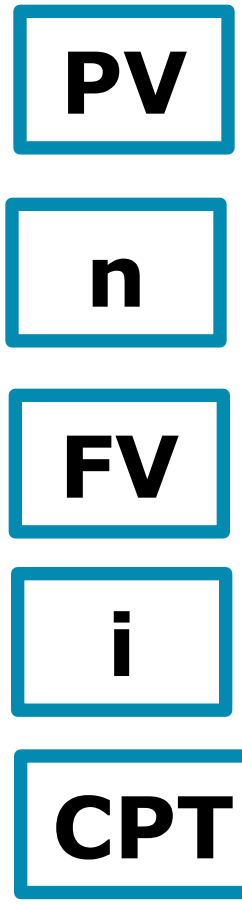
- Accrued Interest and Loan Payments
  - Accrual rate vs. pay rate

| **Type of CPM Loan** | **Pay Rate** | **Loan Balance at Maturity** |
|---|---|---|
| Fully Amortizing | > Accrual rate | Fully repaid |
| Partially Amortizing | > Accrual rate | Not fully repaid |
| Interest Only | = Accrual rate | = Amount Borrowed |
| Negative Amortizing | < Accrual rate | > Amount Borrowed |

# Mortgage Payment Patterns

- Example 4-1
- Calculating the Payment for a CPM
  - $100,000 Mortgage
  - 7% Interest
  - 30 Years
  - Monthly Payments

# Mortgage Payment Patterns




= $100,000

= 30 x 12 = 360

= $0

= 7%/12 = .58333

(or change P/Y to 12 and enter 7)

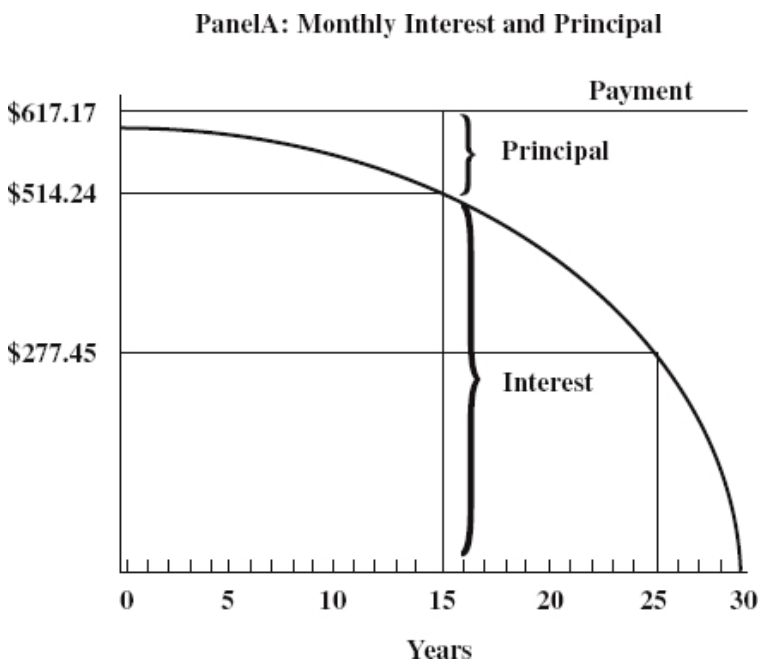
= $665.30

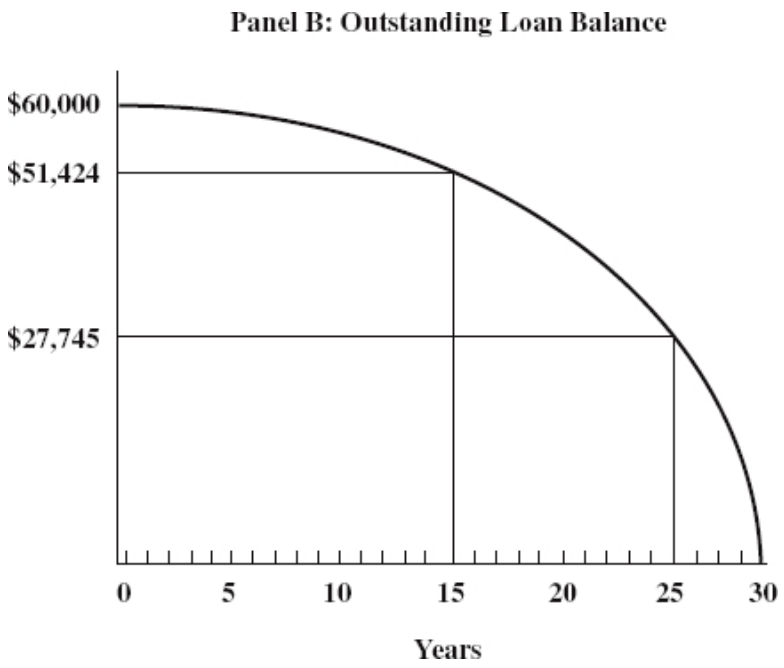
# Mortgage Payment Patterns

- Interest paid in the first month
  - (.07/12) x $100,000 = $583.33
- Principal paid in the first month
  - $665.30 - $583.33 = $81.96
- Every month, interest portion declines
- Every month, principal portion increases.

# Exhibit 4-2

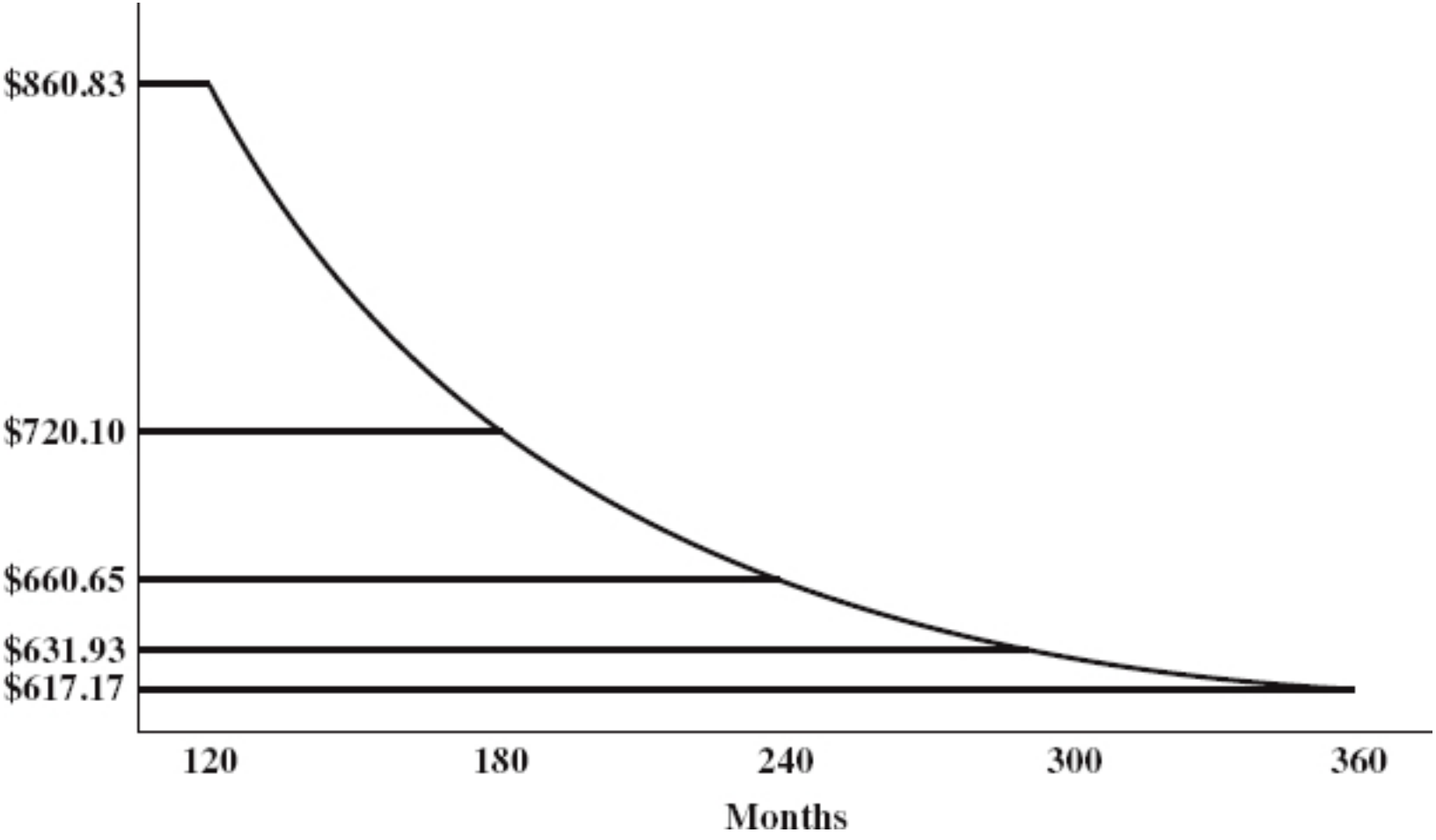
## Monthly Payment, Principal, Interest, and Loan Balances for a Fully Amortizing, Constant Payment Mortgage



# Exhibit 4-3

## Relationship between Monthly Mortgage Payments and Maturity Periods: Fully Amortizing Loans



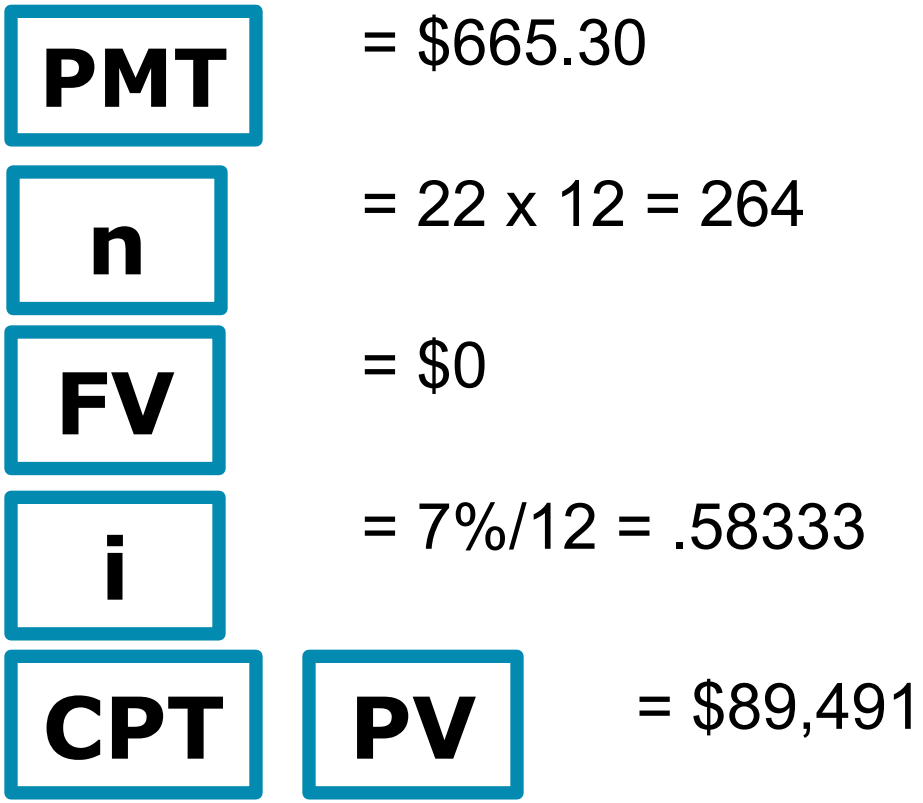
# Computing a Loan Balance

- Essentially “removing” the interest that was built into the payment.
- Two mathematical methods
  - Compute the present value of the remaining payments.
  - Compute the future value of the amortized loan amount.

# Computing a Loan Balance

- There are 3 methods to do this with a financial calculator
  - From Example 4-1, what is the future expected loan balance in 8 years?

# Computing a Loan Balance
# Present Value Method



# Computing a Loan Balance
# Future Value Method

**PV** = $100,000

**n** = 8 x 12 = 96

**PMT** = $665.30

**i** = 7%/12 = .58333

**CPT** **FV** = $89,491

# Computing a Loan Balance Amortization Function Method

- Step 1: Compute Payment = $665.30
- Step 2: Press **AMORT**

= P1 = 1 **ENTER** ↓

= P2 = 96 **ENTER** ↓

Balance = $89,491

# Loan Closing Costs

- Loan Closing Costs
- Additional Finance Charges
  - Loan Origination Fees
    - Cover origination expenses
  - Loan Discount Fees – “Points”
    - Used to raise the yield on the loan
    - Borrower trade-off: points vs. contract rate
    - 1 Point = 1% of the loan amount

# Loan Closing Costs

- Why Points?
  - “Sticky” mortgage rates
  - It’s a way to price in the risk of a borrower.
  - Early repayment of a loan does not allow recovery of origination costs. It’s a way to cover the lender for the overhead of running its business.
  - Earn a profit on loans sold to investors at a yield equal to the loan interest rate.

# Loan Fees and Borrowing Costs

- Calculating the effective interest cost
- Example 4-2:
  - $250,000 home
  - 80% LTV Loan
  - 8% Interest
  - 4 Points
  - 30 Years

# Loan Fees and Borrowing Costs

- Step 1: Compute payment using the face value of the loan.

| | |
|---|---|
| **PV** | = $200,000 |
| **n** | = 360 |
| **i** | = 8 |
| **PMT** | = $1,467.53 |

But, with points paid up front, the borrower actually receives less than the face value.

# Loan Fees and Borrowing Costs

- Step 2:

Loan Amount = $200,000

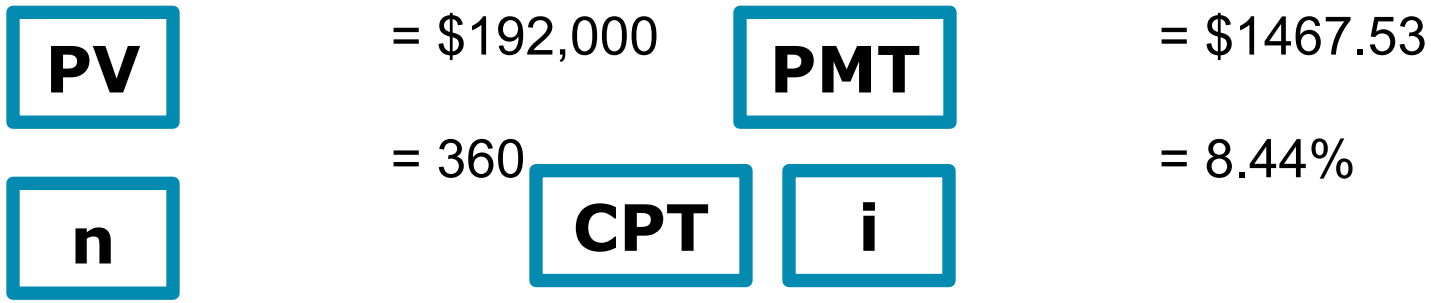
\- Points Paid = (.04 x $200,000)

Amount Received = $192,000

- Compute effective interest cost, using the Amount Received from Step 2 & Payment from Step 1.

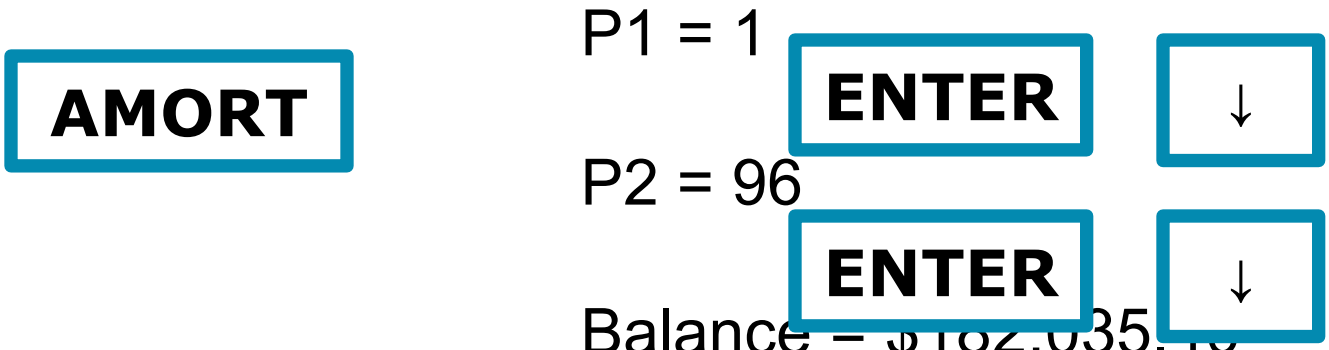
# Loan Fees and Borrowing Costs

- Compute effective interest cost:



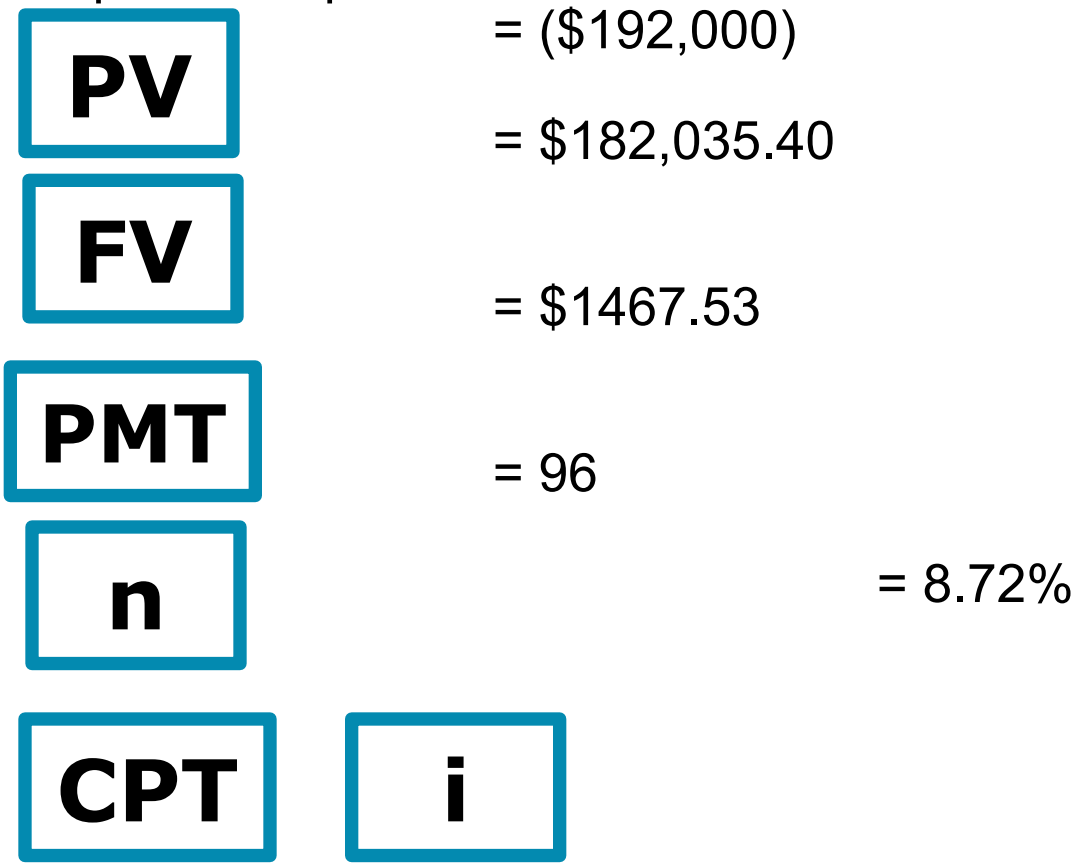
# Loan Fees and Borrowing Costs

- What is the effective cost if we think this loan might be repaid after 8 years?
  - Step 1: Compute PMT = $1467.53
  - Step 2: Compute Future Loan Balance



# Loan Fees and Borrowing Costs

- Step 3: Compute effective interest cost.



# Truth-in-Lending Act

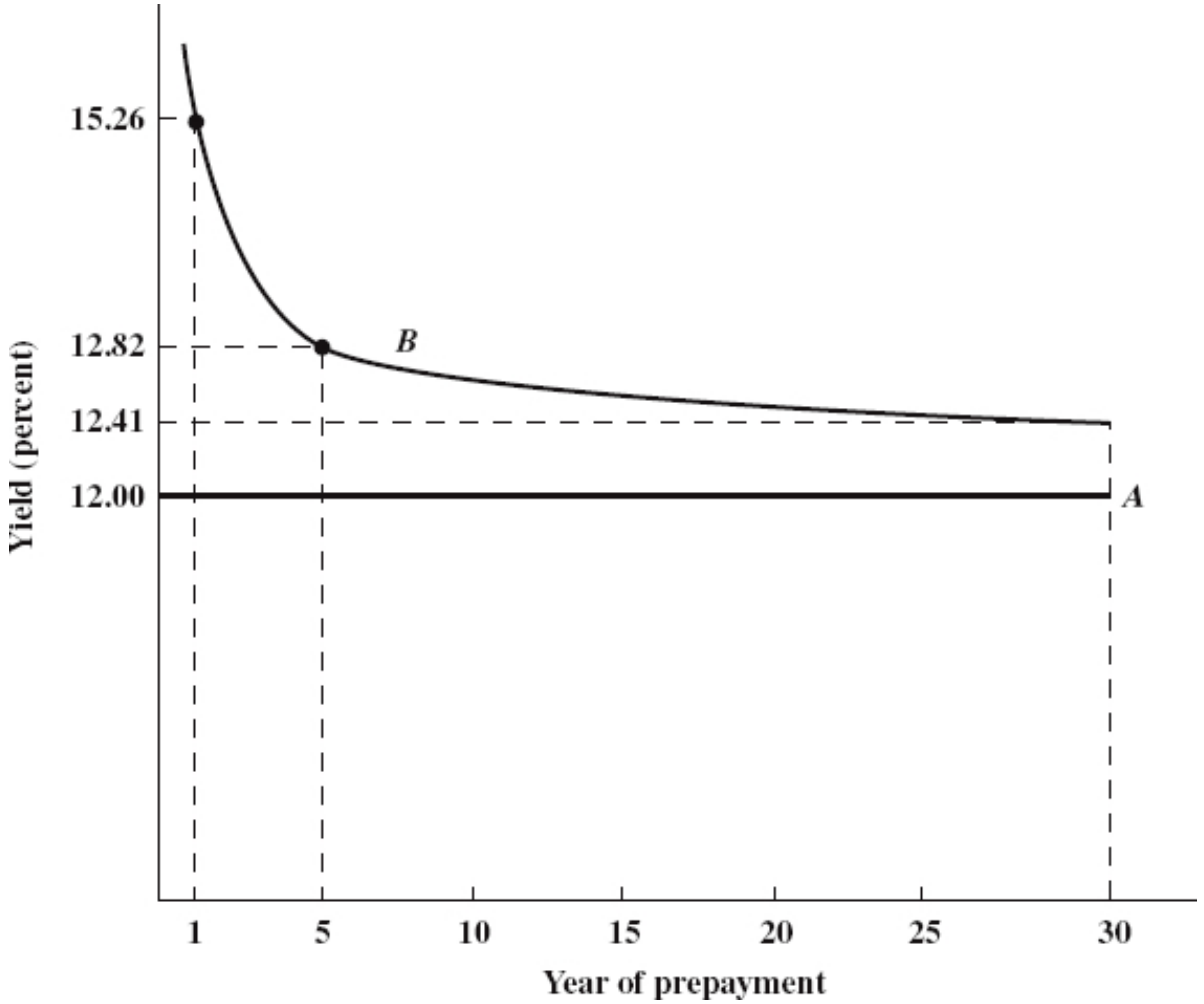
- Truth-in-Lending Act
- Annual Percentage Rate (“APR”)

# “Pricing” FRMs

- By adjusting the fees that are charged, different effective rates of interest may be achieved.
- Prepayment will also effect the effective rate of interest.

# Exhibit 4-8

## Relationship between Mortgage Yield and Financing Fees at Various Repayment Dates



# Other FRM Loan Patterns

- Constant Amortizaton Mortgages
- Callable Loans

# Reverse Mortgages

- Essentially, we're running the math in reverse.
- Instead of the borrower receiving money at the beginning and paying it back over time, the borrower is receiving money over time and paying it back at the end of the life of the mortgage.