

Mortgage Contracts

Mortgage: loan that is collateralized by real property

↓
lender can take property back if borrower does not fulfill

Principal: Amount of money advanced to borrower

Term/Maturity: Period over which the loan is repaid

Loan-to-value: Ratio of principal to home value

Most popular mortgage: 30 yr (FRM)

- Equal monthly payments for 30 yr

Fixed rate are prepayable

- Option to pay off part or all of it anytime

- When borrower moves or refinances

Formula:
$$P \times r_m \left[\frac{1}{1 - (1 - r_m)^{-360}} \right]$$

Annuity - Fixed payments at equal intervals

Present value (P) =
$$\sum_{n=1}^N \frac{PMT}{(1+r)^n}$$

PMT - fixed payment

N - maturity

r - rate

Perpetuity - Fixed payments
aka in equal variables forever
Perpetual bonds/consols

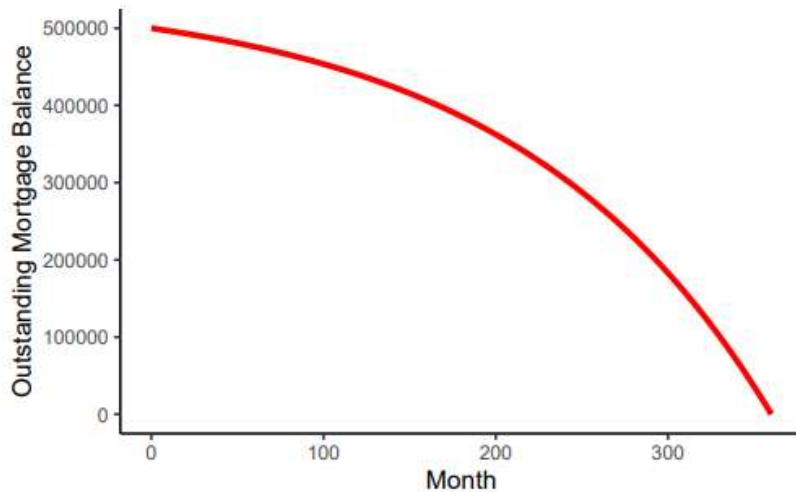
Perpetuity value:
$$\sum_{n=1}^{\infty} PMT \left(\frac{1}{1+r} \right)^n = \frac{PMT}{r} \rightarrow \begin{array}{l} N \text{ periods} \\ \text{in the} \\ \text{future, multiply} \\ \text{by } \left(\frac{1}{1+r} \right)^N \end{array}$$

$$PMT = pr \left(\frac{1}{1 - \left(\frac{1}{1+r} \right)^N} \right)$$

future value by $\left(\frac{1}{1+r} \right)^N$

Mortgage + Amortization Schedule

Much of the monthly payments goes towards interest, eventually most goes towards principal



Accrued interest goes down as you pay down the line

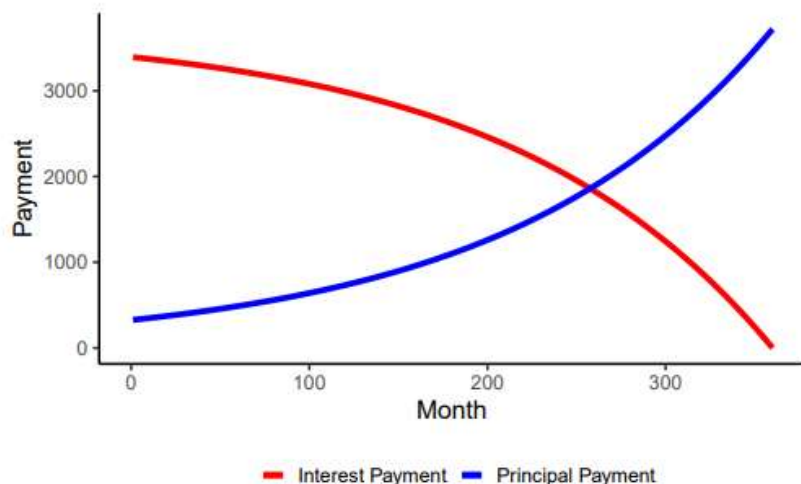
Early in the loan a larger fraction of your monthly payment services interest

- It's easy to calculate the share of your payment going to interest in any month k :

$$INTPMT(k) = r \times BAL(k) \propto \text{Balance}$$

- The reminder of your payment goes toward the principal:

$$PRINPMT(k) = PMT - INTPMT(k)$$



Part 2

Additional costs when taking a mortgage

- Fees - up front (i.e., admin fees/recording tax)
- Discount points
 - Pay up front in exchange for lower int. rate
 - 1 point = 1% of principal
 - Points are tax deductible
 - Good if your mortgage stays towards maturity

Effective Yield

- Adjusts int rate for fees, points, other charges
- Compare real costs of different mortgages

Adjustable Rate Mortgage

- Int rate + payments adjust based on agreed upon market index