

Lecture 12: Mortgage Markets

ECON435: Financial Markets and the Macroeconomy

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Introduction

Mortgage:

- long-term loan
- secured by real estate and [traditionally] a downpayment
- paid off over time (amortization)
- fixed rate or variable rate

typically residential (around 80%)

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History of the Mortgage Market

In 19th century:

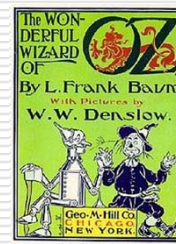
- National Banking Act restricted mortgage lending
 - many states forbid mortgage lending
 - banks should not tie up their capital
- mortgages mostly from wealthy individuals

Late 19th century: mortgage brokers sold bonds backed by mortgages in mid-West

- big boom
- big recession in 1890s (Bryan's "cross of gold" speech)

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The Wonderful Wizard of Oz



http://en.wikipedia.org/wiki/Political_interpretations_of_The_Wonderful_Wizard_of_Oz

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After WW I

- Banks were allowed to originate mortgages
- Again, large boom
- Popularity of "balloon loans"

- Big crash 1929
- Great Depression 1930 - 1933

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Calculating Mortgage Payments

What is the monthly payment P on a mortgage in the amount of PV that runs for T months at a monthly interest rate of i_m ?

$$\begin{aligned} PV &= \frac{P}{1+i_m} + \frac{P}{(1+i_m)^2} + \frac{P}{(1+i_m)^3} + \dots + \frac{P}{(1+i_m)^T} = \\ &= \frac{P}{1+i_m} \left[1 + \frac{1}{1+i_m} + \frac{1}{(1+i_m)^2} + \dots + \frac{1}{(1+i_m)^{T-1}} \right] = \\ &= \frac{P}{1+i_m} \cdot \frac{1 - \left(\frac{1}{1+i_m}\right)^T}{1 - \frac{1}{1+i_m}} = \frac{P}{1+i_m} \cdot \frac{1 - \left(\frac{1}{1+i_m}\right)^T}{\frac{i_m}{1+i_m}} = \\ &= \frac{P}{i_m} \cdot \left[1 - \left(\frac{1}{1+i_m}\right)^T \right] \end{aligned}$$

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Example: Mortgage Payments

Mortgage parameters:

- \$100k mortgage = PV
- 6% nominal rate = .5% monthly interest rate = i_m
- 30 years = 360 months = T

Monthly payment P :

$$P = PV \cdot \frac{i_m}{1 - \left(\frac{1}{1+i_m}\right)^T} = 100,000 \frac{.005}{1 - \left(\frac{1}{1.005}\right)^{360}} =$$

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Mortgage Interest Rates

Determinants of Mortgage Interest Rates:

1. Long-term market rates
 - benchmark: Treasuries
 - spread determined by riskiness of borrower
2. Term: 30 years, 20 years, 15 years, ...
3. Discount points (or "points"):
 - points = interest payments made at closing of loan
 - points reduce interest rate for rest of loan term
 - important consideration: how long will you stay?

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30y-Mortgage Rates



Data: from bankrate.com, 2006 - 2011

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30y vs. 15y-Mortgage Rates



Data: from bankrate.com, 2006 - 2011

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Mortgage Loan Amortization

- Monthly payments have to "fully amortize" the mortgage = pay off principal + interest
- In the beginning: major part of payments covers interest
- Towards the end: large part of payments repays principal

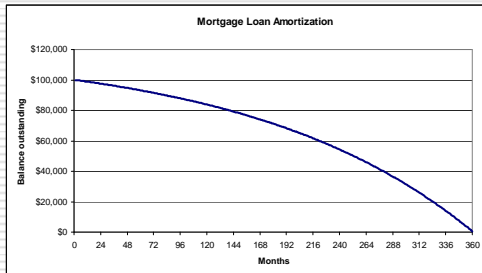
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Mortgage Loan Amortization

Month	Starting Balance	Interest	Payment	Closing Balance
1	100,000.00	500.00	599.55	99,900.45
2	99,900.45	499.50	599.55	99,800.40
3	99,800.40	499.00	599.55	99,699.85
...
12	98,877.15	494.39	599.55	98,771.99
24	97,579.89	487.90	599.55	97,468.24
60	93,187.97	465.94	599.55	93,054.36
120	83,865.95	419.33	599.55	83,685.72
...
222	59,962.31	299.81	599.55	59,662.57
...
358	1,780.81	8.90	599.55	1,190.17
359	1,190.17	5.95	599.55	596.57
360	596.57	2.98	599.55	0.00

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Mortgage Loan Amortization



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Example of Current Mortgage Rates

Fixed	Lender	APR	Disc/Orig points	Rate	Fees in APR	Lock	Est. Points
30 yr fixed	Ability Mortgage Group, LLC	4.94	0.0000/0.000	4.875	\$1,225	30	\$873
30 yr fixed	Quicken Loans	5.43	0.0000/0.000	5.375	\$2,088	45	\$924
30 yr fixed	AmiLoan.com	4.981	0.0000/0.000	4.875	\$1,865	30	\$873
30 yr fixed	Envoy Mortgage	5.337	0.0000/0.000	5.25	\$1,590	30	\$911
30 yr fixed	Aurora Financial	4.954	0.0000/0.000	4.875	\$550	30	\$873

Source: bankrate.com

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The Discount Points Decision

Assume your bank offers two options for a \$100k 30-year mortgage:

- ❑ Option 1:
 - 6% nominal interest rate
 - 0 points
 - ❑ Option 2:
 - 5.5% nominal interest rate
 - 2 points
- (Assume the market discount rate is 6%.)

Which option should you take?

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Comparison of 2 Options

Monthly Payment Option 1:

- ❑ Rate = 6% $\rightarrow i_m = .005$
- ❑ Monthly payment: $P = \$599.55$
(from before)

Monthly Payment Option 2:

- ❑ Rate = 5.5% $\rightarrow i_m = .055/12 =$
- ❑ $P = PV \cdot \frac{i_m}{1 - (1+i_m)^{-T}} = 100,000 \frac{.055/12}{1 - (1+.055/12)^{-360}} =$

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Comparison of 2 Options

Present Value Option 1:

- ❑ Monthly payment: $P = \$599.55$
- ❑ $PV = \frac{\$599.55}{.005} \cdot \left[1 - \frac{1}{1.005^{360}}\right] = \$100,000$

Total Present Value Option 2:

- ❑ Monthly payment: $P = \$567.79$
- ❑ Initial payment for points: \$2000
- ❑ $PV = \$2000 + \frac{\$567.79}{.005} \cdot \left[1 - \frac{1}{1.005^{360}}\right] = \$96,702$

\rightarrow Option 2 seems cheaper...

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Comparison of 2 Options

...but: imagine you have to move after 3 years ($T = 60$)

Option 1:

- ❑ 60 monthly payments of \$599.55 $\rightarrow PV = \$19,707.84$
- ❑ closing balance of loan \$96,084.07 $\rightarrow PV = \$80,292.16$
Sum = \$100,000.00

Option 2:

- ❑ Payment for 2 "points" $\rightarrow PV = \$2000.00$
- ❑ 60 monthly payments of \$567.79 $\rightarrow PV = \$18,803.51$
- ❑ closing balance of loan \$95,726.49 $\rightarrow PV = \$79,993.35$
Sum = \$100,796.86

\rightarrow If you stay for a short time, points are more expensive

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Mortgage Terms

Designed to protect lender from losses:

- **Lien** on your property:
 - obtained for protection of the lender
 - recorded in public register
 - title search makes sure there are no liens on your property when you buy
- **Downpayment**: typically 20%
- **Private Mortgage Insurance (PMI)**: covers losses of lender in case you default and the property is sold for less than your mortgage

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Borrower Qualification

- Monthly payment < 25% of income
- Total monthly payments < 33% income
- Good credit history:
 - Fair Isaac Company (FICO) score depends on:
 - past payment history
 - outstanding debt and credit available
 - length of credit history
 - number of recent credit applications
 - types of credit and loans you have
 - score ranges from 300 – 850
 - score > 720 guarantees best loan terms
 - score < 620 is subprime
- Check your credit history for free at: <http://www.annualcreditreport.com/> (watch out for hoax sites!!!)

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Adjustable Rate Mortgages (ARMs)

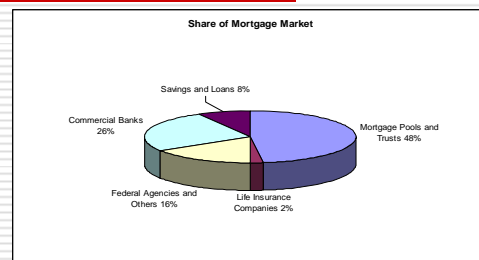
- After a given number of years, interest rate is tied to a benchmark, e.g. average T-bill rate or LIBOR + 2%
- Caps on how high/low interest rate may fall (e.g. at least 2%, at most 6%)
- Exposes borrower to interest rate risk → but often lower payments b/c of upward-sloping yield curve
- Reduces interest rate risk for lender

Examples:

- 5/1 ARM: interest rate fixed for five years, then annual adjustment
- Also popular: 7/1 ARM, 3/1 ARM

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Mortgage-Lending Institutions



Source: Federal Reserve Bulletin, April 2007

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Loan Servicing

Three parts of lending are often performed by different entities:

- 1) **originator**: grants loan and packages it for investor
- 2) **investor**: holds the loan and carries the risk
- 3) **servicing agent**: collects payments and handles paperwork

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Secondary Mortgage Market

- Founded by government after Great Depression:
 - Fannie Mae, FHA, VA: bought only secured mortgages
- Allowed creation of pure mortgage banks who could sell off mortgages to reduce their capital needs

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Mortgage Securitization

Difficulties for private secondary market:

- mortgage denominations relatively small
- contracts not standardized
- servicing is costly
- default risk hard to assess

→ New creation: **Mortgage-Backed Security:**

- alternative to directly selling mortgages in the secondary market

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Mortgage-Backed Securities

- First created by Ginnie Mae, Freddie Mac, Fannie Mae
- Large number of mortgages assembled in a *mortgage pool*
- mortgage pass-through: all payments “pass through” a trust that holds the mortgages on behalf of investors
- for investors: significant prepayment risk
- Strict eligibility conditions for mortgages to be pooled by federal agencies:
 - conforming mortgage loans

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Conforming Loans

- Maximum amount: \$625,500 (raised by 2008 stimulus bill from \$417,000)
 - for larger loan amounts: *jumbo mortgages*: are more expensive
- At least 20% downpayment
- Debt/income limit
- Documentation requirements
- Credit score requirements

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Subprime Mortgages

- For borrowers with low credit score (e.g. FICO < 620)
- high default risk
- popular instrument: 3/27 or 2/28 ARMs:
 - “teaser loans:” 3 years of low interest
 - 27 years of (substantially higher) floating rates
 - people hoped they could refinance after 3 yrs, but this is impossible in the current economic environment
 - often pre-payment penalties
- NOW: epicenter of mortgage crisis
- Subprime market has almost disappeared

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Other Absurdities of the Bubble

No/Low Documentation Mortgages (“liar loans”):

- Alt-A category (between prime & subprime)
- higher risk, and higher interest rate
- rely only on credit check and maximum loan-to-income ratio
- Examples:
 - SISA Loans: stated income, stated assets
 - NINJA Loans: no income, no job or assets

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