Mortgage loans and mortgage-backed securities

Mortgages

- A mortgage loan is a loan secured by the collateral of some specific real estate property which obliges the borrower to make a predetermined series of payments.
- A mortgage design is a specification of the interest rate, term of the mortgage, and manner in which the borrowed funds are repaid.

Participants in mortgage market

- Mortgage originators
- Mortgage servicers
- Mortgage insurers

Contract rate (interest rate on a mortgage loan)

Contract rte is greater than the yield on a Treasury security of comparable maturity. The spread reflects

- costs of collection
- costs associated with default (not eliminated despite the collateral)
- poorer liquidity
- uncertainty concerning the timing of the cash flow.

Fixed rate, level payment, fully amortized mortgage

The borrower pays interest and repays principal in equal instalments over an agreed upon period of time (term of the mortgage). The frequency of payment is typically monthly.

The serving fee is a portion of the mortgage rate. The interest rate that the investor receives is called the *net coupon*.

Amortization schedule for a level-payment fixed-rate mortgage

Mortgage loan:\$Mortgage rate:8Monthly payment:\$Term of loan:3

\$100,000 8.125% \$747.50 30 years (360 months)

monthly payment = mortgage balance

$$\left[\frac{i(1+i)^n}{(1+i)^n-1}\right]$$

where *i* is the simple monthly interest rate.

Example

n = 360, mortgage balance = \$100,000, i = 0.08125/12.

Mortgage payment = \$742.50.

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DOMENT.	Beginning	CHERCE?		Contrado-
市 。2月1日日	Mortgage	Monthly	Monthly	Principal
Month	Balance	Payment	Interest	Repayment
878 1 P	100,000.00	742.50	677.08	65.41
2	99,934.59	742.50	676.64	65.86
3	99,868.73	742.50	676.19	66.30
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358	2,197.66	742.50	14.88	727.62
359	1,470.05	742.50	9.95	732.54
360	737.50	742.50	4.99	737.50

• Interest portion declines and repayment portion increases.

Adjustable rate mortgages

The mortgage rate is reset periodically in accordance with some chosen reference rate.

Other terms

- Rate caps limit the amount that the contract rate may increase or decrease at the reset date.
- A lifetime cap sets the maximum contract rate over the term of the loan.

Prepayment

Payments made in excess of the schedules principal repayments. The amount and timing of the cash flows from the repayments are not known with certainty.

- Sale of a home
- Market rates fall below the contract rate
- Failure to meet the mortgage obligations

Factors affecting prepayment behavior

- 1. Prevailing mortgage rate the current level of mortgage rates relative to the borrower's contract rate.
 - The spread should be wide enough to cover the costs
- 2. Path history of rate spread is important

 depends on whether there have been prior opportunities to refinance since the underlying mortgages were originated.
- 3. Seasonality prepayments are low in the winter months
- 4. Macroeconomic factors
 - e.g. growing economy results in a rise in personal income and in opportunities for worker migration.

• *Mortgage-backed securities* are securities backed by a pool of mortgage loans.

- 1. Mortgage passthrough securities;
- 2. Collateralized mortgage obligations;
- 3. Stripped mortgage-backed securities.

Mortgage passthrough securities

- A mortgage passthrough security is a security created when one or more holders of mortgages form a pool of mortgages and sell shares or participation certificates in the pool.
- The cash flows consists of monthly mortgage payments representing interest, the scheduled repayment of principal, and any prepayments.
- Payments are made to security holders each month. The monthly cash flows for a passthrough are less than the monthly cash flows of the underlying mortgages by an amount equal to serving and other fees.
- Not all of the mortgages that are included in the pool that are securitized have the same mortgage rate and the same maturity. A weighted average coupon rate and a weighted average maturity are determined.

Senior / subordinated structures

- The subordinated class is the first-loss piece absorbing all losses on the underlying collateral, thus protecting the senior class.
- The senior class is giving up yield to the subordinated class holders.

Example \$100 million deal divided into \$92.25 million senior class \$7.75 million subordinated class

Suppose there is \$10 million of losses, the subordinated class experiences \$7.75 million of losses (100% loss) and the senior class experiences a loss of \$2.25 million (2.4% = \$2.25 / \$92.25 loss).

Collateralized mortgage obligations

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Redirect the cash flows (interest and principal) to different bond classes, called tranches so as to mitigate different forms of prepayment risk.

- The creation of a CMO *cannot eliminate prepayment risk*. It can only redistribute prepayment risk among different classes of bond holders.
- CMO class has a different coupon rate from that for the underlying collateral, resulting in instruments that have varying risk-return characteristics that fit the needs of fixed-income investors.

Sequential-pay tranches

Total par value of \$400 million

Tranche	Paramount	coupon rate (%)
A	\$194,500,000.00	7.5
В	\$36,000,000.00	7.5
C	\$96,500,000.00	7.5
D	\$73,000,000.00	7.5
HARDEL	\$400,000,000.00	

Rule Tranche A receives all the principal payments until the entire principal amount owed to that bond class, \$194,500,000 is paid off; then tranche B begins to receive principal and continues to do so until it is paid the entire \$36,000,000.

Five-Tranche Sequential-Pay Structure with Floater, Inverse Floater, and Accrual Bond Classes^a

Tranche	Par Amount	Coupon Rate (%)
A	\$194,500,000.00	7.50
В	\$36,000,000.00	7.50
FL	\$72,375,000.00	1-month LIBOR + 0.50
IFL	\$24,125,000.00	$28.50 - 3 \times (1 - \text{month LIBOR})$
Z (accrual)	\$73,000,000.00	7.50
	\$400,000,000.00	States and a state

Payment rules

For payment of periodic coupon interest:

- Disburse periodic coupon interest to tranches A, B, FL, and IFL on the basis of the amount of principal outstanding at the beginning of the period.
- For tranche Z, accrue the interest based on the principal plus accrued interest in the preceding period.
 - The interest for tranche Z is to be paid to the earlier tranches as a principal paydown.
- The maximum coupon rate for FL is 10%; the minimum coupon rate for IFL is 0%.

Payment rules

For disbursement of principal payments:

- Disburse principal payments to tranche A until it is paid off completely.
- After tranche A is paid off completely, disburse principal payments to tranche B until it is paid off completely.
- After tranche B is paid off completely, disburse principal payments to tranches FL and IFL until they are paid off completely.
- The principal payments between tranches FL and IFL should be made in the following way: 75% to tranche FL and 25% to tranche IFL.
- After tranches FL and IFL are paid off completely, disburse principal payments to tranche Z until the original principal balance plus accrued interest is paid off completely.

Stripped mortgage backed securities

They are created by altering the distribution of principal and interest from a pro rato distribution to an unequal distribution. For example, all the interest is allocated to the *IO class* (interest only) and all the principal to the *PO class* (principal only).

- PO securities are purchased at a substantial discount from par value. The faster the prepayments, the higher the yield the investor will realize.
- IO investors want prepayments to be slow. This is because when prepayments are made, the outstanding principal declines, and less dollar interest is received.

Five Tranche Sequential Pay with an Accrual Tranche and an Interest-Only Tranche

Tranche	Par A mount	Coupon rate (%)
A	\$194,500,000.00	6.00
B	\$36,000,000.00	6.50
C	\$96,500,000.00	7.00
Z	\$73,000,000.00	7.25
10	\$52,566,667 (notional)	7.50
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Payment rules

For payment of periodic coupon interest:

• Disburse periodic coupon

interest to tranches A, B, and C on the basis of the amount of principal outstanding at the beginning of the period. For tranche Z, accrue the interest based on the principal plus accrued interest in the preceding period. The interest for tranche Z is to be paid to the earlier tranches as a principal pay down. Disburse periodic interest to the IO tranche based on the notional amount at the beginning of the period.

Payment rules

For disbursement of principal payments:

Disburse principal payments to tranche A until it is paid off completely.

- After tranche A is paid off completely, disburse principal payments to tranche B until it is paid off completely.
- After tranche B is paid off completely, disburse principal payments to tranche C until it is paid off completely.
- After tranche C is paid off completely, disburse principal payments to tranche Z until the original principal balance plus accrued interest is paid off completely.

		Excess Interest	Notional Amount for a 7.5%
Tranche	Par Amount	(%)	Coupon Rate IO
A	\$194,500,000.00	1.50	\$38,900,000
В	\$36,000,000.00	1.00	\$4,800,000
C C	\$96,500,000.00	0.50	\$6,433,333
Z	\$73,000,000.00	0.25	\$2,433,333
PAR AN	Notional amount for	r 7.5% IO	\$52,566,667