Chapter 20:

Commercial Mortgage Backed Securities (CMBS)
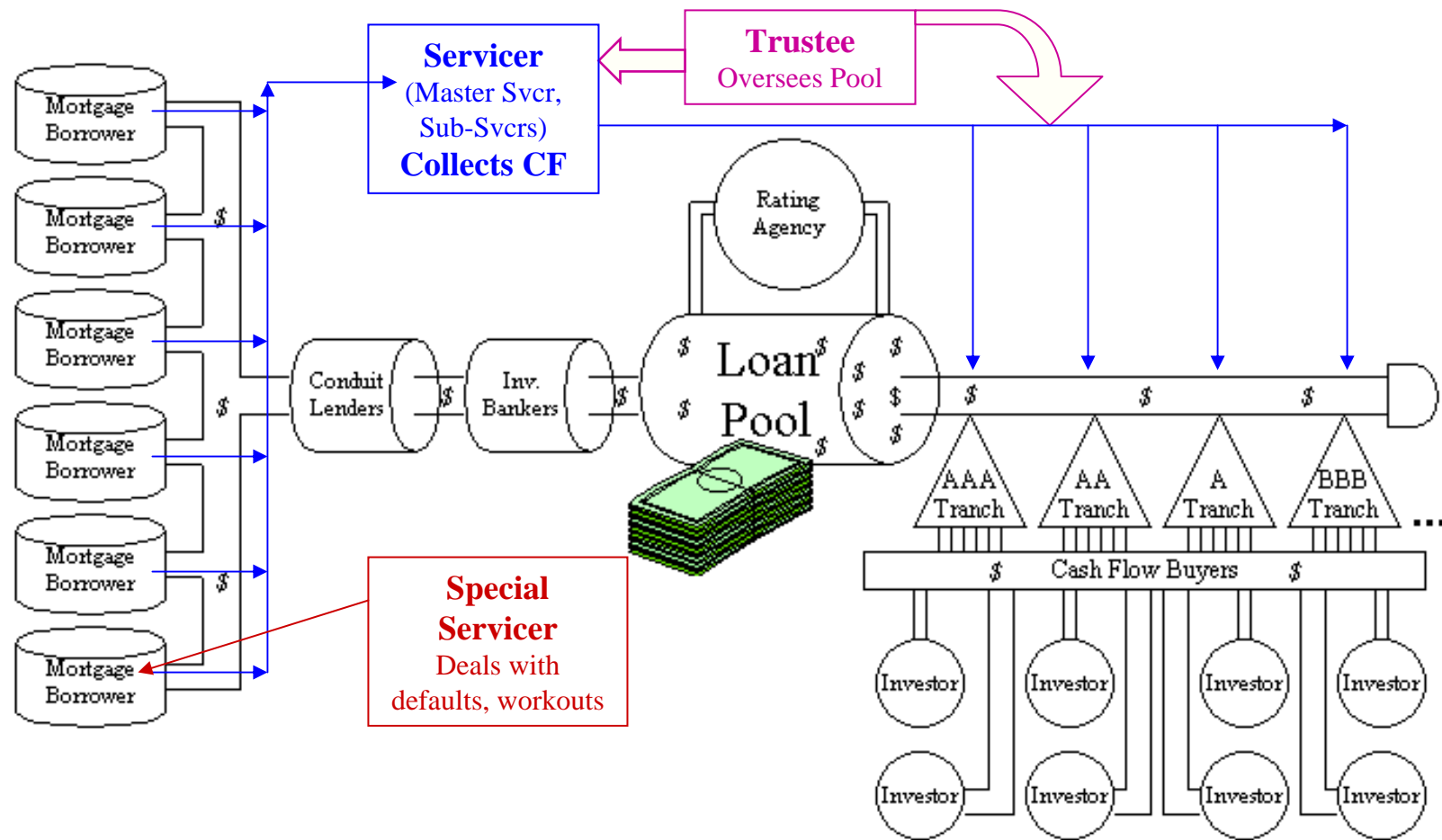
20.1. What are CMBS?...

- **CMBS are mortgage-backed securities based on _commercial_ mortgages.**

- Provide claims to components of the CF of the underlying mortgages.

- **Issued in relatively small, homogeneous units, so as to facilitate trading by a large potential population of investors,**

- Including those who do not wish (or are unable) to invest large sums of money in any given security.

- **Many CMBS are traded in relatively liquid public exchanges (part of the bond market).**

- Market for a given individual security is likely to be rather thin, but the similarity within classes of securities is great enough to allow relatively efficient price discovery and resulting high levels of liquidity in the market.

- **Other CMBS are privately placed initially, only traded privately (if at all).**

20.1. What are CMBS?...

Commercial mortgage loans that are:

- Originated

- Pooled

- Rated by a rating agency

- Sold as a security

CMBS Securitization Process

Mortgage Borrower (×6)

Servicer
(Master Svcr, Sub-Svcrs)
Collects CF

Trustee
Oversees Pool

Special Servicer
Deals with defaults, workouts

Conduit Lenders

Inv. Bankers

Rating Agency

Loan Pool

AAA Tranch   AA Tranch   A Tranch   BBB Tranch   ...

Cash Flow Buyers

Investor (×8)

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CMBS - Servicers and Lingo …

- Real Estate Mortgage Investment Conduit **(REMIC)**
- Pooling and Servicing Agreement **(PSA)**
- Servicers: Master, Sub, and Special
- Trustee
- B-Piece Buyers
- Rating Agencies

20.1.1 A brief history: The birth of an industry...

• **Resolution Trust Corporation (RTC), Financial Institutions Reform, Recovery and Enforcement Act of 1989 (FIRREA):**

    • **RTC (Federal Govt Corp) set up to liquidate the loan portfolios of thrifts and banks that had failed in the commercial property crash of the late 1980s. RTC had to sell large quantities of commercial mortgages, quickly.**

• **Traditional private instl sources of R.E. capital not available at that time (they were "crashing and burning" due to 80s R.E. finance binge). But bond mkt on Wall St was thriving, spent the 1970s and 80s cutting its teeth on derivatives based on residential MBS, had developed procedures useful for securitizing large pools of mortgages (e.g., "tranching").**

• **Key players and investors in the public capital markets perceived in the early 1990s that the commercial property market had "over-shot", fallen too far relative to fundamental value, and it was also obvious that the RTC was under great political pressure to sell assets quickly. ➔ "Grave-dancers" and bargain-hunters provided a market, helped the RTC to give birth to the CMBS market.**

Key was devlpt by bond-rating agencies of the ability to rate the default-risk of CMBS tranches:

> ## Traditional Bond Credit Rating Labels
> ### *Applied to CMBS*

Recall heterogeneity of investor population…

• Bond mkt full of **"passive investors"** (lack time, resources, expertise to assess risk of individual bonds). Won't invest w/out a reliable measure of default risk.

• As with original devlpt of the 2ndary mkt for residential mortgages in the 1930s-50s, a CMBS market could not develop until the investment industry figured out a way to apply traditional bond mkt credit risk ratings to CMBS.

• With RMBS this problem had been solved by the use of mortgage insurance and pool insurance.

• With CMBS it was necessary for bond rating agencies and investmt banks on Wall St to learn how to quantify the default risk of commercial mortgages.

• This was done via sequential payment and **sequential default assignment** in the *tranching* of the securities issued from the CMBS pool.

• When a CMBS tranche obtains a bond rating, investors who know little or nothing about commercial real estate feel comfortable working under the assumption that the **default risk of that tranche is very similar to the default risk of any other bond with the same rating**.

• This vastly expands the pool of potential investors and makes the public market for CMBS viable.

20.1.2: Conduits, Seasoned loans, and Risk-based capital requirements

Two types of loans in CMBS pool at time of IPO:
- *"Conduit"* loans,
- *"Seasoned"* loans.

Conduit loans:

New loans, issued with intent of being placed into a CMBS pool.

Seasoned loans:

Old loans, originally issued by a "portfolio lender".

Default risk and prepayment characteristics of new & old loans may differ, hence credit risk assessment must keep this difference in mind.

Conduit lenders include:
- Commercial banks,
- Investment banks,
- Mortgage banks,
- Life Insurance Companies.

Traditionally commercial mortgages were almost entirely issued to be held in portfolio, as there was no major secondary market.
Major portfolio lenders were (and are):
- **Life Insurance Companies (LICs)**
- **Pension Funds (PFs)**

Why do you suppose these were the major types of lenders?

Why would a portfolio lender such as a LIC want to sell its old loans into a CMBS pool?

• **During the 1990s one reason was the establishment of new "risk-based capital requirements" (RBC) for depository institutions and life insurance companies.**

• **RBC requirements make it necessary for banks and insurance companies to retain a greater amount of equity backing for investment in types of assets that are viewed as more risky.**

• **RBC requirements view commercial mortgages in the form of whole loans as being more risky than good quality debt securities. Such loans could be sold into the CMBS market, and the proceeds of such a sale could be used to buy CMBS securities that had much lower RBC requirements than the original whole loan. (Tranching was a major means to accomplish this trick.)**

• **e.g., Suppose for every $1 of equity a LIC could hold $20 worth of whole commercial mortgages, or $30 worth of investment grade rated bonds (including such CMBS tranches). ➔ The LIC can obtain greater leverage by selling mortgages into CMBS.**
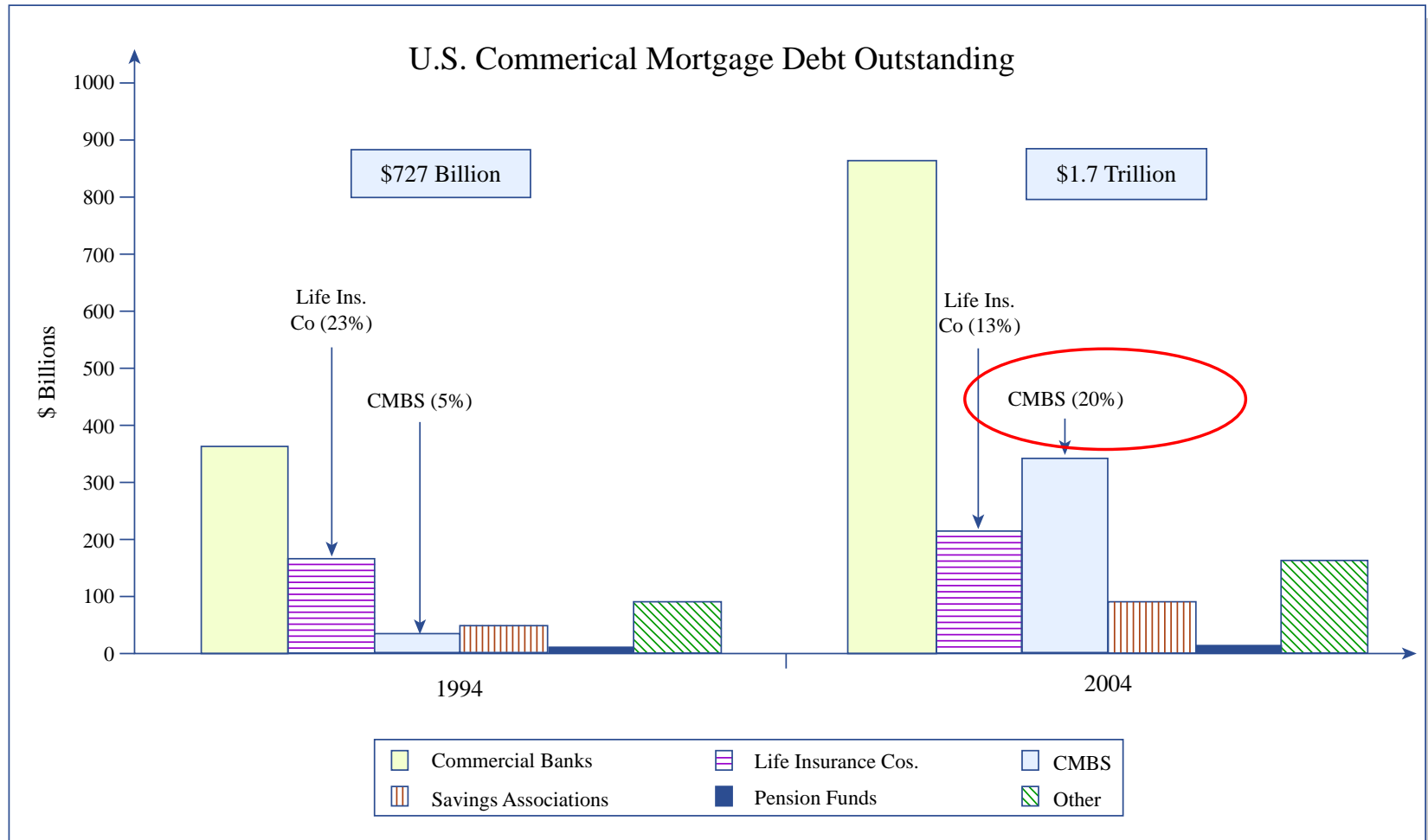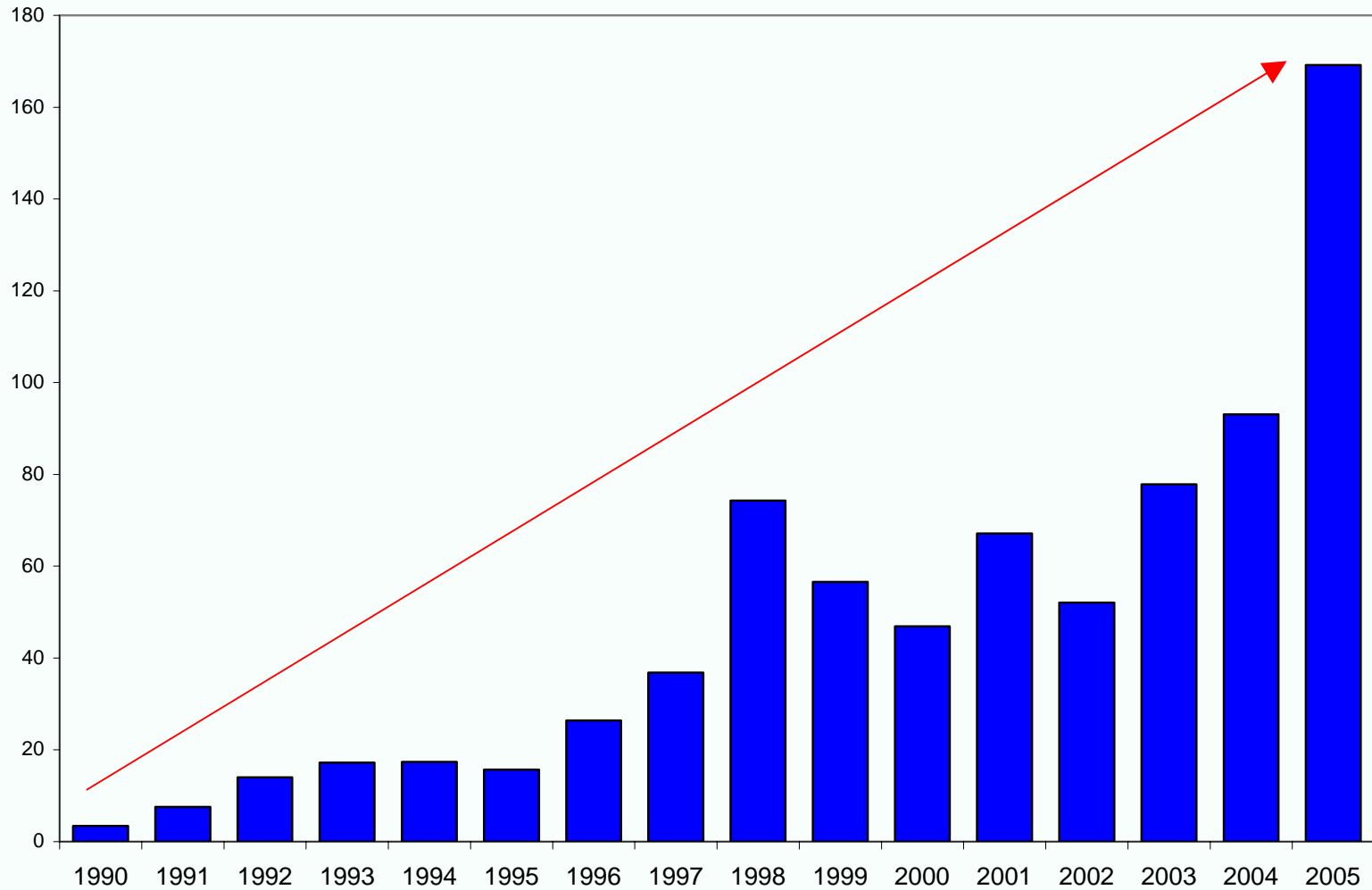
20.1.3 The magnitude of the CMBS industry

Figure by MIT OCW, adapted from course textbook.

Exhibit 20-2: CMBS Issuance, U.S., 1990-2005

20.2 CMBS Structure: Tranching & Subordination…

Basic Structure **… A senior/subordinate structure in which the cash flow from the pool of underlying commercial mortgages is used to create distinct classes of securities; the pool is cut up into** *tranches.*

Tranching cash flow claim priority involves two primary dimensions:

> • *Loan Retirement.* ➔ *Duration / Interest Rate Risk.*
>
> • *Credit Losses.* ➔ *Default Risk.*

In CMBS it is usually the default risk dimension that is most important (most commercial mortgages have "prepayment protection").

The opposite is true in RMBS, where duration is the prime concern, due to the greater prepayment risk in residential loans (RMBS pools have "default protection").

Also, often an *"IO"* **class is "stripped" off of the other securities (e.g., from the excess of pool loan coupon interest over the A-Tranche coupon interest).**

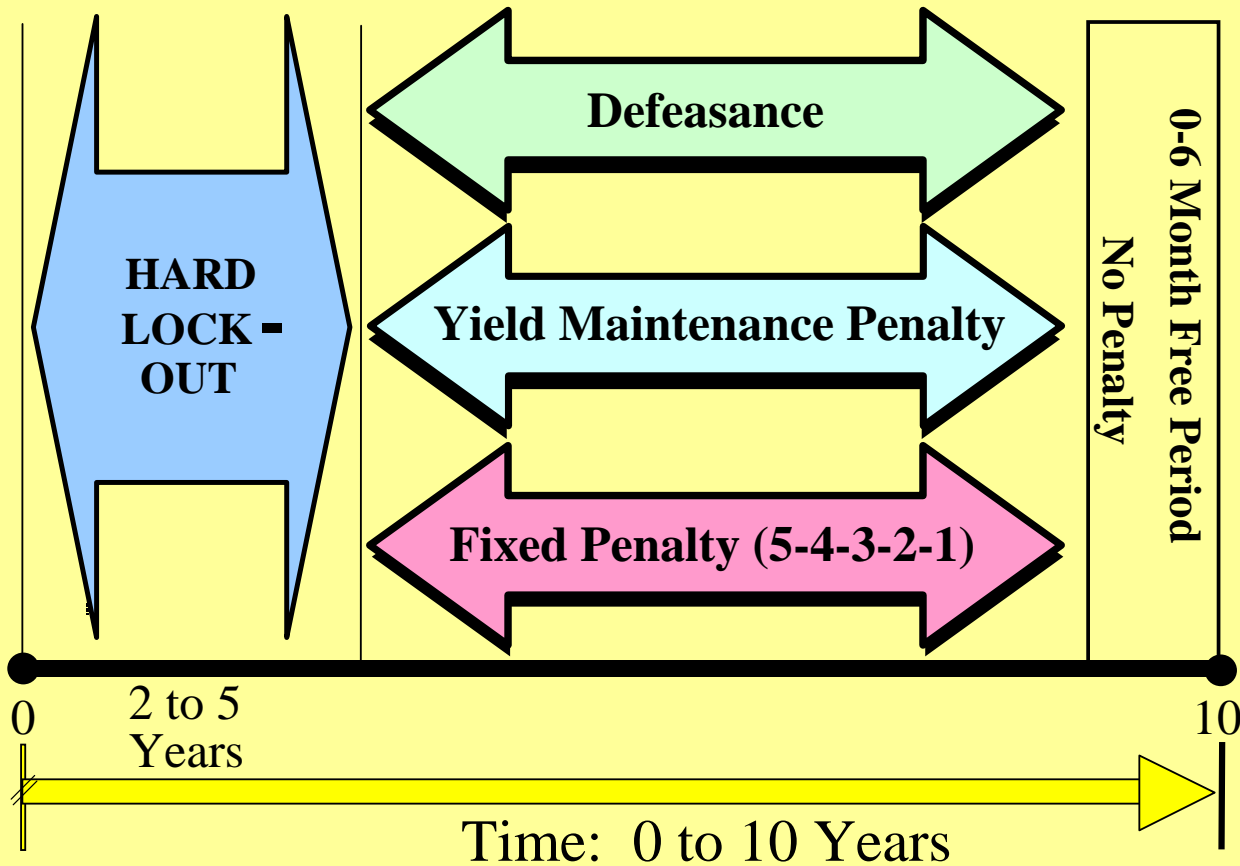## *An Aside … Prepayment Protection in Commercial Mortgages*

Due to their history as a prime investment for institutions interested in *"maturity matching"* (such as LICs), commercial mortgages have traditionally incorporated much more *"prepayment protection"* (aka *"call protection"*) than residential mortgages.

Four major types of **prepayment protection**, listed in order from most to least protective:

1. *"Hard Lockout"*: Forbids prepayment prior to loan maturity.

2. *"Defeasance"*: Borrower must purchase T-Bond strips to provide lender with same cash flows as mortgage for remaining life of mortgage.* (T-Bond collateral substitutes property collateral, resulting in lower default risk, hence increased value for lender.)

3. *"Yield Maintenance Provision"*: Borrower pays a "make whole" penalty to lender. Typical requirement would be penalty equal to PV of difference between loan interest and current T-Bond interest (for bond of maturity equal to remaining maturity on loan), with the PV calculated based on T-Bond yield as the discount rate.

4. *"Fixed Percentage Penalty Points"*: Borrower pays stated percentage over the OLB on the loan.

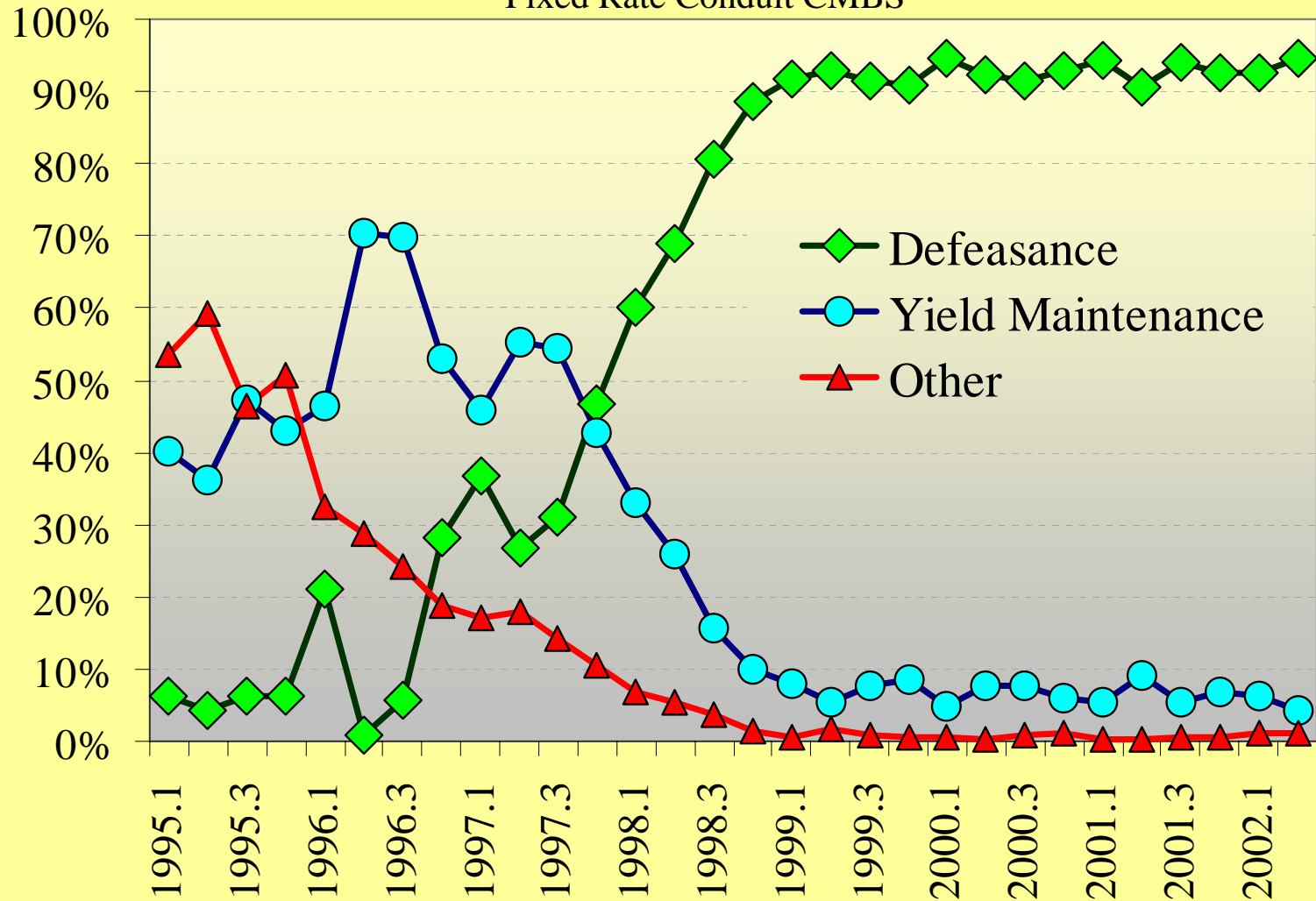Note: Many loans mix two or more of the above. (e.g., lockout period followed by points penalty that declines with further age of loan.)

Common Prepayment Penalties

HARD LOCK-OUT

Defeasance

Yield Maintenance Penalty

Fixed Penalty (5-4-3-2-1)

0-6 Month Free Period No Penalty

0

2 to 5 Years

10

Time: 0 to 10 Years

Prepayment Penalties Over Time

Fixed Rate Conduit CMBS

Sources: Bear Stearns, Trepp, LLC

Typical CMBS Tranching Structure:

Sequential Assignment of Credit Losses &Principal Repayments…

		Default Risk		Prepayment Risk/Maturity	

$100MM Pool of Mortgages

$85MM Investment Grade CMBS
Aaa/AAA
Aa/AA
A/A
Baa2/BBB

$11 MM Non-Investment Grade CMBS
Ba/BB
B/B

$4 MM Unrated CMBS

Last Loss — **Lowest Risk** — **First Prepay** — **Shortest Maturity**

Loss Position | Credit Risk | Repmt Position | Duration

First Loss — **Highest Risk** — **Last Prepmt** — **Longest Dur.**
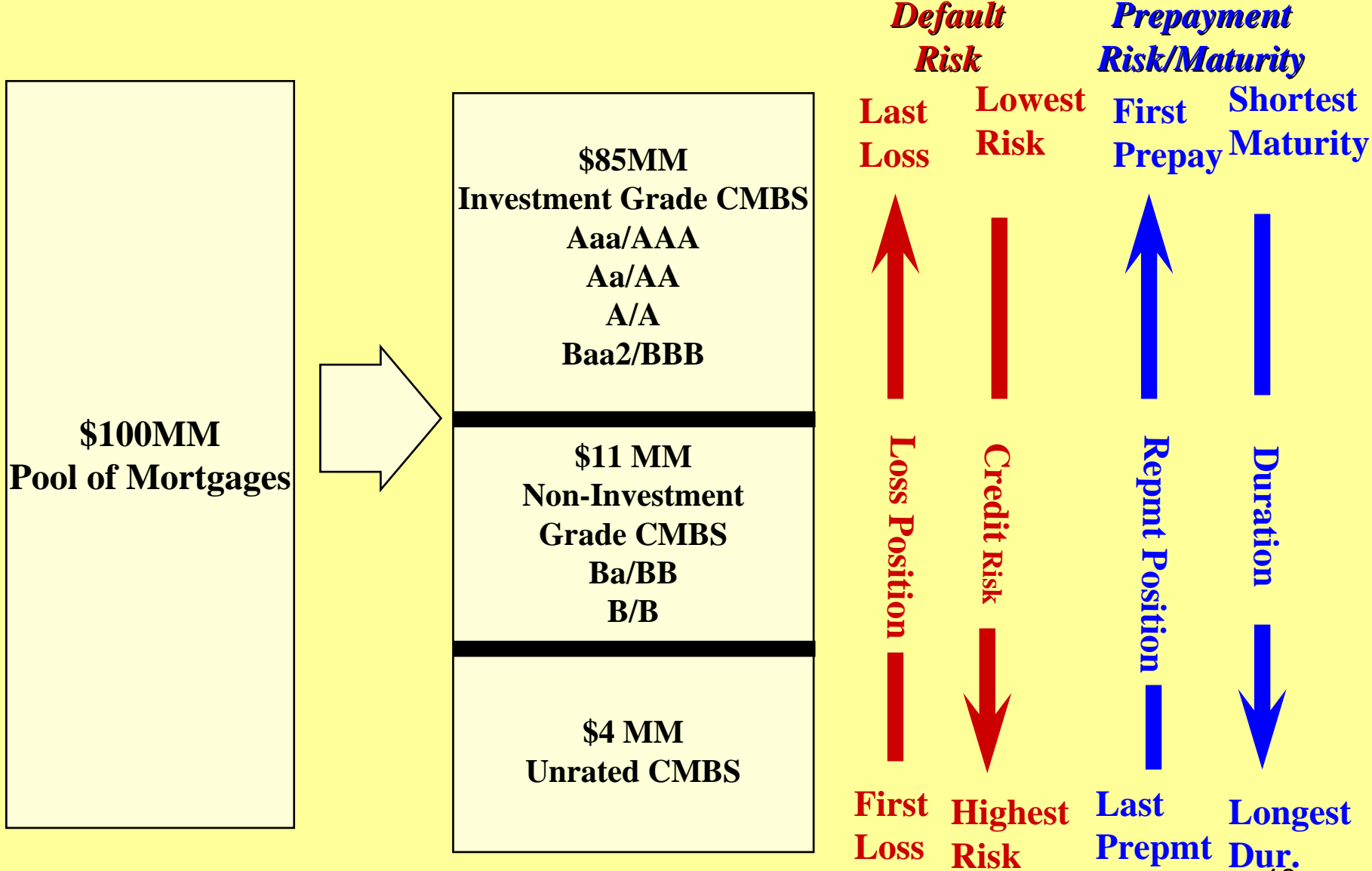
20.2.1 A simple numerical example of tranching...

Underlying Pool Characteristics...

Consider a pool consisting of 10 commercial mortgages:
- All 10 mortgages interest-only, annual payments in arrears.
- All 10 mortgages are non-recourse, with lockouts preventing prepayment.
- 5 loans mature in 1 year, 5 in 2 years.
- Each loan par value (OLB) = $10 million.
- Each loan coupon (contract) int. rate = 10%.
- Collateral value = $142,857,000.

Therefore, Underlying Pool:
- Total par value = $100 million,
- *"Weighted average maturity"* (WAM) = 1.5 years.
- *"Weighted average coupon"* (WAC) = 10%.
- LTV ratio = $100,000,000/$142,857,000 = 70%.

A Simple Numerical Example of Tranching...

Commercial Mortgage Loans
($100m pool; 10, $10m interest-only loans)
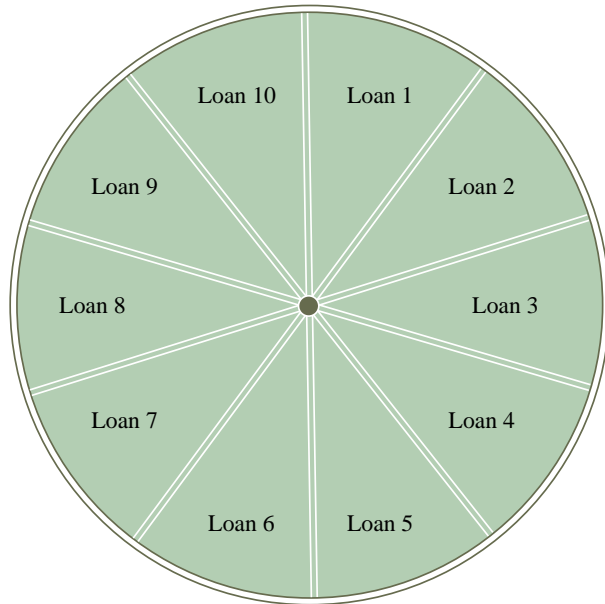
Securities
(3 tranches, total par value of $100m)
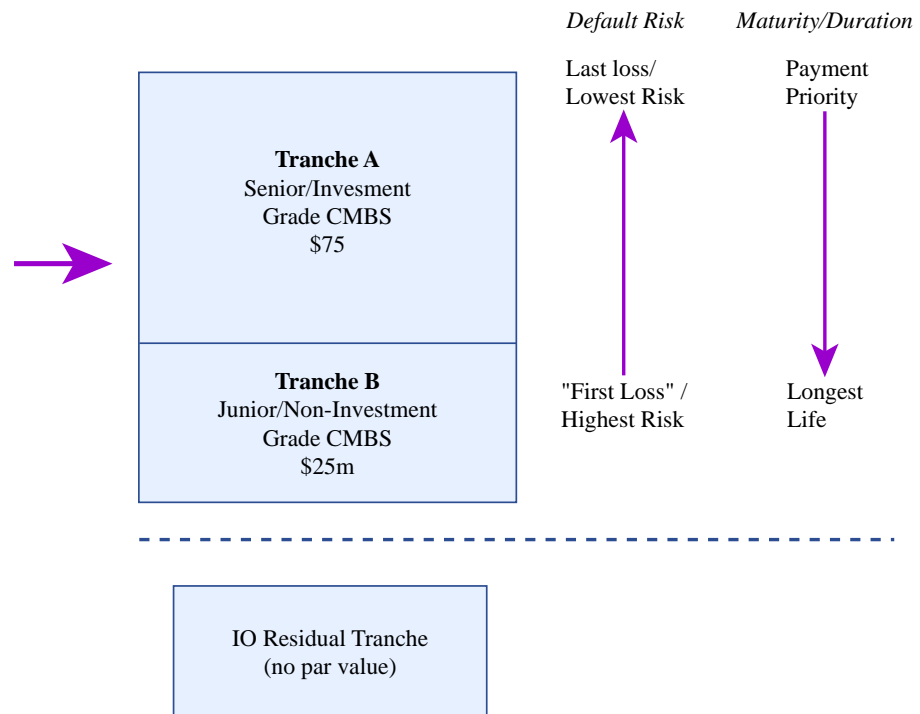
Default Risk

Last loss/
Lowest Risk

"First Loss" /
Highest Risk

Maturity/Duration

Payment
Priority

Longest
Life

Tranche A
Senior/Invesment
Grade CMBS
$75

Tranche B
Junior/Non-Investment
Grade CMBS
$25m

IO Residual Tranche
(no par value)

20.2.1 A simple numerical example of tranching...

CMBS Structure of Securities in the Deal…

Three classes (tranches) are created based on the underlying pool, and sold into the bond (CMBS) market:

Class	Par Value (millions)	WAM (yrs.)	Credit Support	Coupon	YTM	Value as CMBS* (millions)
A	$75	1.33	25%	8%	8%	$75.00
B	$25	2.00	0% (1st-loss)	10%	12%	$24.15
IO	NA	1.25	NA	NA	14%	$1.70
Pool	$100	1.50	NA	10% (WAC)	NA	$100.85

A Tranche is "senior", "investment grade" securities: Figure by MIT OCW, adapted from course textbook.
- **Gets retired 1st (all five 1-yr loans liquidating pmts would go to A).**
- **25% credit support ⬅➡ 25% of pool par value will be assigned credit losses (par value lost in default) *before* A tranche receives any credit losses (any reduction in par due to default). ➔ Effective LTV for A tranche = (1-0.25)70% = 52.5%. (Underlying properties would have to lose 47.5% of their value before A tranche gets hit, since it is *most senior* tranche.)**
- **Shorter duration: WAM = (50/75)*1 + (25/75)*2 = 1.33 yrs.**
-

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Class	Par Value (millions)	WAM (yrs.)	Credit Support	Coupon	YTM	Value as CMBS* (millions)
A	$75	1.33	25%	8%	8%	$75.00
B	$25	2.00	0% (1st-loss)	10%	12%	$24.15
IO	NA	1.25	NA	NA	14%	$1.70
Pool	$100	1.50	NA	10% (WAC)	NA	$100.85

Figure by MIT OCW, adapted from course textbook.

B Tranche is "subordinated" ("non-investment grade" & "unrated") securities:
• **Much riskier than whole loan of 70% LTV, because loss of 47.5% of property value would wipe out B tranche, only cause 25% loss severity (1 - .525/.700) in loan.**
• **Longer duration: (WAM = (25/25)*2 = 2.00 yrs.**

"X Tranche" (IO security) has no par value:
• **Based on "extra interest" stripped from A tranche (security coupon = 8%, underlying pool WAC = 10%; ➔ "notional" par val.=$75 million, coupon = 2%, ➔ $1.5 million interest per yr.).**
• **Subordinated claim on interest in pool (receives only *residual* interest after other tranches coupons paid, thus exposed to default risk).**

20.2.1 A simple numerical example of tranching...

Class	Par value (millions)	WAM (yrs.)	Credit Support	Coupon	YTM	Value as CMBS* (millions)
A	$75	1.33	25%	8%	8%	$75.00
B	$25	2.00	0% (1st - loss)	10%	12%	$24.15
lO	NA	1.25	NA	NA	14%	$1.70
Pool	$100	1.50	NA	10% (WAC)	NA	$100.85

Value as CMBS > Par Value

Figure by MIT OCW, adapted from course textbook.

*The value of each tranche is determined by taking the present value of contractual cash flows at the yield to maturity. For example, for tranche B,

$$Value = \frac{2.5}{1.12} + \frac{(25+2.5)}{1.12^2} = 24.15$$

Why do you suppose the B Tranche sells at a discount to its par value?...

Why do you suppose the X Tranche (IOs) requires such a high yield?...

Now suppose all loans pay as contracted except one of the 2-yr loans defaults in yr.2 paying no interest that year and recovering only $5 million in foreclosure sale proceeds. What will the ex post CMBS cash flows look like?...

Tranche (Par, Coupon)		Year 1 Prin. + Int. = Total CF	Year 2 Prin. + Int. = Total CF
A (75, 8 %)	Scheduled:	50 + 6 = 56	25 + 2 = 27
	Received:	50 + 6 = 56	25 + 2 = 27
B (25, 10 %)	Scheduled:	0 + 2.5 = 2.5	25 + 2.5 = 27.5
	Received:	0 + 2.5 = 2.5	20 + 2.0 = 22.0
10 (NA)	Scheduled:	0 + 1.5 = 1.5	0 + 0.5 = 0.5
	Received:	0 + 1.5 = 1.5	0 + 0.0 = 0.0
Pool (100, 10 %)	Scheduled:	50 + 10 = 60	50 + 5 = 55
	Received:	50 + 10 = 60	45 + 4 = 49

Class	Par value (millions)	WAM (yrs.)	Credit Support	Coupon	YTM	Value as CMBS* (millions)	Realized Yld. (IRR)**
A	$75	1.33	25%	8%	8%	$75.00	8%
B	$25	2.00	0% (1st - loss)	10%	12%	$24.15	0.75%
lO	NA	1.25	NA	NA	14%	$1.70	-11.79%
Pool	$100	1.50	NA	10% (WAC)	NA	$100.85	NA

20.3 CMBS Rating and Yields…

Recall that **key** to well-functioning liquid public market in CMBS is ability of distant, passive investors, who have no local real estate expertise, to feel confident about the magnitude of default risk in the securities they are buying.

➔ Need **credit-rating** from an established bond rating agency.

> *Bond Credit Rating*…
>
> An **objective and expert assessment** of the approximate magnitude of **default risk**.
> - **In principle, any two bonds with the same credit rating (from the same agency) should have similar default risk**

Rating		Meaning
Moody's	**S&P**	
Aaa Aa	AAA AA	Highest quality (investment grade)
A Baa	A BBB	High quality (investment grade)
Ba B	BB B	Medium quality (speculative grade)
Caa & lower	CCC & lower	Poor quality, some issues in default (speculative to "junk" grades)
Unrated	Unrated	Too little information or too risky to rate (generally "junk" grade)

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Figure by MIT OCW, adapted from course textbook.

20.3.2 Credit rating & CMBS structure: *real-world example from Morgan-Stanley*

Proceeds	($)
Collateral Balance	1,000,000,000
Bond Balance	1,000,000,000
Bond Proceeds	1,040,778,425
Expenses	9,000,000
Net Profit	31,778,425

Yield	
Yield Frequency	Semi-Annual
Yield Day Count	30/360
WA Yield on Bonds	5.19%
WA Spread (bp)	115.34
Average Life (yrs)	9.02

Capital Structure

A	B	C	D	E	F	G	H	I	J	K	L	M
Class	Rating	Sub Level (%)	Balance ($)	Coupon (%)	Price (%)	Yield (%)	Spread (bp)	Bench-mark	Ave. Life (yrs)	Principal Window (mos)	Pricing Scenario	Bond Proceeds ($)
A1	AAA/Aaa	17.000	171,208,000	4.16	100.21	4.12	30.0	S	5.70	116	0	171,559,792
A2	AAA/Aaa	17.000	658,792,000	4.94	100.49	4.90	32.0	S	9.71	1	0	662,045,156
B	AA/Aa2	14.000	30,000,000	5.01	100.50	4.97	39.0	S	9.71	1	0	30,149,951
C	A/A2	10.500	35,000,000	5.11	100.51	5.07	49.0	S	9.71	1	0	35,178,014
D	A-/A3	9.000	15,000,000	5.19	100.52	5.15	57.0	S	9.71	1	0	15,077,365
E	BBB/Baa2	6.500	25,000,000	5.47	100.54	5.43	85.0	S	9.71	1	0	25,135,433
F[1]	BBB-/Baa3	5.500	10,000,000	5.80	100.43	5.78	120.0	S	9.71	1	0	10,042,815
G	BB+/Ba1	4.000	15,000,000	5.24	83.03	7.82	365.0	T	9.71	1	0	12,454,629
H	BB/Ba2	3.500	5,000,000	5.24	80.14	8.32	415.0	T	9.71	1	0	4,006,954
J	BB-/Ba3	3.000	5,000,000	5.24	70.01	10.27	610.0	T	9.71	1	0	3,500,531
K	B+/B1	2.500	5,000,000	5.24	60.67	12.42	825.0	T	9.71	1	0	3,033,722
L	B/B2	2.000	5,000,000	5.24	57.80	13.17	900.0	T	9.71	1	0	2,890,186
M	B-/B3	1.750	2,500,000	5.24	53.41	14.42	1025.0	T	9.71	1	0	1,335,196
N	NR/NR	--	17,500,000	5.24	27.08	27.00	2282.8	T	9.71	1	0	4,738,836
X	AAA/Aaa	--	1,000,000,000	W	5.96	6.50	250.0	T	8.88	114	100CPY	59,629,845

Notes
1. Class F accrues interest at a rate equal to the weighted average net mortgage rate

Based on the following underlying pool and bond market yields…

Underlying Pool:

Collateral Characteristics

Collateral Type	No. of Loans	Principal Balance ($)	Gross Coupon	Servicing Fee	WAC	Seasoning	Orig. Amort	Orig. Term
Fixed Rate	100	1,000,000,000	5.90%	10 bps	5.80%	4 mos	360 mos	120 mos

Deal

Coll. Cut-off Date	01/01/2004
Dated Date	01/01/2004
First Payment Date	02/15/2004
Pricing Date	01/13/2004
Settlement Date	02/01/2004
Pay Frequency	Monthly

Bond Market Yield Curve, & Swap spreads…

Treasury Curve 12/29/2003	(%)
2 yr	1.85
5 yr	3.22
10 yr	4.23
30 yr	5.04

Swap Spreads 12/29/2003	Bps
2 yr	29.50
5 yr	40.75
10 yr	39.00
30 yr	31.25

20.3.2 Credit rating & CMBS structure: *real-world example continued …*

- Obviously, this CMBS structure is considerably more complex than our previous highly simplified example

- Market yields reflect default risk (credit rating), as well as maturity in some cases (reflecting yield curve).

- Yields are quoted as spread to 10-yr T-Bonds for the higher yield (non-investment grade) tranches. In the past it was common to quote yields for all bond tranches/classes as spreads to Treasuries. Today, yields for higher-rated tranches are commonly quoted as spreads to similar-maturity "Swapped LIBOR", a fixed-interest-rate reflecting LIBOR risk (slight default risk, illiquidity risk comparable to CMBS AAA tranches).

What is An Interest Rate Swap?

The "pay fixed" payer wishes to swap a fixed rate cash flow to floating rate

The counterparty wishes to receive fixed and pay float

The "pay fixed" side agrees to pay the swap rate for 10 years of 4.62%

- 10 year US treasury = 4.23%

- 10 year swap spread = 39 bps
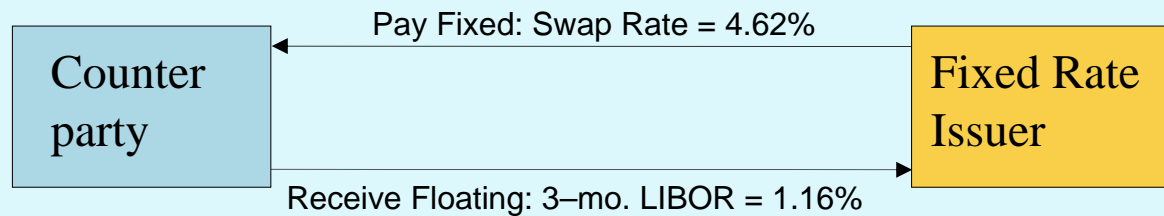
- 10 year swap rate = 4.62% (4.23% + 0.39%)

The swap rate is set equal to the PV of the forward LIBOR curve

In return the pay fixed side will receive the 3 mos LIBOR

Cash flows are "netted" each quarter

The notional amount of the swap is NOT exchanged

Example of a 10 year Interest Rate Swap

```
                  Pay Fixed: Swap Rate = 4.62%
  ┌──────────┐  ◄─────────────────────────────  ┌──────────┐
  │ Counter  │                                    │Fixed Rate│
  │ party    │  ─────────────────────────────►    │ Issuer   │
  └──────────┘  Receive Floating: 3–mo. LIBOR = 1.16%  └──────────┘
```

Example: Assume a $100 million 10 year Interest Rate Swap

Period 1: Pay fixed amount = $100 m * (4.62%/4) = $1.155m

  Pay float side amount = $100 m * (1.16%/4) = $0.29 m

  Net amount due from pay fixed = 1.155 – 0.29 = $0.865 m

Period 2: Assume 3 mos LIBOR has increased to 2%

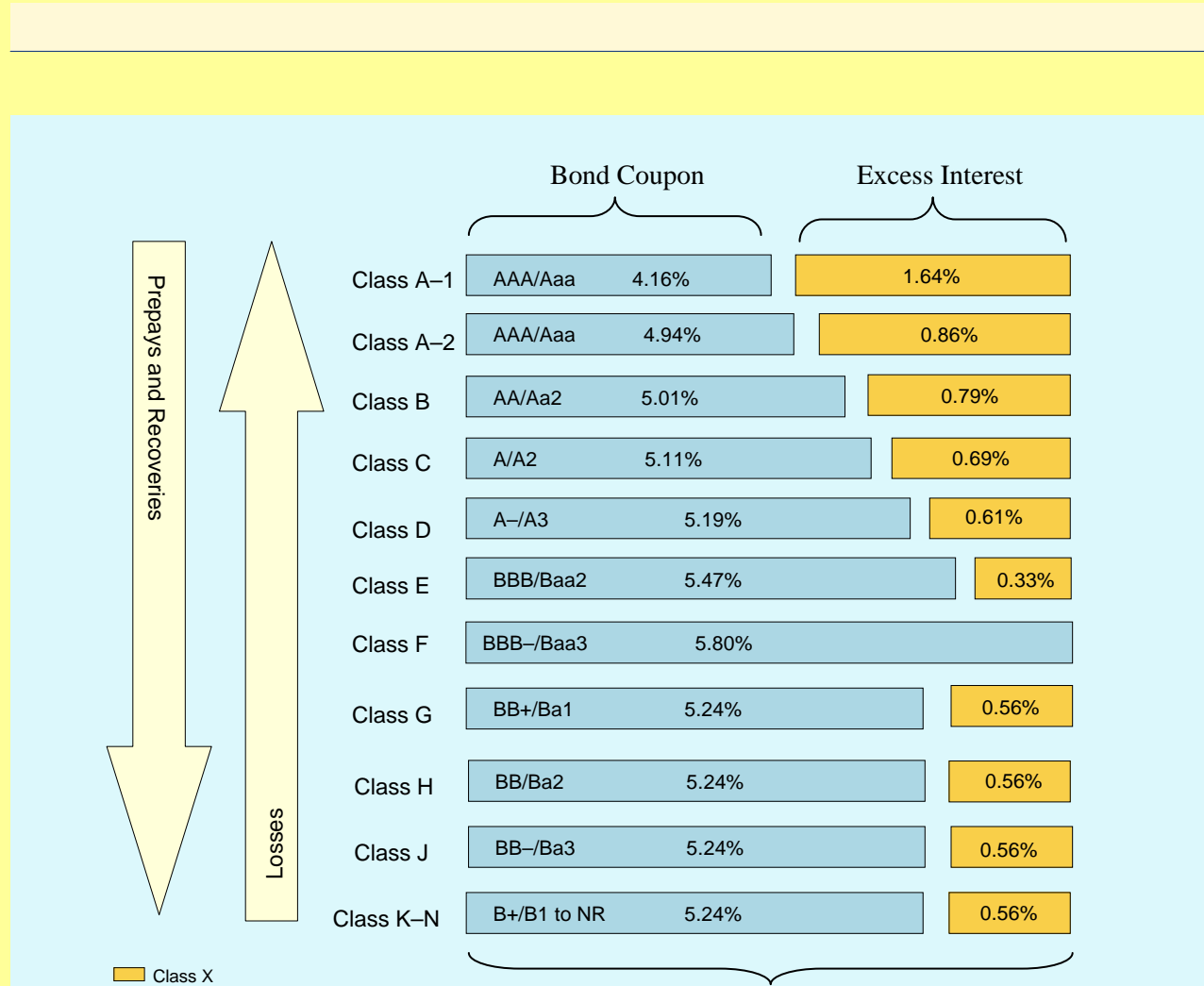 **Pay fixed amount = $100 m * (4.62%/4) = $1.155m**

  Pay float side amount = $100 m * (2.0%/4) = $0.50 m

  Net amount due from pay fixed = 1.155 – 0.50 = $0.655 m

Tranche coupons <= Pool coupon

I.G. coupons target sales @ par

- IO = Interest Only security, no principal amount
- WAC = weighted average coupon
- IOs created by stripping interest from a CMBS deal's various tranches (yellow)
- Size coupons on P&I bonds to create as close as possible to par value bonds as possible
- Difference between bond coupon and WAC of mortgage pool is "excess interest"
- Rated AAA by rating agencies because of seniority in the deal's cash flow
- IOs are risky bonds – exposed to defaults and to prepayments

	Bond Coupon	Excess Interest
Class A–1	AAA/Aaa 4.16%	1.64%
Class A–2	AAA/Aaa 4.94%	0.86%
Class B	AA/Aa2 5.01%	0.79%
Class C	A/A2 5.11%	0.69%
Class D	A–/A3 5.19%	0.61%
Class E	BBB/Baa2 5.47%	0.33%
Class F	BBB–/Baa3 5.80%	
Class G	BB+/Ba1 5.24%	0.56%
Class H	BB/Ba2 5.24%	0.56%
Class J	BB–/Ba3 5.24%	0.56%
Class K–N	B+/B1 to NR 5.24%	0.56%

Prepays and Recoveries

Losses

Class X

WAC = 5.80%

20.3.2 Credit rating & CMBS structure... A Recent CMBS Deal [Exh. 20-9]

Class	Amount ($Mil)	Rating (Moody's)	Rating (S&P)	Subord. (%)	Coupon (%)	Dollar Price	Yield (%)	Avg. Life (Years)	Spread (bp)
Morgan Stanley Capital I Trust, 2005-IQ10									
A-1	75.150	Aaa	AAA	20.00	4.914	100.249	4.801	2.99	S+10
A-1A	231.768	Aaa	AAA	20.00				8.68	
A-2	50.000	Aaa	AAA	20.00	5.126	100.549	5.007	4.97	S+23
A-3-1FL	75.000	Aaa	AAA	20.00	L+24	100.000		6.47	L+24
A-3-1	78.000	Aaa	AAA	20.00	5.251	100.547	5.169	6.47	S+35
A-3-2	50.000	Aaa	AAA	20.00	5.253	100.545	5.175	6.66	S+35
A-AB	75.000	Aaa	AAA	20.00	5.178	100.549	5.102	6.91	S+27
A-4A	527.250	Aaa	AAA	30.00	5.230	100.548	5.186	9.57	S+28
A-4B	75.322	Aaa	AAA	20.00	5.284	100.546	5.243	9.81	S+33
A-J	129.549	Aaa	AAA	11.63	5.446	100.547	5.305	9.89	S+39
B	30.938	Aa2	AA	9.63	5.495	100.548	5.357	9.96	S+44
C	11.601	Aa3	AA-	8.88	5.513	100.384	5.397	9.97	S+48
D	25.137	A2	A	7.25	5.513	99.855	5.467	9.97	S+55
E	13.535	A3	A-	6.38	5.513	99.181	5.557	9.97	S+64
F	19.335	Baa1	BBB+	5.13	5.513	97.697	5.777	10.31	S+85
G	11.602	Baa2	BBB	4.38	5.513	96.624	5.943	10.87	S+100
H	17.402	Baa3	BBB-	3.25	5.513	92.296	6.513	11.62	S+155
J	3.867	Ba1	BB+	3.00				12.06	
K	7.734	Ba2	BB	2.50				12.57	
L	5.801	Ba3	BB-	2.13				13.12	
M	5.801	B1	B+	1.75				14.12	
N	3.867	B2	B	1.50				14.56	
O	5.801	B3	B-	1.13				14.85	
P	17.403	NR	NR	0.00				17.99	
X-1(IO)	1,546.863*	Aaa	AAA		0.043	0.481	7.653	8.46	T+325
X-2(IO)	1,502.744*	Aaa	AAA		0.233	0.704	5.040	6.08	T+70
X-Y(IO)	139.729*	Aaa	AAA					9.10	

Multiple AAA tranches

Mezzanine tranches

High yield tranches

Invst. grade bonds: BBB and above

No coupon or yld shown → bonds are privately placed.

* Notional Amount

Source: Commercial Mortgage Alert, October 14, 2005.

29

The new Super-Senior AAA's…

Old school

New school—Super/Senior

Blended spread on most senior 87% of deal: S+24

AAA
87% of deal

S+24

AA—NR
13.0% of deal

Subordination

20.00%

13.00%

13.00%

AAA
80% of deal

S+22

Subordinate AAA
7.0%
S+26

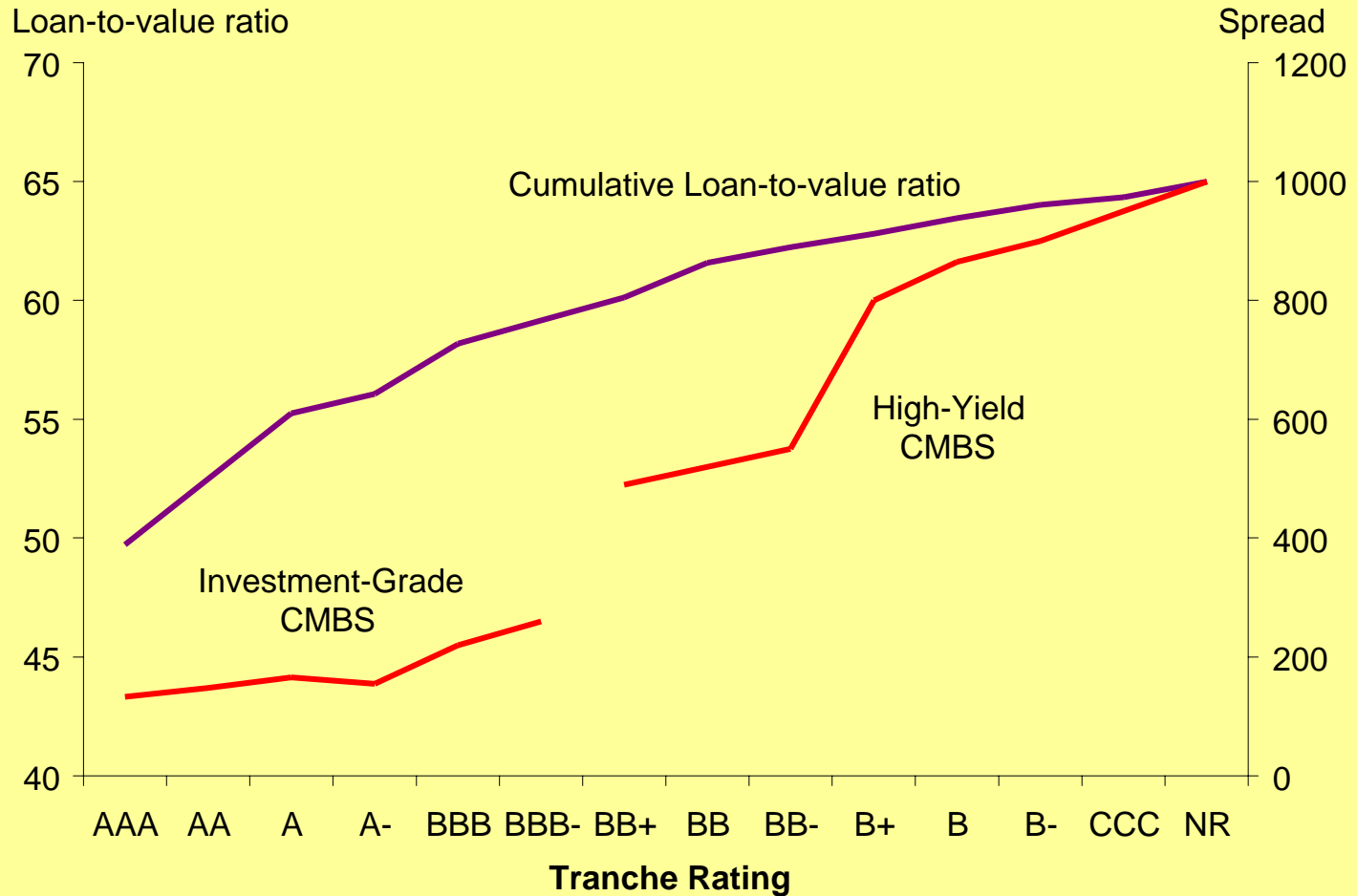AA—NR
13.5% of deal

Blended spread on most senior 87% of deal: S+23
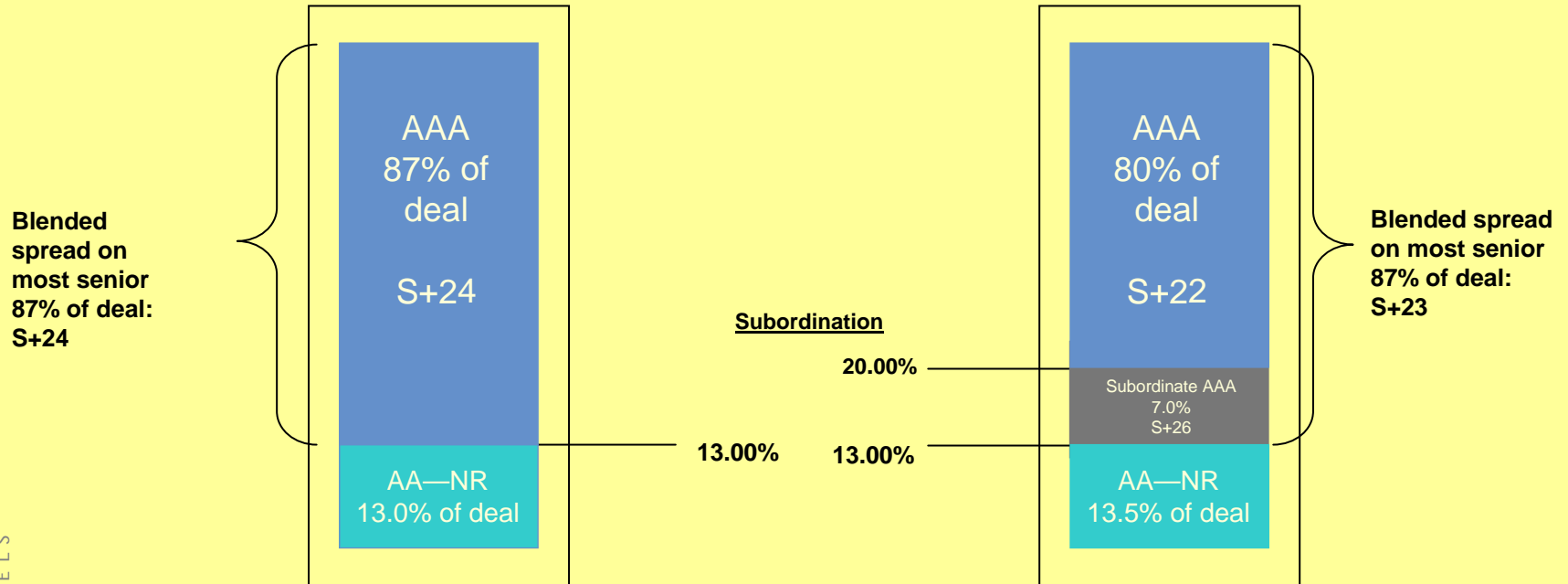
- Blended spread on the AAA's in the Super-senior scenario is better than what you could sell in the traditional AAA structure

- The increased credit support of the super senior (20% vs. 13%) structure has alleviated credit concerns surrounding the "frothiness" of the current lending environment as well the decline in credit support levels

CREDIT SUPPORT LEVELS

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The *credit-rating* a CMBS tranche receives is a function of the nature & risk of the underlying mortgage pool, plus the tranche's credit support …

• e.g., a mortgage pool consisting of loans that have relatively low and homogeneous LTV ratios will not need as much credit support for a given credit-rating. Therefore, a larger proportion of the securities issued from such a pool can have higher credit-ratings, which means lower yields, thereby enabling the overall CMBS issue to obtain a higher average price and greater total proceeds.

• Holding the quality of the underlying mortgage pool constant, greater credit support will result in a higher rating for a given tranche.

• For example, an underlying pool with good quality information and a 60% LTV ratio might require only 15% credit support for a AAA rating, enabling 85% of the issue's total par value to go into senior tranches.

• In contrast, a more heterogeneous pool with an average LTV ratio of 75% and some questionable appraisals might require 45% credit support for a AA rating, allowing only 55% of the pool to be sold at a high-priced senior level.

• It is the job of the bond-rating agency to figure out how much credit support is required for a given credit-rating for each tranche in a CMBS issue. The CMBS issuer works with the rating agency in an iterative security design process to develop the structure of the issue.

• For example, if the rating agency requires 35% credit support for a AAA rating and 30% for a AA rating, it is then up to the CMBS issuer to decide whether to structure the senior tranche as a AAA-rated tranche containing 65% of the pool, or as a AA-rated tranche containing 70% of the pool.

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Bond buyers draw a sharp distinction between investment-grade and high-yield

Loan-to-value ratio

Spread

Cumulative Loan-to-value ratio

High-Yield CMBS

Investment-Grade CMBS

Tranche Rating: AAA, AA, A, A-, BBB, BBB-, BB+, BB, BB-, B+, B, B-, CCC, NR

Source: JPMorgan Fleming

Credit Enhancement

How the credit rating agencies decide on the amount of credit support required…

Basic Formula: Foreclosure Frequency X Loss Severity = Loss Coverage

The loss coverage implied by this formula must be provided by credit enhancement.

Example: Consider a pool of mortgages that the issuers want to qualify for a Aa2 / AA (double-A) rating.
The rating agency decides on a sustainable cash flow, then applies the debt service coverage ratio that results, say 1.25.
If a portfolio were subjected to a double-A level recession (for point of reference, a double-A recession is comparable to the dislocations in the New England real estate market in 1989-1992), it might experience:

Foreclosure Frequency of 50%

Loss Severity on the sale of foreclosed property of 50%

Then 0.5 X 0.5 = 0.25 = 25%

This portfolio thus requires 25% credit enhancement to qualify the mortgages with a 1.25 DSCR for an Aa2/AA rating.

NOTE: In RTC bonds, total credit enhancement often included several components, e.g.,
Cash reserve fund + Overcollateralization + Subordination (after A-rated classes)

Example:

Table 4-A. $100 Million CMBS:
Hypothetical Tranche Structure

Rating	Size of Class	Subordination	Loss Severity X Loss Frequency						= Loss Coverage
Aaa/AAA	$70 MM	30%	60%	X	50%	= 0.60 X 0.50	=	0.30	= 30%
Aa2/AA	$5 MM	25%	50%	X	50%	= 0.50 X 0.50	=	0.25	= 25%
A2/A	$5 MM	20%	50%	X	40%	= 0.50 X 0.40	=	0.20	= 20%
Baa2/BBB	$5 MM	15%	39%	X	38.5%	= 0.39 X 0.385	=	0.15	= 15%
Ba2/BB	$6 MM	9%	30%	X	30%	= 0.30 X 0.30	=	0.09	= 9%
B2/B	$5 MM	4%	20%	X	20%	= 0.20 X 0.20	=	0.04	= 4%
NR	$4 MM	First Loss				NONE			

Roughly speaking…

- **Each SeverityXFreq combi above is associated with a probability of occurrence (based on economy, R.E.mkt, pool quality [e.g., LTV], etc)**

- **Those probabilities combined w coverage ➔ expected losses for ea tranche.**

- **Those expctd losses ➔ yield degradation assoc w given credit rating.**

Historical Commercial Mortgage Defaults

- – Esaki, L'Heureux, Snyderman—ELS Study (1999, update in 2002)
- – Tracked insurance company commercial mortgage defaults from '72–'00
    - – Originated from '72–'95
    - – Tracked performance through '00

    - – Lifetime average default rate was 18%
    - – Highest default rate for any origination cohort was 32% in 1986

    - – Loss severity averaged 34% on liquidated loans
    - – Approximately 50% defaulted loans liquidated

- • Basic formula rating agencies use to figure out credit support:
    - • Default frequency * Loss Severity = Expected Loss

How does the average conduit capital structure compare to the historical commercial mortgage delinquency experience?

Are subordination levels too high? Too low?

Based on the ELS study AAA and AA bonds are sized to withstand a repeat of the late 1980s and not suffer any principal losses

The single A and BBB bonds will not suffer losses under an average stress scenario

- **18% default x 34% loss severity = 6.12% loss**

Single As and BBB's suffer losses based on experience of the worst origination cohort

- **32% x 34% = 10.88%**

Conduit Capital Structure
vs. ELS Study

% Subordination

AAA (83.00%)	
AA (3.00%)	
A (3.50%)	
BBB (4.00%)	
BB (3.00%)	
B (1.50%)	
UR (2.00%)	

17.00%
14.00%
10.50%
6.50%
3.50%
2.00%
0%

Average Default Rate — 6.12%

Worst Cohort (1986) — 10.88%
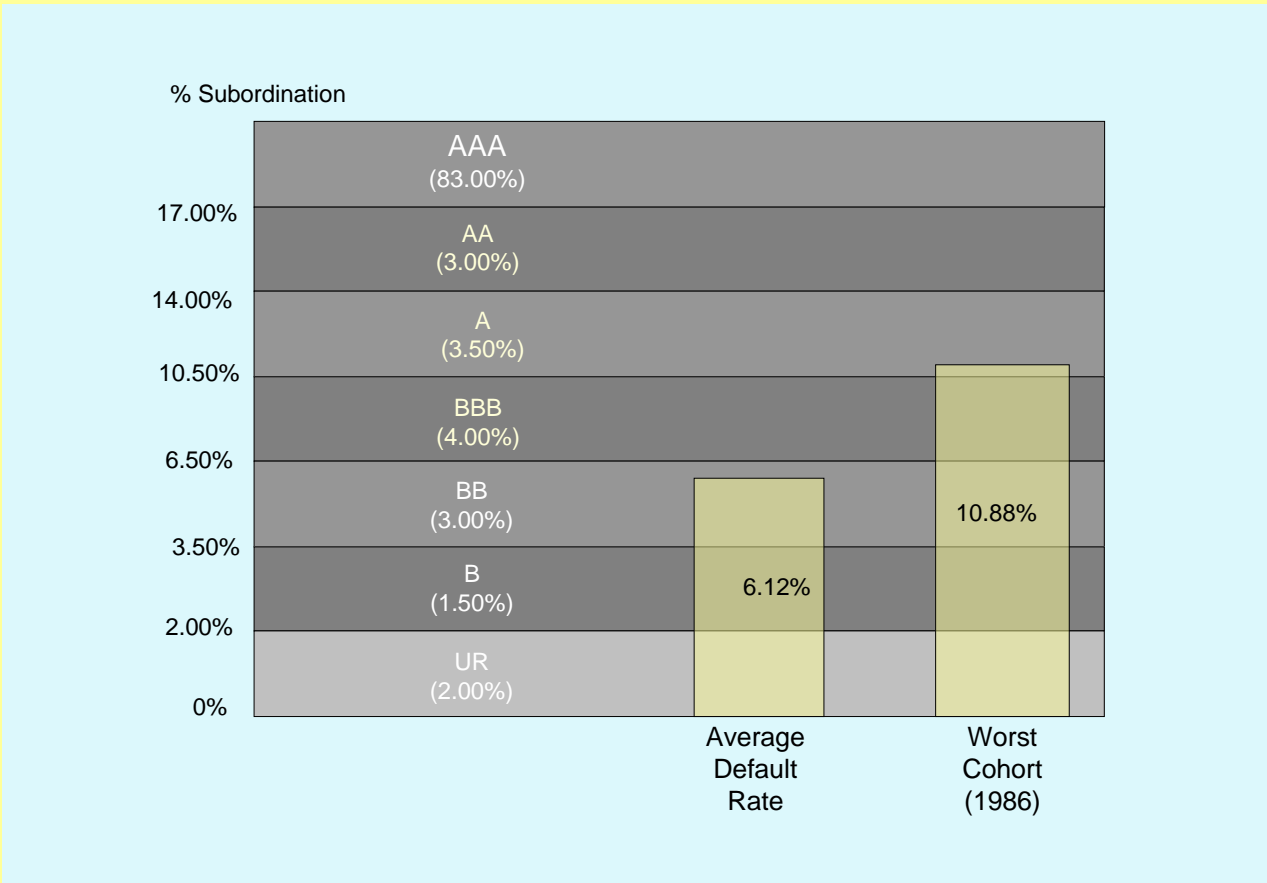
20.3.3 Rating CMBS tranches...

Credit-rating agencies employ:
- **Statistical and analytical techniques,**
- **Qualitative investigation (inclu legal & mgt assessments, due diligence),**
- **Common sense.**

The issuer's track record is considered as well as the pool of loans & the underlying property collateral.

Traditional underwriting measures such as LTV ratio and DCR are examined for the pool as a whole.

Some of the larger mortgages in the pool are examined individually.

Pool *aggregate* measures (weighted average) are considered.

Pool *heterogeneity* is also considered:
- **Dispersion in LTV & DCR,**
- **Diversification of collateral (by property type, geographic location).**

Diversity & heterogeneity of the mortgages within a pool can matter as much as the average characteristics of the pool, esp. for lower-rated tranches:
- **e.g., Diversification ➜ *Reduced* default risk for *senior* trances; *Increased* default risk for *lower* tranches (esp. first-loss). *Why?...***

20.3.3 Rating CMBS tranches (cont.)…

Variables that can be important in analyzing the credit quality of a mortgage pool and the various tranches that can be carved out of it, in either quantitative or qualitative analysis, include:

- Overall average LTV ratio & DCR
- Dispersion (heterogeneity) in LTV and DCR
- Quality of LTV and DCR information
- Property types in the pool
- Property ages and lease expirations
- Geographical location of properties
- Loan sizes & total number of loans
- Loan maturities
- Loan terms (e.g., amortization, floating rates, prepayment, recourse)
- Seasoning (age) of the loans
- Amount of pool overcollatalization or credit enhancement
- Legal structure & servicer relationships
- Number of borrowers & cross-collateralization

20.3.3 Rating CMBS tranches (cont.)…

Rating agencies (and consultants working for them) employ:

- **Econometric models of commercial mortgage default probability (e.g., logit, probit binary choice models, proportional hazard models).**

- **Empirical estimates of conditional loss severity.**

- **Monte Carlo simulation of interest rates, property market, and credit losses, to *"stress test"* the pool and the various tranches that may be defined based on it.**

Because of the importance of the credit-rating function in determining the value and hence financial feasibility of a CMBS issue, the *rating agencies play a quasi-regulatory role in the CMBS market*.

(This is much like the role played by FNMA, FHLMC and GNMA as the dominant secondary market buyers and security issuers in the RMBS market.)

The result is greater *standardization* of commercial mortgages, especially smaller loans of the type that are most likely to be issued by conduits.

20.3.4 CMBS Yield Spreads and the Capital Market

Yield spreads reflect the capital market's evaluation of default risk in CMBS tranches. As noted previously, spreads are quoted in two ways,

"Yield spread" = CMBS yield – **T-Bond** yield

    or,

"Yield spread" = CMBS yield – **Swap** yield

1. **Treasury Spread**

2. **Swap Spread**

(where "Swap Yield" is the swapped LIBOR yld, for fixed-rate LIBOR of same maturity as CMBS WAM.)

The Treasury spread can be expressed in terms of the swap spread as follows:

(CMBS yld – T-Bond yld) = (CMBS yld – Swap yld) + (Swap yld – T-Bond yld)

- Yield spreads can change over time, especially for the higher-risk tranches.

- When mkt perceives a threat to credit quality (e.g., recession, overbuilding), spreads widen, more so for lower-rated tranches (due to greater exposure to default risk and expected magnitude of conditional credit losses).

- A famous and dramatic example of this occurred in 1998 . . .

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Investment Grade CMBS Yields: Spread (basis points) over 10-yr Treasury Yield

Basis Points
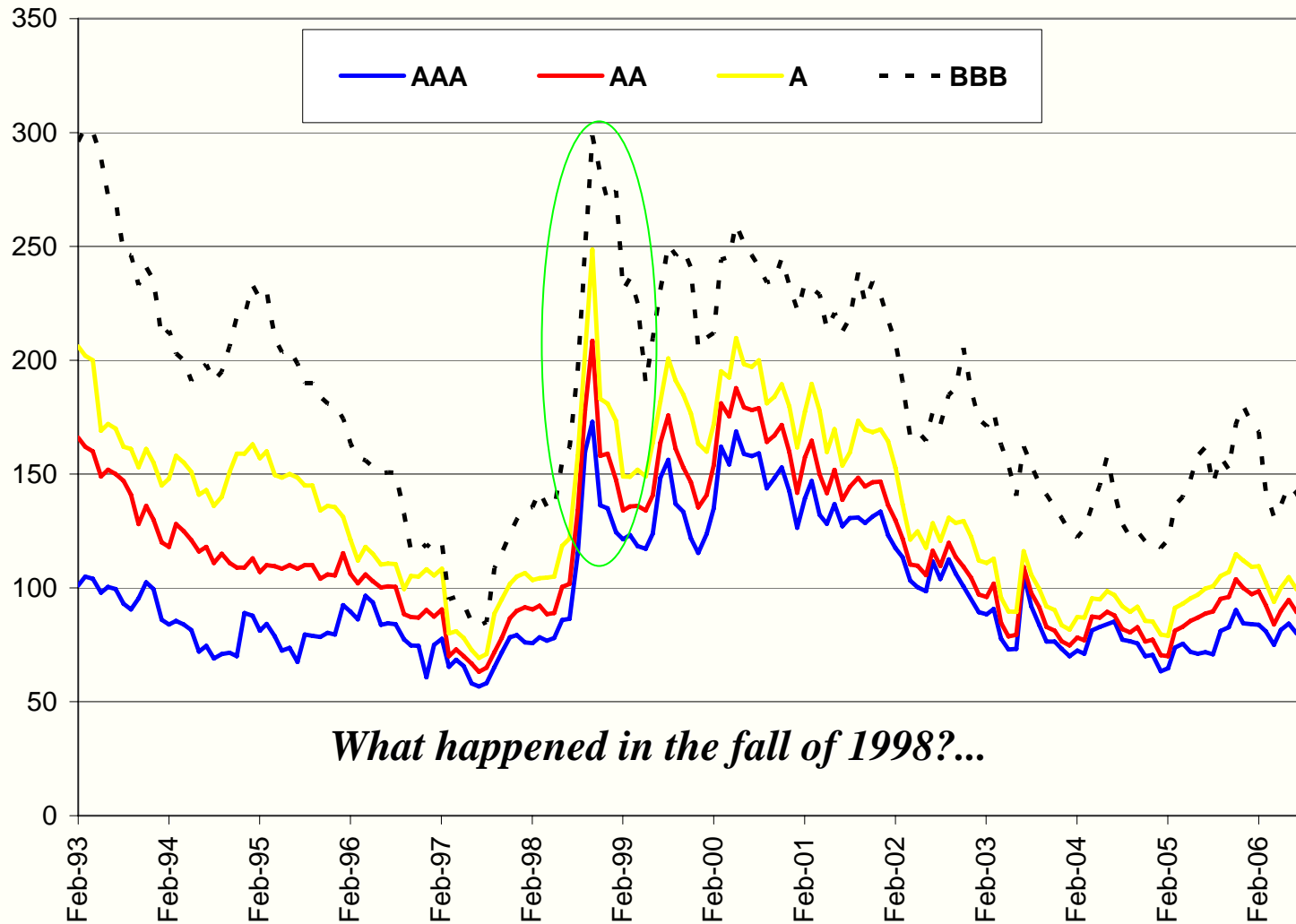
What happened in the fall of 1998?...

Source: JP Morgan

The 1998 crisis may have been a *"textbook example"* of how the public capital markets can help to effectively regulate the flow of capital to the real estate sector: the "negative feedback loop" in the real estate system described in Chapter 2…

• **The jump in yields for lower-rated CMBS depicted in Exhibit 20-10 effectively eliminated the market for new issues of CMBS by the fall of 1998:**

> •**Commercial property investors and developers who had been planning to borrow money using the CMBS market as an indirect source of funds (e.g., through conduit mortgages), would have to face interest rates so high, and/or LTV ratio limits so low, that the financial feasibility of their investments and developments would be called into question.**

> •**(REIT share prices also tumbled in 1998, temporarily also eliminating new REIT equity issues as a source of capital for real estate.)**

➔ **As a result, the *flow of capital* reaching the real estate sector was cut back.**

This reduction in capital flow put some breaks on new construction, directly or indirectly resulting in less new space supply coming into the system than otherwise would have been the case at that time.

A technical result of the 1998 experience is that investment grade CMBS spreads are now typically quoted relative to LIBOR Swaps, rather than Treasury Bonds.
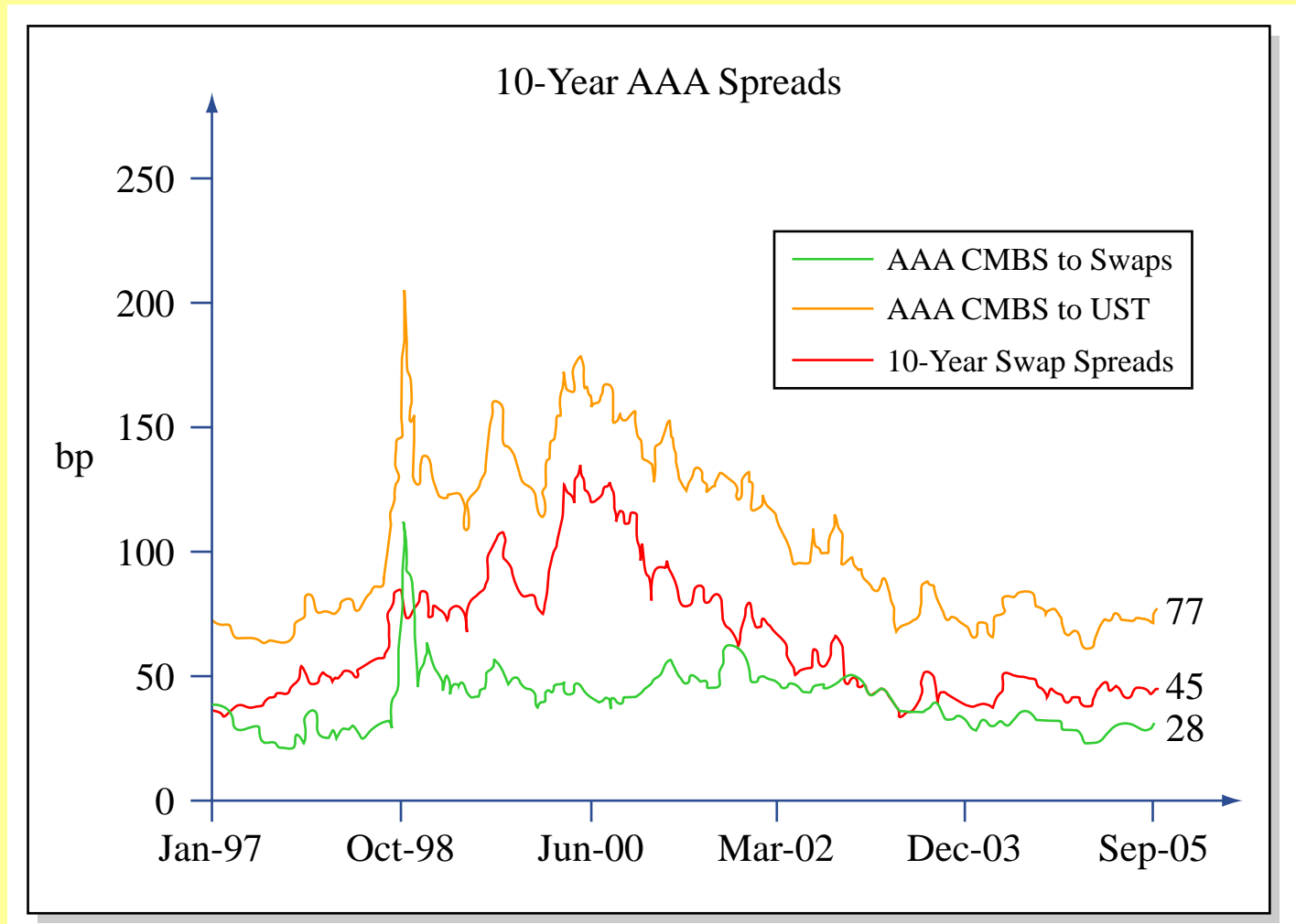

10-Year AAA Spreads

Legend:
- AAA CMBS to Swaps
- AAA CMBS to UST
- 10-Year Swap Spreads

CMBS Spreads to Treasury and Swap Benchmarks (example numbers as of late 2005)

10-Year AAA CMBS Yield → 5.25%

CMBS Spread to Swaps = 35 bp

10-Year Swap Yield → 4.90%

Swap Spread to TSY = 40 bp

10-Year Treasury Yield → 4.5%

CMBS Yield Spread to Treasuries (TSY) = 75 bp
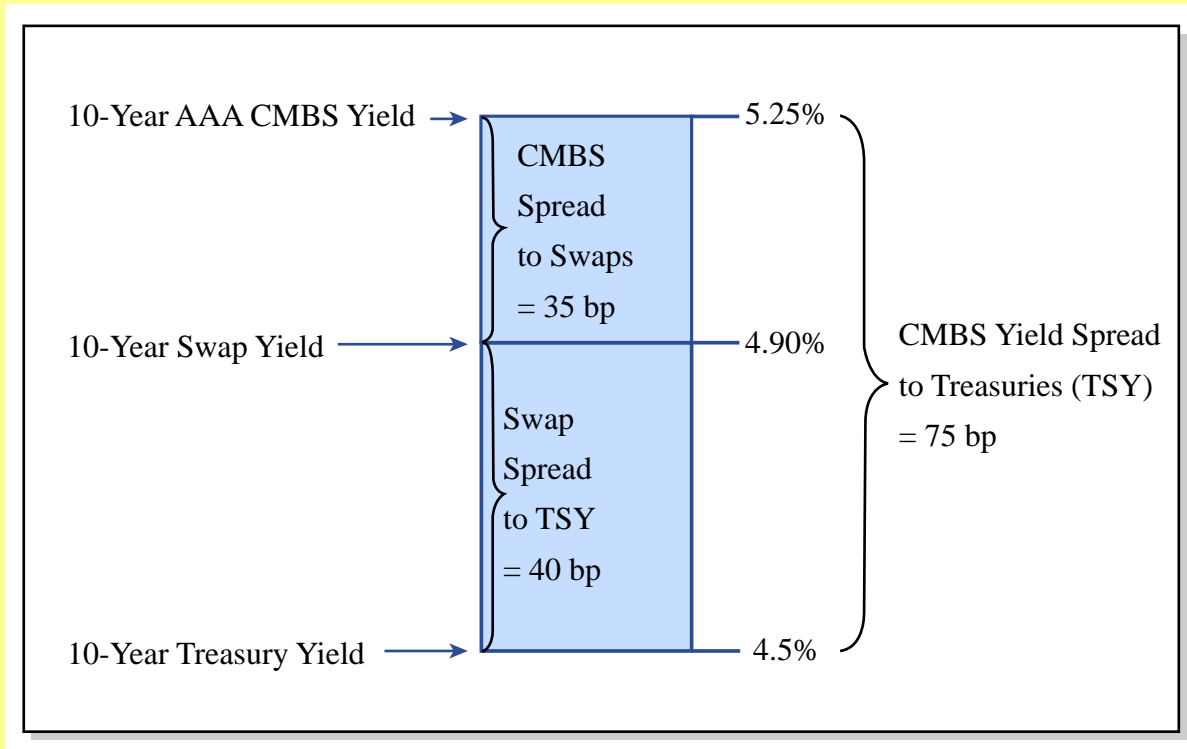
Figure by MIT OCW, adapted from course textbook.

Swap spreads reflect credit risk in fixed income-markets in general, that is not real estate specific. The CMBS spread to the fixed swap rate then adds the incremental risks specific to CMBS; the CMBS spread above Tsy reflects both.

LIBOR Swaps contain a little bit of *default risk* (more than T-Bonds, Less than CMBS AAA), but *"liquidity risk"* similar to CMBS AAA tranche.

=> Swap spreads tend to be highly correlated with CMBS spreads, and as a result CMBS players use swaps to hedge when accumulating loans to securitize.
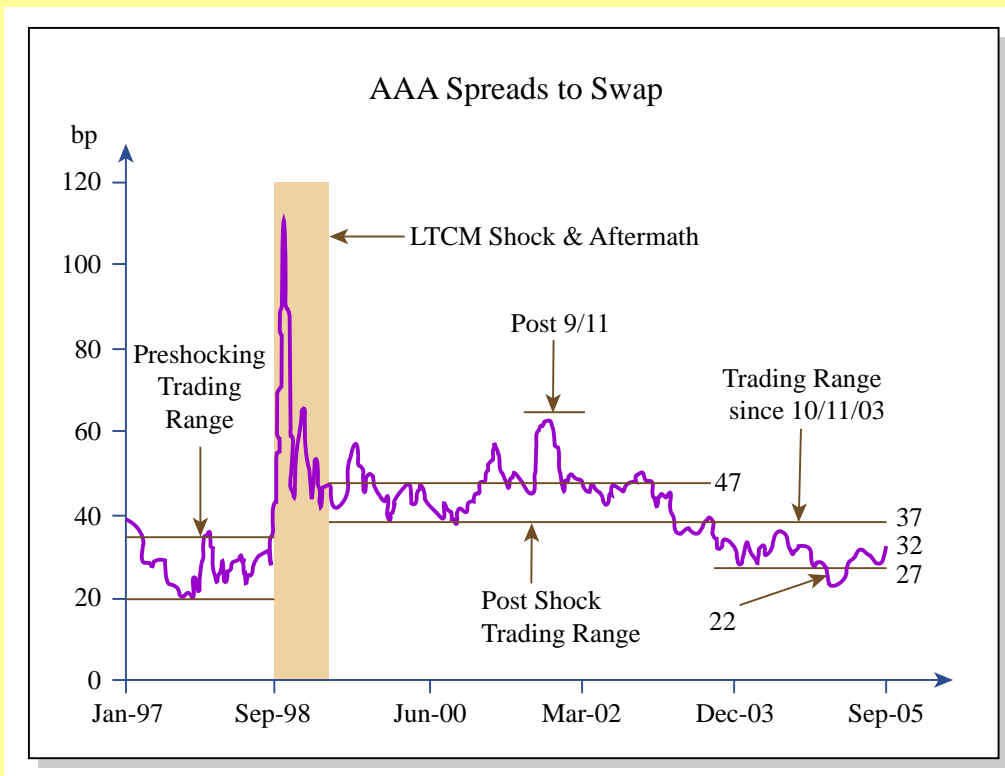
Figure by MIT OCW, adapted from course textbook.

The difference is not so much a perception of greater default risk *per se*, but greater *"liquidity risk"* (difficulty selling securities at full value during *"events"*, times of shock or crisis in the financial markets), even though the underlying credit quality of the pool may be relatively unaffected.

(Of course, default risk must underlie this type of liquidity risk at a deeper level, because U.S. T-Bonds do not suffer from liquidity risk, presumably because they are free of any default risk, so investors feel confident pricing them even during financial crises. This is also facilitated by the depth and breadth of the T-Bond market, the sheer quantity of homogeneous securities issued. For both these reasons, T-Bonds are the recipient of a *"flight to quality"*.)

The 1998 experience was a major event in the process of the CMBS market maturing and *"cutting its teeth"*, the first major crisis faced by the market. Yield spreads seem to have made a permanent (?) adjustment since then…
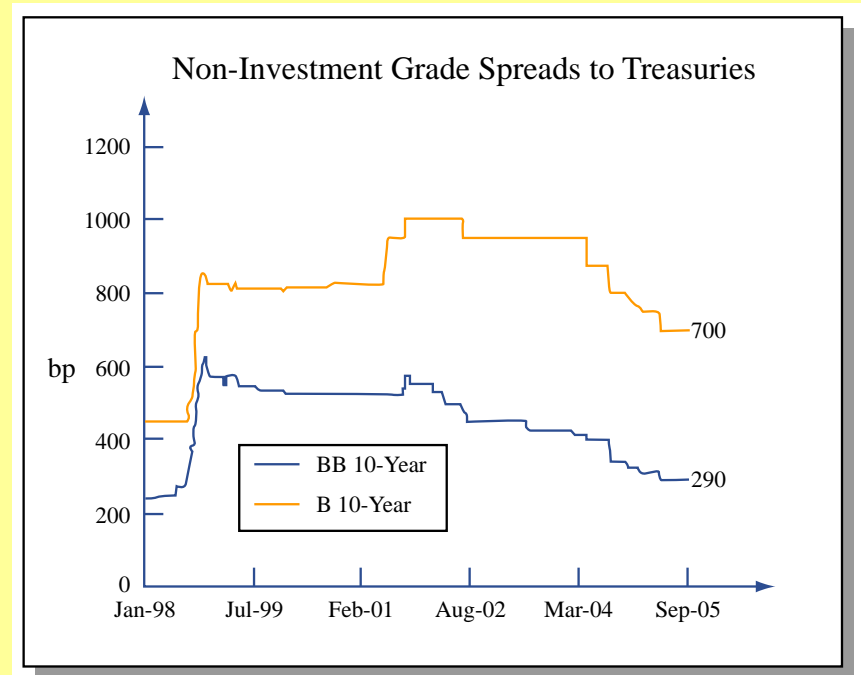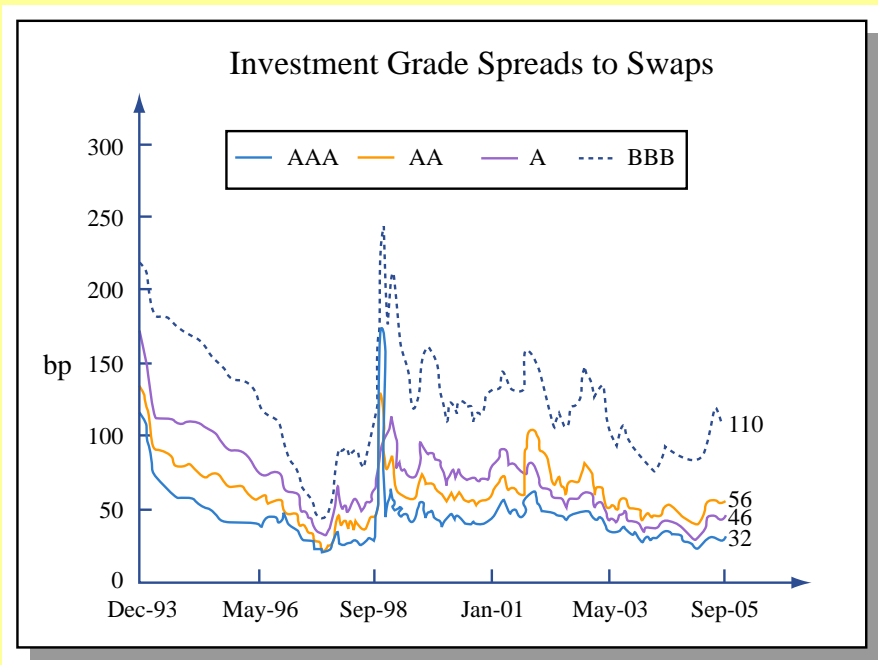

Figure by MIT OCW, adapted from course textbook.

Spreads have recently come down to below pre-crisis (of 98) levels…

CMBS Mkt Yld Spreads over 10-yr T-Bonds			
	Dec.2004	Dec.1998	Apr-98
AAA	70	136	77
AA	77	161	88
A	85	186	105
BBB	127	275	140
BB	325	575	250
B	770	825	450

Credit support levels…too high, too low, just right?

Weighted-average fixed-rate conduit CMBS subordination (%)

	1996	1997	1998	1999	2000	2001	2002	2003	2004
AAA	31.5	30.3	28.8	27.0	22.2	21.0	20.7	16.5	13.7
AA	25.3	24.1	23.7	22.3	17.8	17.4	16.1	13.7	11.1
A	19.7	18.5	18.7	17.3	13.7	12.9	12.3	10.0	8.1
BBB	14.8	13.3	12.6	12.3	9.6	9.1	8.1	6.7	4.9
BBB-	12.6	11.5	10.9	10.5	8.3	7.6	7.2	5.2	3.6
BB	7.9	6.0	5.8	6.1	4.5	4.6	4.4	3.5	2.7
B	3.3	3.0	3.2	2.9	2.1	2.4	2.2	1.9	1.6

Source: JPMorgan Research

CREDIT SUPPORT LEVELS

- Subordination levels have fallen steadily since the late 1990s and took another sharp drop in 2004. How low can they go?

- However, we have probably hit a plateau for a short while given the "frothiness" of the current lending environment

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20.3.5 CMBS versus corporate bond spreads

Throughout much of their early history, CMBS yields generally exceeded those on similar maturity corporate bonds of equal credit rating.

CMBS vs Corporate Bond Market Yield Spreads in Comparable Maturity A-rated Securities:
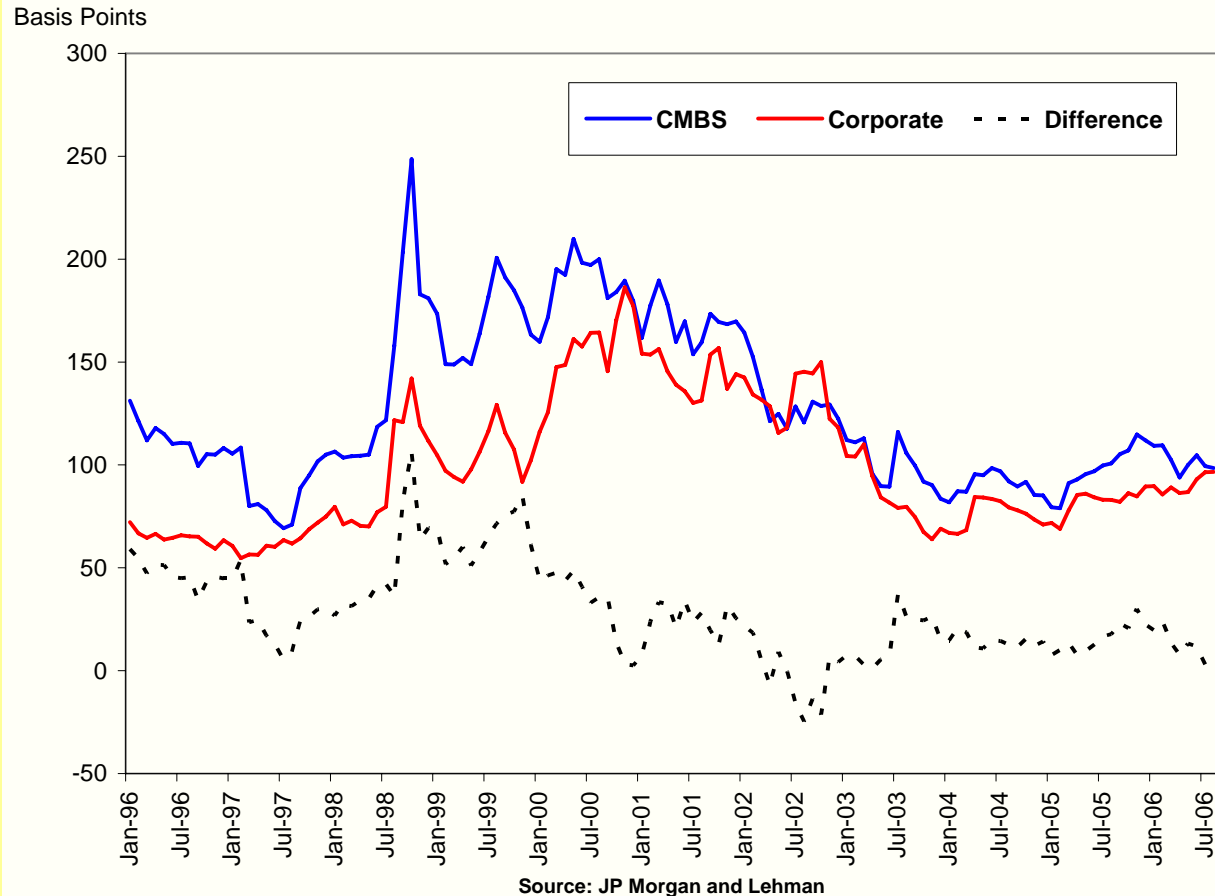
Why would this be?...

20.3.5 CMBS versus corporate bond spreads

CMBS are "different animals" compared to corporate bonds:

1. *Prepayment Risk:* Most U.S. commercial mortgs have "prepayment protection", but some do not (or it is imperfect, or goes away). ➔ Some CMBS pools contain mortgages that are more like callable corporate bonds, resulting in a yield premium to reflect the prepayment risk faced by the investor. Such a yield premium would affect spreads for all tranches, but especially for senior tranches, given the typical principal payback priority structure.

2. *Agency and Extension Risk:* In the event of default in CMBS pools, a conflict of interest tends to exist between investors in senior versus junior tranches. The former want immediate foreclosure, while the latter tend to prefer a workout and extension of loan term. The authority to decide whether to foreclose or exercise forebearance is vested in the *"special servicer",* who is usually effectively controlled by the junior tranche holders (after all, they stand to lose or gain the most from how the default is handled). ➔ Foreclosure/workout decision cannot be expected to be handled optimally from the senior tranche holders' perspective. ➔Higher yield in the senior tranches. No such conflict of interest exists in typical corporate bonds because there is only one class of investor.

3. *Credit Information Quality and Going-concern Risk & Liquidity Implications:* Bonds backed by large publicly-traded corporations have available more on-going information relevant to the credit risk of the borrower. Also, the public corporation is a single going-concern that typically knows it will need to return to the bond market again, probably regularly in the near and long-term future. It therefore must carefully consider its reputation in the bond market, and this makes it less likely to default on its bonds. Rating agencies and investors were initially more "in the dark" about the credit risk of the typical CMBS issue than they are with the typical corporate bond. This concern was (still is?) especially relevant for the lower-rated tranches.

20.3.5 CMBS versus corporate bond spreads

- Such differences as these between CMBS and corporate bonds presumably explain the difference in yields for otherwise similar maturity bonds with the same credit-rating.

- The higher CMBS spreads cannot be presumed to give CMBS investors "something for nothing", that is, a better risk-adjusted expected return than corporate bonds.

- Also, CMBS were still a new type of security in the 1990s. The capital markets were still learning about the nature of their risk and return. The CMBS industry seems to be evolving toward the mitigation of some of the differences noted here, esp. for more senior tranches. There is mounting evidence that the spread between CMBS and equivalent corporate bonds has been recently narrowing…

History seems to be proving the 3rd bullet point true.

10-Year BBB CMBS Spread versus BBB Corporate Industrial Spreads to Treasuries

– **Historically BBB CMBS has traded wide (cheap) to BBB corporates**

– **In 2003-04 BBB CMBS traded on top of BBB corporates**

Since 2002 there has been very little spread between CMBS and Corporate I.G. yields.

Source: Morgan Stanley.

BBB CMBS to UST
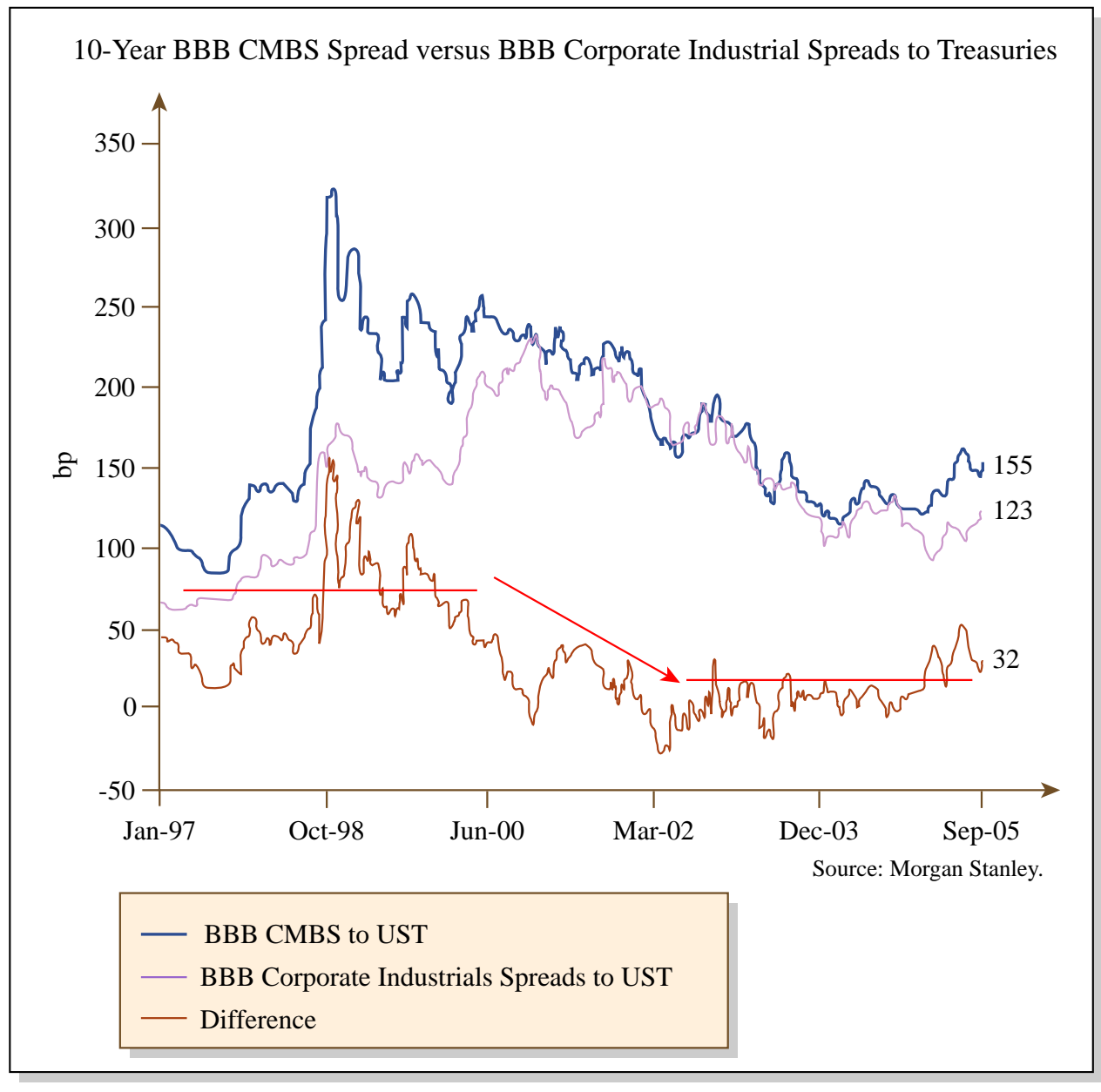BBB Corporate Industrials Spreads to UST
Difference

Figure by MIT OCW, adapted from course textbook.

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20.4 CMBS Borrower Considerations

• Borrowers must understand that REMIC regulations limit the ability of servicers to change mortgage loan documents once a loan is securitized …

→ CMBS is a relatively inflexible; post-loan closing, it is difficult to modify the collateral (i.e. property), *unless planned for and included in the loan documents at the time of closing.*

→ CMBS loans are generally not well suited for properties with significant expansion possibilities and/or redevelopment potential.

• CMBS provides relatively standardized, cookie-cutter loans.

→ Not for borrowers looking for a customized loan or relationship-based lending

Ch.20 CMBS Summary;

• **CMBS have unique investment characteristics (relatively little prepayment risk, relatively high yields) that appeal to important classes of investors, thereby increasing the capital available to real estate, and improving the efficiency of the functioning of the capital market for investors.**

• **Variety in the risk and return attributes of the securities carved out of a mortgage pool allow different tranches to appeal to different types of investors.**

• **The CMBS market is another example of how investor heterogeneity drives the investment industry.**

• **Typically, the investment-grade tranches that make up the bulk of a typical CMBS issue find ready buyers in the form of conservative institutions such as pension funds, life insurance companies, and bond mutual funds.**

• **The market for the more risky speculative and junk tranches is much thinner.**

• **Major buyers and holders of the lower tranches are aggressive investors willing to take on risk for high expected returns, and who typically have specialized knowledge and expertise regarding commercial property risk.**

• **Such investors have included the investment banks and conduits issuing the CMBS, the "special servicers" who are charged with taking over defaulted loans in the pool to attempt "workouts" with the borrowers, and specialized mortgage REITs .**