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 **RBS Greenwich Capital**

# The Mystery of CMBX

## CMBS Fixed-Rate Conduit/Fusion Spreads (2008 YTD) – Waves of Spread Widening

- First real widening wave hits in August 2007
  - Spring rating agency paradigm shift
  - Reprieve due to Fed ease in early Fall
- Second wave begins in late-October 2007 and continues
  - Mark-to-market risk trumps all
  - Losses mount
  - Shorts grow
- CMBS spreads surpass historical wides
  - 2008 fixed spread movement: +55 to +350 bps
  - 2007 fixed spread movement: +84 to +765 bps
- Greater widening in non-triple-A CMBS
  - Widening both technical and fundamental

CMBS Spread Activity: Market Snapshot								
	Spread to Swaps/LIBOR (BPs)							
	1/25/08	1/5/07	Sprd. Chg.	07 Avg.	07 Max.	Max. Date	07 Min.	Min. Date
<b>Fixed-Rate CMBS</b>								
<b>AAA- 3Y SS</b>	170	13	157	35	105	12/21	9	3/23
<b>AAA- 5Y SS</b>	230	18	212	49	125	11/30	17	2/16
<b>AAA- 7Y SS</b>	240	24	216	55	130	11/30	23	1/26
<b>AAA- A-AB</b>	200	24	176	50	115	12/14	22	1/26
<b>AAA- 10Y SS</b>	175	23	152	47	106	11/23	22	2/16
<b>AAA-10Y Mezz.</b>	250	25	225	59	155	11/30	25	1/5
<b>AAA-10Y Jr.</b>	330	28	302	76	200	12/7	28	1/5
<b>AA</b>	550	36	514	100	270	12/21	33	2/16
<b>A</b>	800	46	754	145	385	12/21	41	2/16
<b>BBB</b>	1,200	77	1123	274	675	12/21	65	2/23
<b>BBB-</b>	1,400	95	1305	350	850	12/21	85	2/23
<b>Floating-Rate CMBS</b>								
<b>AAA SR</b>	110	8	102	30	100	12/7	6	2/2
<b>AAA JR</b>	175	12	163	45	150	12/7	10	2/2
<b>AA</b>	300	21	279	67	225	12/7	18	2/2
<b>A</b>	400	33	367	95	275	12/7	31	2/2
<b>BBB</b>	600	70	530	159	400	12/7	60	2/2

Source: RBS Greenwich Capital

## CMBS Fixed-Rate Conduit/Fusion Pricing – What’s Triggered the Widening?

### FACTORS EXTERNAL TO CMBS MARKETPLACE DRIVE CMBS SPREADS

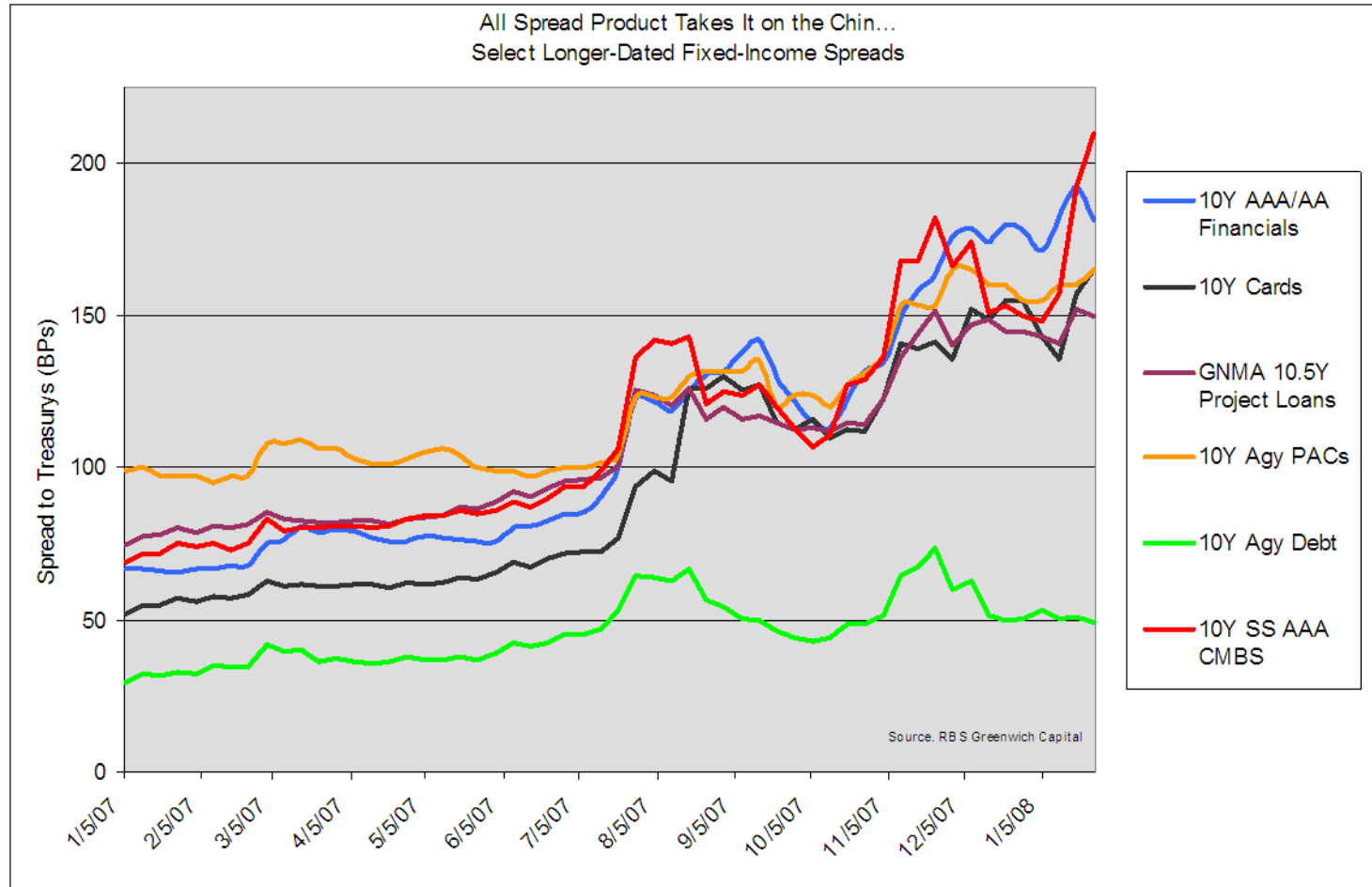
- Subprime contagion – all mortgage product subject
- Subprime-Related Tape Bombs...
  - Structured Investment Vehicles (SIVs) shut down/liquidate – key investors of floating-rate CMBS
  - ABS CDO downgrades / liquidations as deals hit events of default (EOD)
  - Bank and brokerage subprime/CDO related write-downs
  - Bond insurers at risk of losing triple-A ratings – trigger added write-downs
    - Fitch Downgrades:
      - Ambac Assurance Corp to ‘AA’ from ‘AAA’
      - SCA
      - FGIC Corp. to ‘AA’ from ‘AAA’
      - MBIA on Watch Negative
- Fading liquidity
  - No/limited financing available for CMBS investors
  - Traders forced to reign in balance-sheet exposure
  - Conduit lenders forced to price loans to current wider CMBS spreads and volatility

## CMBS Fixed-Rate Conduit/Fusion Pricing – What’s Triggered the Widening?

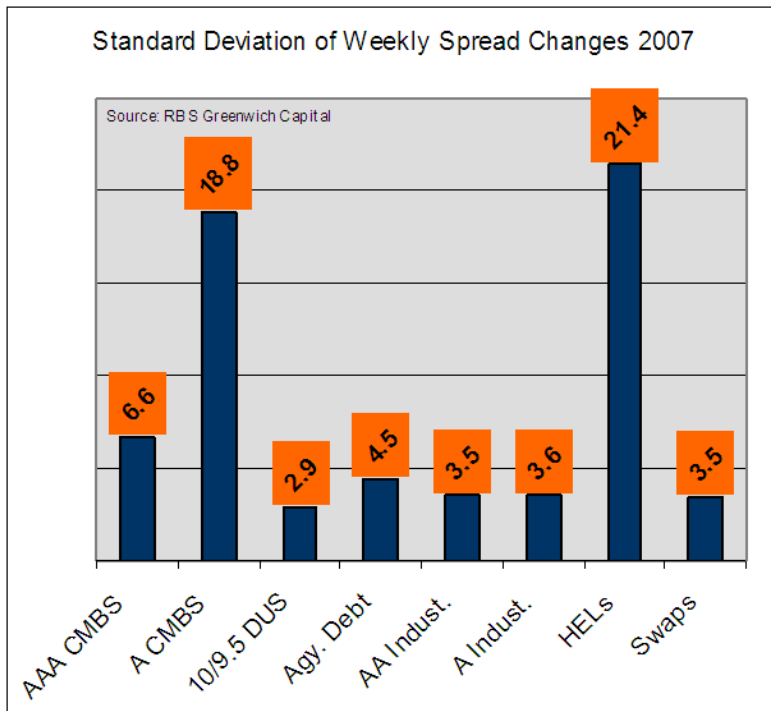
### **BUT SOME INTERNAL CMBS ISSUES AS WELL**

- Rating agencies
  - Over-leveraged, aggressively underwritten commercial loans
  - Rating agency model changes and higher credit enhancement requirements heighten risk of bond downgrade
  - CRE CDOs under review for downgrade – mainly transactions backed by NIG fixed-rate bonds (BB, B, NR)
- Conduit lenders priced out of market
  - Wider mortgage spreads due to CMBS spread widening
  - Reduced loan proceeds due to heightened credit concerns from investors and rating agencies
  - Sharp decline in originations
  - Increased refinance risk
    - Especially for maturing floating-rate loans
    - Short-term debt packages and bridge equity from public to private mega deals
- Reduced availability of financing for CMBS investors across the credit stack (affects leveraged investors most)
- Growing fears of recession and the potential to negatively affect CRE fundamentals

No Immunity: Spreads Across Fixed-Income Markets Come Under Pressure



## Heightened Volatility for CMBS Spreads – Why? It’s a Mortgage Product



Fixed-Income Standard Deviations of Weekly 10Y Spread Changes

	AAA CMBS	A CMBS	10/9.5 DUS	FNMA Debt	AA Indust.	A Indust.	AAA HELs	Swaps
1997	2.1	2.4	2.4	2.4	4.0	5.4	3.8	1.2
1998	16.2	22.8	19.0	22.8	25.5	15.7	12.3	15.2
1999	2.8	5.1	4.1	5.1	6.8	4.0	5.7	4.1
2000	1.3	1.9	1.6	1.9	5.5	5.8	5.7	5.6
2001	2.0	3.1	2.5	3.1	4.3	5.4	3.0	4.4
2002	1.6	2.9	1.9	2.9	4.8	5.5	3.0	4.2
2003	1.4	2.1	1.7	2.1	4.0	6.5	2.9	5.8
2004	1.4	2.0	2.4	2.8	6.1	3.3	7.6	3.4
2005	1.3	1.7	0.7	2.0	3.5	3.7	3.2	1.5
2006	0.9	1.1	0.8	1.8	1.1	1.7	3.0	1.5
2007	6.6	18.8	2.9	4.5	3.5	3.6	21.4	3.5

Source: RBS Greenwich Capital

## Steeper CMBS Credit Curve Driven by Technical and Fundamental Factors Alike

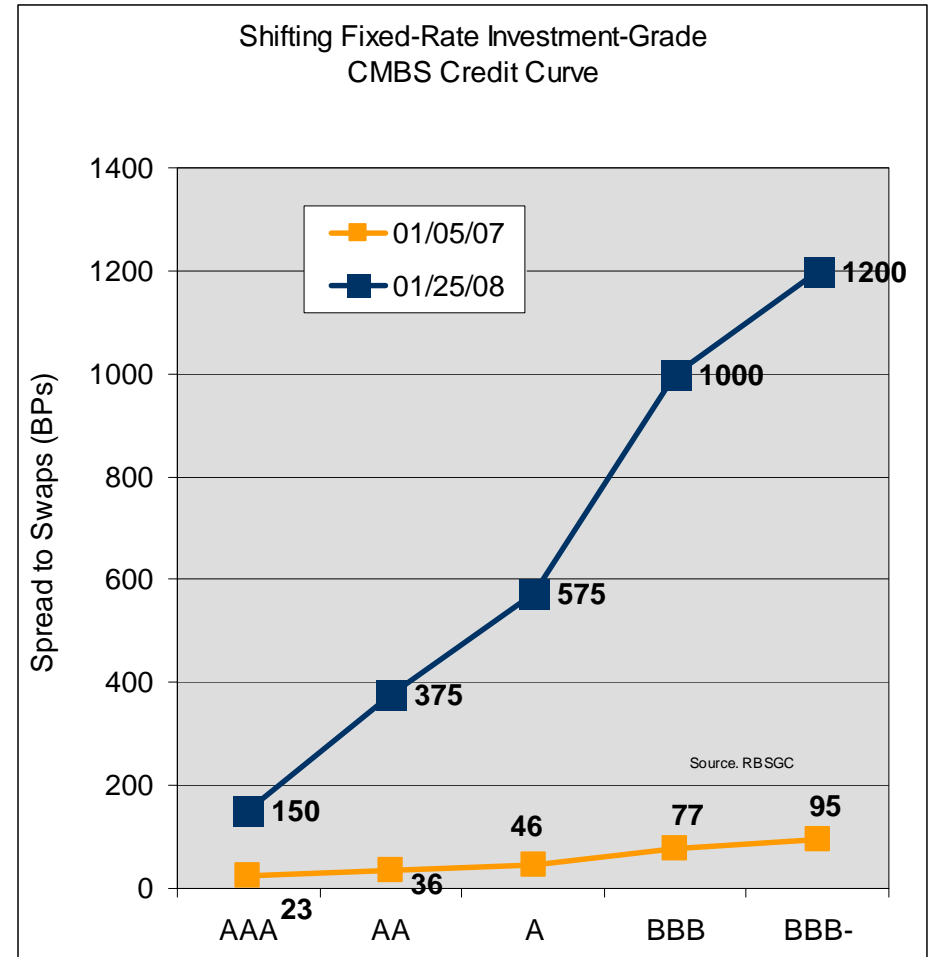
		1/25/08	1/5/07
<b>Fixed</b>	AAA to BBB-	1,050 bps	72 bps
<b>Floating</b>	AAA to BBB	490 bps	62 bps

### Technical Factors

- No CDO bid
- CMBX
- Mark-to-market fear

### Fundamental Factors

- Credit enhancement (CE) too low
- Aggressive underwriting/excessive leverage
- Risk of downgrade given projected CE increases



## Fundamental Factors Behind Curve Steepening: Credit Enhancement

- Significant declines in credit enhancement -- Down 50% to 76% since 1996
- Why lower credit enhancement?
  - Fusion transactions, investment-grade loans secured by Class-A trophy properties
  - Greater usage of pari-passu & A/B note structures to drive down LTVs
  - Strong CRE property fundamentals

- Declines continued in 2007, despite:

- Frothy property valuations
- Excessive leverage
- Aggressive underwriting

WA Fixed-Rate Conduit CMBS Subordination (%)							
Date	AAA	AA	A	BBB	BBB-	BB	B
<b>1996</b>	<b>31.5</b>	<b>25.3</b>	<b>19.7</b>	<b>14.8</b>	<b>12.6</b>	<b>7.9</b>	<b>3.3</b>
<b>Pre-July-07</b>	<b>11.7</b>	<b>9.7</b>	<b>7.3</b>	<b>4.1</b>	<b>3.0</b>	<b>2.3</b>	<b>1.6</b>
% Chg.	-62.7%	-61.7%	-62.8%	-72.1%	-76.1%	-70.4%	-51.7%
Post July-07	12.7	10.6	8.0	4.7	3.7	2.6	1.8
% Chg. (%)	5.5%	6.1%	6.6%	10.9%	18.6%	12.0%	15.7%

- In April 2007, Moody's instigates change

## Fundamental Factors Behind Curve Steepening: Aggressive Underwriting/Leverage

### *Subordination levels ... 'misaligned' with growing risks...*

Moody's Stressed DSCR: 0.91x (2007)

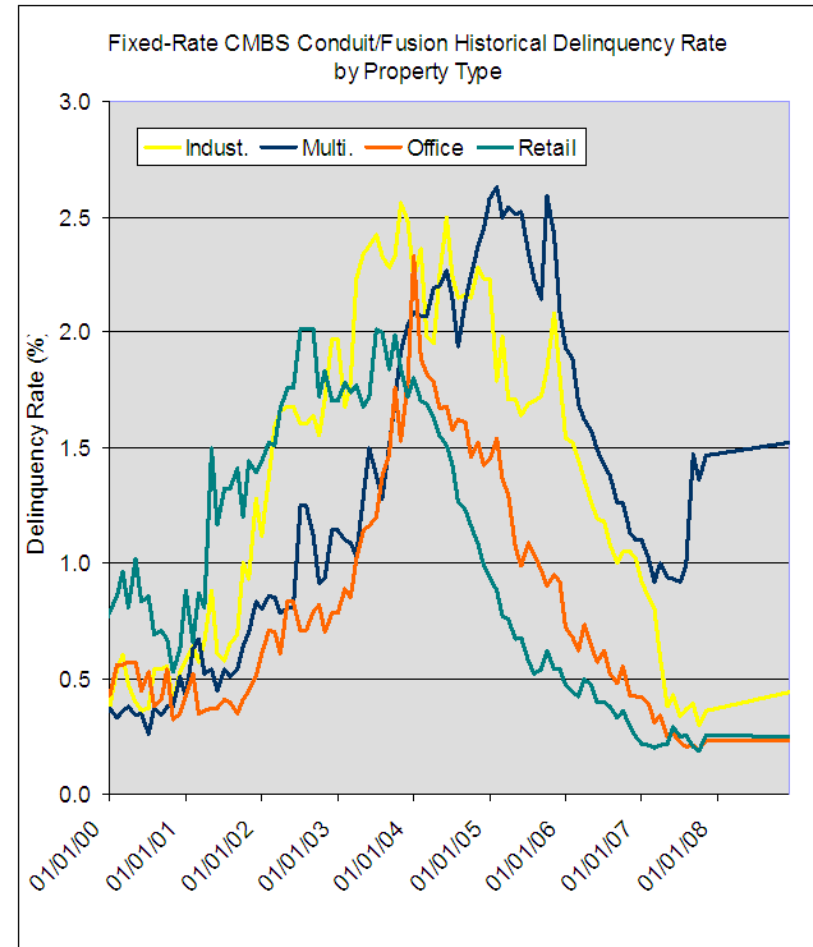
Moody's Stressed LTV: 111.2% (2007)

Conduit/Fusion Fixed-Rate CMBS Deal Composition and Credit Statistics						
	2007	2006	2005	2004	2003	2002
Avg. Deal Size (\$B)	3.60	2.61	2.18	1.24	1.17	1.01
Avg. Loan Size (\$M)	17.94	14.52	13.93	11.63	9.95	8.25
Largest Loan %	9.97	9.48	8.69	10.35	9.10	8.77
Avg. AAA AJ CE (%)	12.00	12.02	12.67	13.81	16.78	19.56
Avg. BBB- CE (%)	3.12	3.06	3.33	3.61	4.47	8.10
% of IO Loans	30.22	45.20	41.86	NA	NA	NA
% of IO Loans (Term)*	55.82	29.15	21.79	34.62	13.32	6.11
Moody's Stressed DSCR	0.91	1.00	1.05	1.19	1.28	1.27
Moody's Stressed LTV (%)	111.24	100.50	96.40	87.67	83.51	85.98
Subordinate Debt**	54.63	43.73	39.64	28.90	27.24	8.58
B-notes (%)	8.09	6.90	7.07	10.19	13.09	7.88
IG Rated Loans (%)	7.04	11.83	13.90	22.04	22.94	14.32

Sources: RBS Greenwich Capital, Fitch, S&P, and Moody's. \*2002-2005 IO percentages reflect initial and term IO loans combined. \*\*In-place and allowable.

## Current CMBS Loan Credit Fundamentals Encouraging

- **Historically low commercial mortgage delinquencies**
  - 0.47% in 12/07
  - Cycle high of 2.48% in October 2003
  - All-time high of 7.53% in 6/92 (Life company loans)
- **Dollar volume of delinquent loans more telling than rate...**
  - \$2.4 billion in 11/07
  - \$5.0 billion in 10/03
- **Drivers of performance**
  - Sound CRE fundamentals
  - Strong demand for commercial real estate
  - Plentiful capital sources
- **Higher defaults anticipated, but modest in historical terms**
  - IO loans make it easier to make debt service



## Beware the Media Hysteria...Fuel for CMBS Shorts

### *“Yikes! CMBS Delinquencies Rising Sharply”*

- Recent headline following rise in delinquency to 0.45% from 0.40%
- Anticipated increases in CMBS delinquencies in 2008 are coming off historical lows
- Read My Lips: It’s the Technicals Stupid!
  - October 2003
 

• Average AAA Credit Enhancement:	16.5%
• Delinquencies at Cycle High:	2.48%
• 10Y AAA Spreads to Swaps:	30 basis points
  - January 2008
 

• Average AAA Credit Enhancement:	30%
• Delinquencies at Cycle Low:	0.47%
• 10Y AAA Spreads to Swaps:	175 basis points recent wide

## CMBS Bond Losses Minimal Overall, Non-Existent in Investment-Grade Bonds

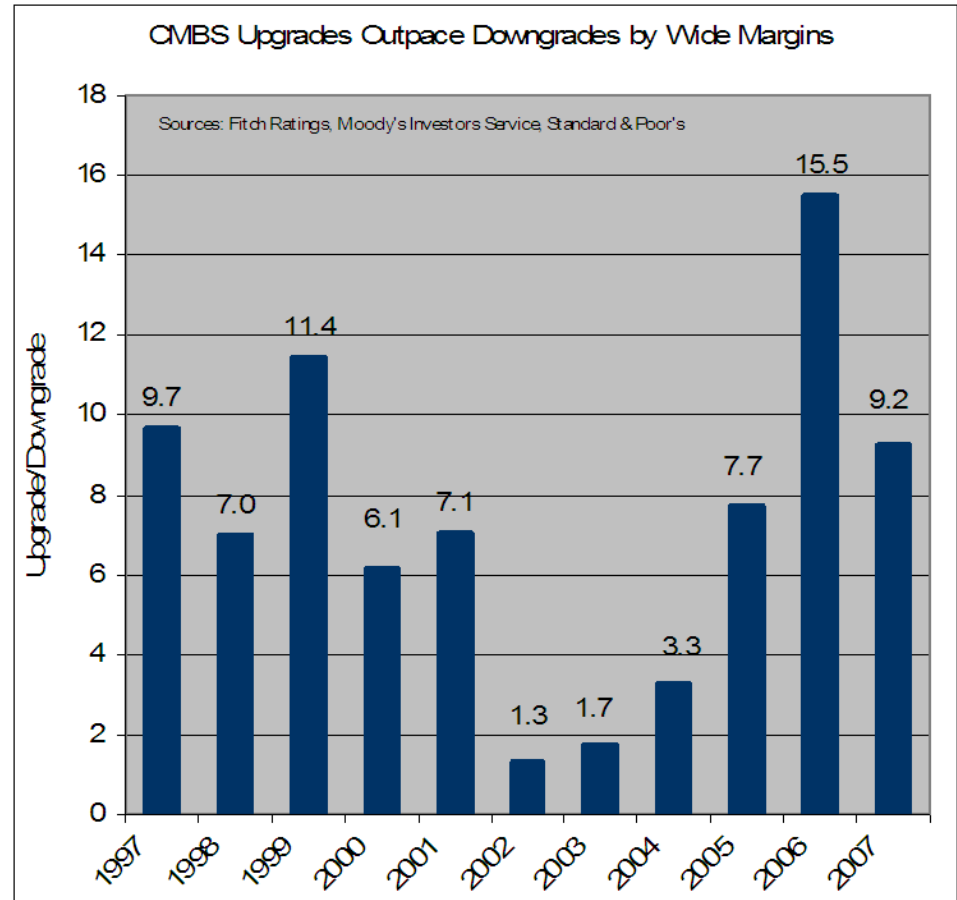
- 357 CMBS bonds experienced write-downs of some \$3.2 billion from 1995 thru May 2007
- Majority of CMBS write-downs occur in *un-rated equity classes*
- By vintage, 1998 saw the largest number and dollar volume of bond write-downs at 59 and \$838.7 million in outstanding balance – driven by healthcare and hotel – still no non-investment-grade bond losses.

Fixed-Rate CMBS Write-Downs by Vintage and Rating (1995 - 2006)													
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
<b>Total Fixed-Rate Conduit/Fusion Issuance (\$B)</b>	<b>3.5</b>	<b>10.0</b>	<b>21.8</b>	<b>52.2</b>	<b>37.8</b>	<b>28.3</b>	<b>35.5</b>	<b>43.4</b>	<b>56.8</b>	<b>55.6</b>	<b>138.8</b>	<b>162.2</b>	<b>645.9</b>
<b>Writedown (\$MM)</b>													-
AAA	-	-	-	-	-	-	-	-	-	-	-	-	-
AA	-	-	-	-	-	-	-	-	-	-	-	-	-
A	-	-	-	-	-	-	-	-	-	-	-	-	-
BBB	-	-	-	-	-	-	-	-	-	-	-	-	-
BBB-													-
BB	-	-	14.9	-	-	-	-	-	76.8	-	-	-	91.7
B	18.1	12.4	46.8	38.7	34.6	41.6	11.4	-	31.0	-	19.3	-	253.9
<b>Below B</b>	<b>32.0</b>	<b>125.0</b>	<b>465.0</b>	<b>800.0</b>	<b>410.0</b>	<b>317.7</b>	<b>286.5</b>	<b>79.2</b>	<b>22.0</b>	<b>3.7</b>	<b>299.0</b>	-	<b>2,840.1</b>
Number of Bond Write-downs	24.0	26.0	49.0	59.0	51.0	54.0	43.0	26.0	14.0	6.0	5.0	-	357.0
Cum. Write-Down (\$MM)	50.1	137.4	526.7	838.7	444.6	359.3	297.9	79.2	129.8	3.7	318.3	-	3,185.7
Cum. Write-Down (% of Orig. Bal.)	1.43%	1.38%	2.41%	1.61%	1.18%	1.27%	0.84%	0.18%	0.23%	0.01%	0.23%	0.00%	0.49%

Source: RBSGC and Intex Solutions, Inc.

## Stable/Positive CMBS Bond Ratings

- CMBS Upgrades Still Dwarf Downgrades
  - 1999: 336 Upgrades to 32 Downgrades
  - **2002: 565 Upgrades to 435 Downgrades**
  - 2006: 3,406 Upgrades to 220 Downgrades
  - 2007: 2,167 Upgrades to 235 Downgrades
  - Overall 2007 upgrade/downgrade ratio at 9:1
- Periods of increased volatility generally due to:
  - Floating-rate refi risk (Adverse Selection)
  - Terrorism insurance/Windstorm Insurance
  - Temporary interest shortfalls triggered by insurance issues
  - Single-tenant defaults
  - High levels of defeasance
- Risks: Fewer upgrades/Increased downgrades due to:
  - Higher credit enhancement
  - Anticipated reduced defeasance
  - Growing volume of watchlisted loans
  - Refinance risks on 2005-2007 vintage loans



## Term vs. Balloon Defaults: Disappointing the Short Sellers

- **Term defaults will rise, but tempered by:**

- High percentage of IO loans
- Sound property fundamentals at outset of some cooling in U.S. economy
- Historically low delinquencies – 0.47%

Rising rates equal higher financing

- **Degree of default rise linked to:**

- Depth/length of economic downturn
- NOI growth versus assumptions
- Extent of cap rate backup

Rising rates lead to higher cap rates and lower property values

- **Concerns remain over Balloon defaults**

- Refi risk high in floaters maturing now
- But risk exists for fixed-rate loans

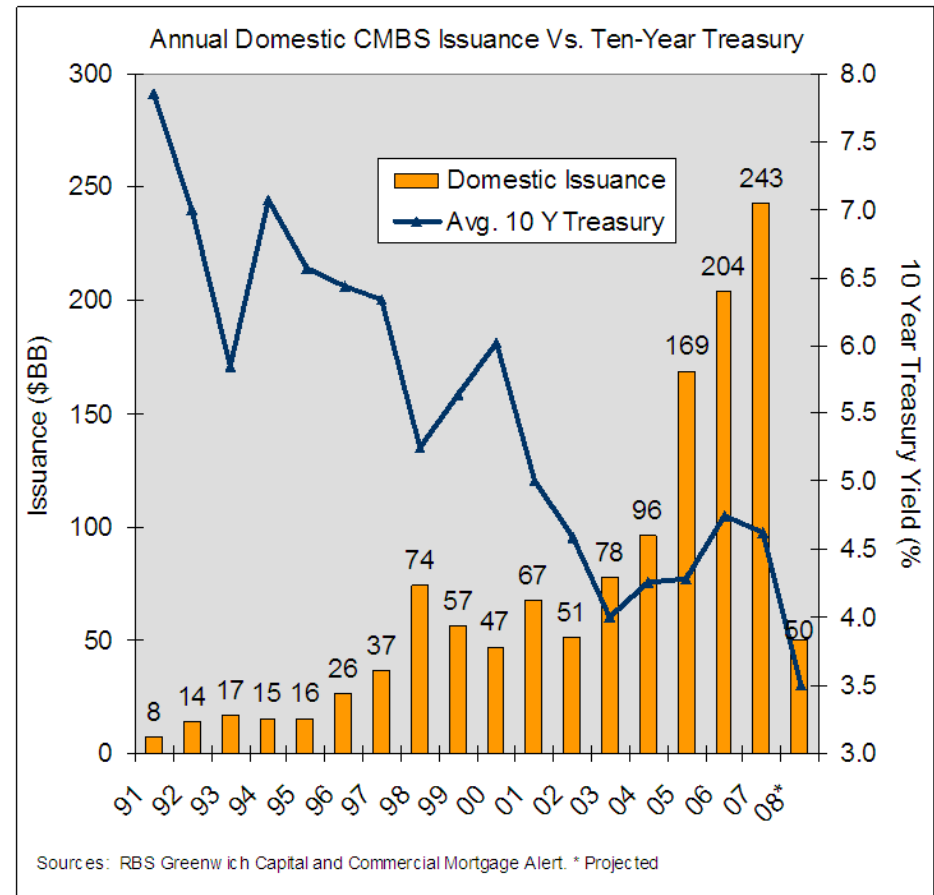
Insufficient increases in NOI

Added Stress on DSCR

Increased Balloon Refinancing Risk

## Regaining Stability: Slowdown in Origination Volume Is a Temporary Necessity

- **'07 domestic supply totaled \$241B -- +19% to '06**
  - 1H07 = \$149 billion
  - 2H07 = \$94 billion
  - 2008 projection: \$50B
- **Why the issuance surge in 2007?**
  - Prepays/defeasance at record high -- \$32B in 2007
  - Still low commercial mortgage rates:
    - 6.48% average in 2007
    - Increased conduit market share – 35%
  - Public to Private M&A Activity
- **Why the screeching halt...now?**
  - Higher mortgage spreads
  - More stringent underwriting
  - Slowdown in property transaction
- **Expected rebound in 2009**



## CMBX Overview

- Allows participants to take long or short positions in various CMBS credits
- Each CMBX series references 25 most recently issued fixed-rate CMBS
- Each series contains six sub-indices representing the credit stack in a typical fixed-rate transaction
  - SS AAA, AJ AAA, AA, A, BBB, BBB- and BB (CMBX.1 excludes BB)
- Fixed rate on each index is determined at launch
- Deal requirements: size, diversification, credit quality...
- Began trading in March 2006; new indices created every April 25<sup>th</sup> and October 25<sup>th</sup>
- Reference obligations (ROs) are equally weighted by initial par amount at index inception – 4%
- 14 dealers serve as market makers, Markit is the Administration and Calculation Agent

## Major Characteristics of Each CMBX Series

- There are currently four CMBX reference pools:
  - CMBX.NA.06.1: 09/05 – 01/06
  - CMBX.NA.06.2: 03/06 – 10/06
  - CMBX.NA.07.1: 11/06 – 03/07
  - CMBX.NA.07.2: 04/07 – 09/07
- Current illiquid markets suggest preference for on-the-run CMBX.4
- Preferences determined by whether participant buying protection (effectively short) or selling protection (effectively long)
  - CMBX.1 and CMBX.4 vs. CMBX.2 and CMBX.3

Summary Characteristics of CMBX Indices														
Index	Avg. Deal Size (\$MM)	IG Loan (%)	B Note (%)	Sub Debt (%)	IO Initial (%)	IO Term (%)	Mdy's Prop. Score	Largest Loan (%)	UW LTV (%)	Mdy's Stress LTV	UW DSCR	Mdy's Stress DSCR	Credit Enhancement (%)	
													AJ	BBB-
<b>CMBX.4</b>	<b>3,344</b>	<b>4.8</b>	<b>9.5</b>	<b>55.7</b>	<b>30.8</b>	<b>56.0</b>	<b>1.5</b>	<b>10.0</b>	<b>70.1</b>	<b>107.7</b>	<b>1.37</b>	<b>0.83</b>	<b>12.32</b>	<b>3.36</b>
<b>CMBX.3</b>	<b>3,401</b>	<b>11.0</b>	<b>5.2</b>	<b>45.4</b>	<b>31.2</b>	<b>50.3</b>	<b>1.7</b>	<b>8.9</b>	<b>68.3</b>	<b>104.3</b>	<b>1.45</b>	<b>0.96</b>	<b>11.42</b>	<b>2.77</b>
<b>CMBX.2</b>	<b>2,473</b>	<b>9.4</b>	<b>4.7</b>	<b>43.1</b>	<b>49.9</b>	<b>24.1</b>	<b>1.8</b>	<b>9.7</b>	<b>68.6</b>	<b>101.2</b>	<b>1.43</b>	<b>0.99</b>	<b>12.22</b>	<b>3.16</b>
<b>CMBX.1</b>	<b>2,525</b>	<b>14.5</b>	<b>7.3</b>	<b>44.8</b>	<b>43.1</b>	<b>23.8</b>	<b>1.8</b>	<b>8.8</b>	<b>68.2</b>	<b>98.3</b>	<b>1.57</b>	<b>1.05</b>	<b>12.50</b>	<b>3.32</b>

Source: Fitch, S&P, Moody's, Commercial Mortgage Alert, and Commercial Real Estate Direct \*Stressed using Agency LTV and DSCR

## CMBX Credit Events

- CMBX Credit Events; Payment by Seller of Protection:
  - Principal Writedown
  - Principal Shortfall
  - Interest Shortfall

## How Does CMBX Work?

- The Fixed Rate (coupons) on each index are determined at the launch of the index
- The Fixed Rate is payable to the protection seller on the 25<sup>th</sup> of each month
- The Up-Front Payment is the difference between the coupon and the market spread

$$\text{Upfront Payment} = \frac{(\text{Current Spread} - \text{Fixed Coupon}) * \text{Notional} * \text{Duration}}{10,000}$$

Sample CMBX Trade		Protection Buyer (Synthetic Short)	Payment	Protection Seller (Synthetic Long)
Index	CMBX.NA.BBB.4	Up-Front Payment (\$3,649,062)	→	
Notional	\$10,000,000	Protection Premium (500 bps per annum)	→	
Fixed Rate	500 bps		←	Interest Shortfalls (2)
Traded Spread	1,236.88 bps		←	Principal Writedowns
Up-Front Payment	3,649,062		←	Principal Shortfalls (3)
Source.	<a href="http://www.markit.com">www.markit.com</a>	Interest Shortfall Recoveries (4)	→	
		Principal Writedown Recoveries (4)	→	

Payments are made monthly on the 25<sup>th</sup> (or following business day)

(1) If the fixed-rate is greater than the current spread, the seller pays the buyer; if smaller, the buyer pays the seller.

(2) Interest shortfall protection is limited to the amount of the fixed rate.

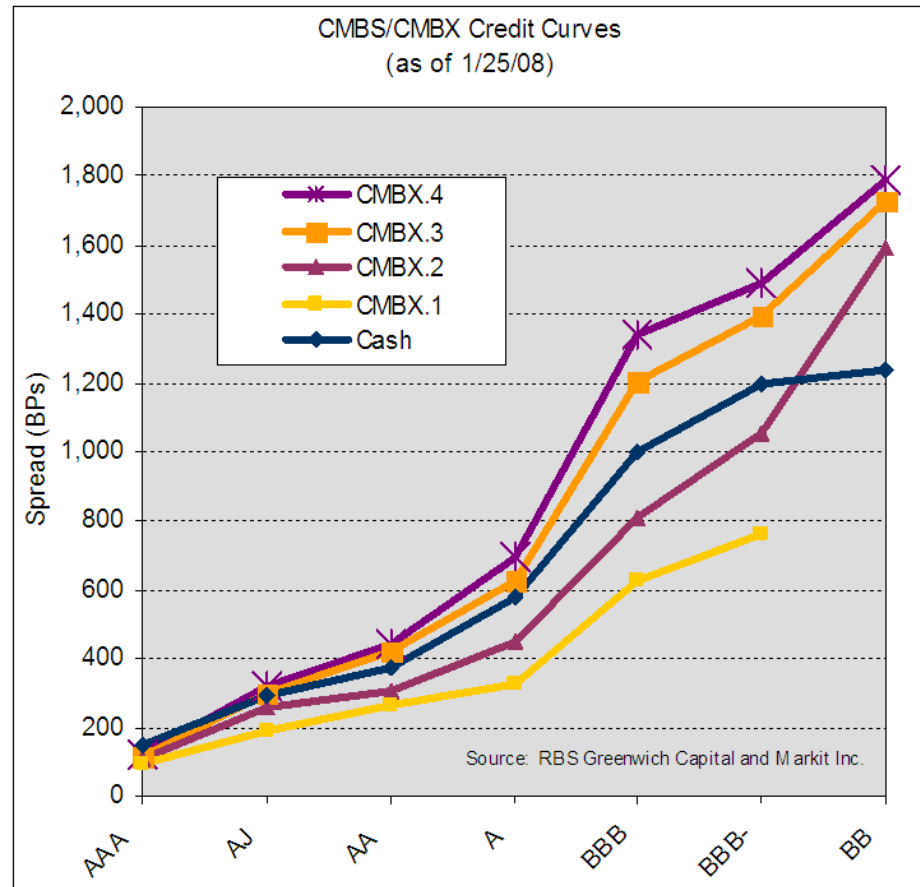
(3) Principal shortfalls are only payable at the stated final maturity of each index component.

(4) Principal and interest shortfalls do not accrue interest.

## Cash CMBS Spreads Pushed Wider by Synthetic CMBS Markets

### *CMBX has fanned CMBS spread volatility*

- Synthetics trade wider than cash for all but highest-rated IG bonds
- Cash market taking cues from CMBX
- Volume of synthetic trades unlimited
- Attractive hedge for CMBS long positions
  - CMBS issuers are 'natural' hedgers
  - Volatility driven by limited dealer hedging needs
- Macro hedge funds look for a cheap short post ABX
- Dealers recognize momentum trade and set shorts



## CMBX Breakeven Analysis Highlights Relative Value in Select Credits

Snapshot of CMBX.4 Market Dynamics															
Base-Case No-Loss Scenario															
Index / Series	CPN	Mid Spread	Market Price (Clean)	Orig. CE	Curr. CE	PV Upfront Payment	Default Timing (Yr.)	Default %	Recovery	PV Running Payment	PV Payments Received	PV Float Payments	Net PV Revenue		
CMBX.AAA.4	0.35%	125.00	93.22%	29.05%	29.07%	678,110	-	-	-	278,669	956,779	0.00	956,779		
CMBX.AJ.4	0.96%	311.88	84.78%	12.40%	12.41%	1,520,776	-	-	-	775,625	2,296,401	0.00	2,296,401		
CMBX.AA.4	1.65%	424.69	82.52%	10.37%	10.37%	1,746,247	-	-	-	1,335,263	3,081,510	0.00	3,081,510		
CMBX.A.4	3.48%	683.12	79.58%	7.89%	7.89%	2,039,505	-	-	-	2,844,247	4,883,752	0.00	4,883,752		
CMBX.BBB.4	5.00%	1259.38	62.69%	4.62%	4.63%	3,726,474	-	-	-	4,123,402	7,849,876	0.00	7,849,876		
CMBX.BBB-.4	5.00%	1425.38	57.12%	3.51%	3.51%	4,283,575	-	-	-	4,130,936	8,414,511	0.00	8,414,511		
CMBX.BB.4	5.00%	1750.00	48.05%	2.62%	2.62%	5,191,133	-	-	-	4,156,754	9,347,888	0.00	9,347,888		
Default Scenario: 75% of Reference Obligations Take Losses (25% Loss in Year 5, 50% Loss in Year 8, 0% Recovery)															
Index / Series	CPN	Mid Spread	Market Price (Clean)	Orig. CE	Curr. CE	PV Upfront Payment	Default Timing (Yr.)	Default %	Recovery	PV Running Payment	PV Payments Received	PV Float Payments	Net PV Revenue	Implied Loan Defaults*	Implied Loan Losses*
CMBX.AAA.4	0.35%	125.00	93.22%	29.05%	29.07%	678,110	5, 8	25, 50	0	238,083	916,193	4,808,285	-3,794,954	51.67%	18.08%
CMBX.AJ.4	0.96%	311.88	84.78%	12.40%	12.41%	1,520,776	5, 8	25, 50	0	657,257	2,178,033	4,808,285	-2,316,486	48.50%	16.98%
CMBX.AA.4	1.65%	424.69	82.52%	10.37%	10.37%	1,746,247	5, 8	25, 50	0	1,130,469	2,876,716	4,808,285	-1,741,619	32.30%	11.30%
CMBX.A.4	3.48%	683.12	79.58%	7.89%	7.89%	2,039,505	5, 8	25, 50	0	2,394,783	4,434,289	4,808,285	-630,949	24.29%	8.50%
CMBX.BBB.4	5.00%	1259.38	62.69%	4.62%	4.63%	3,726,474	5, 8	25, 50	0	3,454,596	7,181,070	4,808,285	2,715,916	15.23%	5.33%
CMBX.BBB-.4	5.00%	1425.38	57.12%	3.51%	3.51%	4,283,575	5, 8	25, 50	0	3,457,421	7,740,996	4,808,285	3,526,379	11.91%	4.17%
CMBX.BB.4	5.00%	1750.00	48.05%	2.62%	2.62%	5,191,133	5, 8	25, 50	0	3,467,103	8,658,236	4,808,285	4,819,910	7.20%	2.52%

Sources: RBSGC, Markit, and Trepp Derivatives. Notes: PV of upfront payment is the risk adjusted rate (swap rate + market spread); Running PV and floating PV are discounted at swaps rate. \* Assumes 35% loss severity.

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