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Effect of MOATS and Volatilities on Real Estate ABS Valuations

On Tuesday, August 7, the Mortgage Option-Adjusted Term Structure (MOATS) model of conforming mortgage rates will become the default setting for all Yield Book™ calculations. Because subprime mortgage rates are derived from conforming rates, this change will affect the valuation of all subprime mortgage securities. In this article, we compare the valuations obtained from the current model of conforming mortgage rates to MOATS. We also review the impact of the choice of volatility on valuations.

Spread to Treasuries, Spread to Swaps, and MOATS

The current calculation of conforming mortgage rates takes the current spread between the mortgage current coupon and the ten-year Treasury and assumes that that spread remains unchanged for all times in the future. (The mortgage current coupon is defined as the net coupon of the agency TBA that is priced at par.) MOATS, on the other hand, calculates the conforming mortgage rate along different interest rate paths by taking the market OAS relative to the swap curve for a current-coupon TBA, and assuming that the OAS remains constant over different interest rate scenarios.²¹

A third option available on Yield Book™ derives the conforming mortgage rate from the swap rates, by assuming that the spread between the ten-year swap rate and the mortgage current coupon remains unchanged into the future. Ultimately, which model of the conforming mortgage rate is the best is an empirical question. In the past, changes in the conforming mortgage rate have followed changes in the ten-year Treasury very closely. More recently, the relationship has weakened, favoring one of the other models of the conforming rate.

Regardless of how the future values of the conforming rate are derived, the subprime mortgage rate is calculated by adding a spread to the conforming rate. The spread depends on collateral characteristics, as well as specific assumptions about the future level of competition in the subprime industry. Over time, the spread follows a mean-reverting process, driven by changes in the conforming rate.²²

OASs calculated under MOATS are generally tighter than OASs calculated under the other models of the conforming rate. When the mortgage rate is derived as a constant spread over the ten-year Treasury or the ten-year swap rate, the basis-point volatility of the mortgage rate is the same as that of the underlying Treasury or swap rate. In MOATS, however, the OAS calculation links the volatility of the mortgage rate to the volatilities of the swap rates for all maturities. The net effect is an increase of mortgage rate volatility compared to the other two cases. Option costs for most securities increase and OASs tighten.

The present model assumes that the current-coupon spread is constant. MOATS assumes that the OAS is constant.

The subprime rate is the conforming rate plus a mean-reverting spread.

MOATS leads to tighter OASs.

²¹ See *New Model (MOATS and Prepay Model)*, Salomon Smith Barney, August 1, 2001, for a detailed description of the MOATS model, as well as other models of the conforming mortgage rate. Available on SSB Direct under MB 787.

²² See *Bond Market Roundup: Strategy* March 2, 2001, and March 9, 2001, for a description of the process followed by the subprime-conforming spread.

*For subprime
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For subprime mortgage sequentials the OAS tightening relative to the Treasury model of mortgage rates is 3bp–4bp. For securities backed by collateral that is less sensitive to rate shifts, such as high-LTV loans, the tightening is smaller. Figure 55 shows a comparison of OASs, effective durations, and effective convexities for several real estate ABS securities valued under the three different models of the conforming mortgage rate. OASs are computed relative to the swap curve, using the market-implied volatilities from July 31, 2001.

Figure 55. Effect of Model of Conforming Mortgage Rates on the Valuation of Subprime and High-LTV Mortgage Securities

Security	Price	WAL 100PPV	Spread To Swap	Conf. Mortgage Rate Model															
				Spread to Treasury			Spread to Swap				MOATS								
				OAS	Eff. Dur.	Eff. Conv.	OAS	Diff.	Eff. Dur.	Diff.	Eff. Conv.	Diff.	OAS	Diff.	Eff. Dur.	Diff.	Eff. Conv.	Diff.	
RASC 01.KS2 AI2	100.76	1.9Yr	52bp	28bp	1.99Yr	-1.17	29	1	2.01	0.02	-1.19	-0.02	25	-3	2.08	0.09	-1.22	-0.05	
RASC 01.KS2 AI3	101.07	2.9	55	10	3.17	-1.55	12	2	3.14	-0.03	-1.47	0.08	6	-4	3.25	0.08	-1.51	0.04	
RASC 01.KS2 AI4	101.78	4.9	69	-7	5.12	-1.91	-6	1	5.06	-0.06	-2.20	-0.29	-10	-3	5.08	-0.04	-2.06	-0.15	
RASC 01.KS2 AI5	102.97	8.0	90	10	5.60	-1.48	7	-3	5.79	0.19	-1.46	0.02	6	-4	5.79	0.19	-1.42	0.06	
RASC 01.KS2 AI6	101.84	6.4	63	27	5.02	-0.38	26	-1	4.95	-0.07	-0.38	0.00	24	-3	4.96	-0.06	-0.27	0.11	
RFMS2 01.HI2 AI3	100.91	2.6	62	48	2.15	-0.70	49	1	2.16	0.01	-0.68	0.02	46	-2	2.20	0.05	-0.71	-0.01	
RFMS2 01.HI2 AI4	100.88	3.6	70	52	3.01	-0.68	55	3	2.98	-0.03	-0.67	0.01	52	0	3.03	0.02	-0.69	-0.01	
RFMS2 01.HI2 AI5	100.82	4.6	75	54	3.64	-0.72	60	6	3.66	0.02	-0.77	-0.05	56	2	3.74	0.10	-0.82	-0.10	
RFMS2 01.HI2 AI6	101.07	6.2	83	58	4.57	-0.77	60	2	4.65	0.08	-0.75	0.02	56	-2	4.72	0.15	-0.72	0.05	
RFMS2 01.HI2 AI7	100.67	10.0	105	77	6.33	-0.46	75	-2	6.31	-0.02	-0.38	0.08	74	-3	6.30	-0.03	-0.41	0.05	

OASs are relative to the swap curve of July 31, 2001.

Source: Salomon Smith Barney.

*The effect on durations
is low.*

The impact of the new models of the conforming rate on effective durations is greatest for the last cash flow for subprime mortgage collateral and for the next-to-the-last cash flow for the high-LTV collateral. In all cases shown in Figure 55, however, the effect is small, registering less than 0.2 years.

The relative steepness of the Treasury and swap forward curves plays a role in OAS changes, in addition to the volatilities of the mortgage rates. For example, the increase in OASs for short-weighted average life (WAL) securities under the swap-rate model is not expected on the basis of volatilities – basis-point volatilities are higher for swap rates than for Treasury rates. However, the ten-year forward Treasury curve is significantly steeper than the ten-year forward swap curve, leading to a greater slowdown of prepayments and higher option costs.²³

Effect of Volatilities

*Valuation depends
critically on the choice of
volatility.*

In addition to the model of the conforming mortgage rates, OASs, effective durations, and effective convexities on real estate ABSs are sensitive to the choice of volatilities. This choice is especially important in MOATS, because the mortgage rates enhance the volatility of the underlying swap or Treasury rates.

²³ For subprime and high-LTV securities priced near par, a slowdown of prepayments leads to higher option costs. See *Bond Market Roundup: Strategy*, January 12, 2001, for an example. Between the maturities of zero and five years the forward swap curve rises by 84bp and the forward Treasury curve by 107bp.

Investors who do not hedge vols actively should consider average implied and average empirical vols.

For investors who actively hedge their volatility exposure, the current implied volatilities are the natural choice. For those who do not hedge their volatility exposure, which is the majority of the ABS market, a historical average of either implied or empirical volatilities is likely a better measure of the excess return that a security may be expected to earn.

- Investors who do not hedge volatility exposure and whose investment horizon is longer than about six months should consider using **average implied volatilities** to value real estate ABSs.
- Investors who do not hedge volatility exposure, who expect to hold the security to maturity, and who believe that historical volatilities are a better estimate of future volatilities than implied volatilities, should consider using **average historical volatilities** to value real estate ABSs.

Current implied volatilities are high.

Current implied volatilities are high by historical standards. For example, the 5X10 swaption volatility is now 16.25%, which puts it in the 97th percentile for the past year and the 99th percentile for the past three years. As a result, OASs calculated from the one-year average of implied cap and swaption volatilities are significantly higher than the OASs based on current volatilities. Figure 56 provides a comparison. Also shown in the figure are the valuation parameters computed from long-term historical averages of empirical volatilities, as provided on Yield Book™. (Such estimates are subject to significant uncertainty for the volatilities of the long rates or the long-term cumulative volatilities of the short rates.)

Figure 56. Effect of the Volatility Assumption on the Valuation of Subprime and High-LTV Mortgage Securities

Security	Price	WAL 100PPV	Spread to Swap	Volatility															
				Current Implied			One-Year Av. Of Implied						Long-Term Av. Of Empirical						
				OAS	Eff. Dur.	Eff. Conv.	OAS	Diff.	Eff. Dur.	Diff.	Eff. Conv.	Diff.	OAS	Diff.	Eff. Dur.	Diff.	Eff. Conv.	Diff.	
RASC 01.KS2 AI2	100.76	1.9Yr	52bp	29	2.01	-1.19	38	9	1.94	-0.07	-1.17	0.02	42	13	1.83	-0.18	-1.19	0.00	
RASC 01.KS2 AI3	101.07	2.9	55	12	3.14	-1.47	25	13	3.09	-0.05	-1.55	-0.08	31	19	3.09	-0.05	-1.69	-0.22	
RASC 01.KS2 AI4	101.78	4.9	69	-6	5.06	-2.20	11	17	5.13	0.07	-2.46	-0.26	13	19	5.15	0.09	-2.20	0.00	
RASC 01.KS2 AI5	102.97	8.0	90	7	5.79	-1.46	21	14	5.92	0.13	-1.59	-0.13	29	22	6.00	0.21	-1.52	-0.06	
RASC 01.KS2 AI6	101.84	6.4	63	26	4.95	-0.38	33	7	5.04	0.09	-0.40	-0.02	34	8	5.12	0.17	-0.22	0.16	
RFMS2 01.HI2 AI3	100.91	2.6	62	49	2.16	-0.68	56	7	2.14	-0.02	-0.73	-0.05	60	11	2.11	-0.05	-0.82	-0.14	
RFMS2 01.HI2 AI4	100.88	3.6	70	55	2.98	-0.67	64	9	2.99	0.01	-0.76	-0.09	68	13	3.00	0.02	-0.95	-0.28	
RFMS2 01.HI2 AI5	100.82	4.6	75	60	3.66	-0.77	67	7	3.68	0.02	-0.82	-0.05	69	9	3.76	0.10	-0.93	-0.16	
RFMS2 01.HI2 AI6	101.07	6.2	83	60	4.65	-0.75	67	7	4.66	0.01	-0.76	-0.01	67	7	4.73	0.08	-0.89	-0.14	
RFMS2 01.HI2 AI7	100.67	10.0	105	75	6.31	-0.38	83	8	6.30	-0.01	-0.35	0.03	86	11	6.42	0.11	-0.52	-0.14	

OASs are relative to the swap curve of July 31, 2001.

Source: Salomon Smith Barney.

The choice of volatility has a large effect on OASs.

The choice of volatility has a large effect on OASs. For five-year subprime sequentials, for example, the difference between current implied and average implied volatilities is 17bp, and the difference between current implied and empirical volatilities is 19bp. The increases in OASs exist even though under average implied and average empirical volatilities the duration of the bond increases. Figure 56 implies that **investors should develop an opinion about volatilities before determining relative value between ABSs**. A subprime sequential that appears rich relative to cards under one volatility assumption may become significantly cheap under another.

Figure 57. Percentage of ABS Floating-Rate and Fixed-Rate Issuance, Year-to-Date 2000–2001

	2000		2001 (YTD)
Floating-Rate	62.8	%	55.9%
Fixed-Rate	37.2		44.1

Source: Salomon Smith Barney.

Figure 58. Year-to-Date ABS Public and 144A Issuance by Sector, 2000–2001 (Dollars in Millions)

	2000 (YTD)	Percentage	2001 (YTD)	Percentage
Auto/Vehicle Loans	37,180.3	23.0%	52,780.4	25.0%
Equipment Loans	4,588.2	2.8	3,888.6	1.8
Credit Cards	26,331.4	16.3	46,453.9	22.0
Home Equity Loans	40,066.1	24.8	57,498.5	27.2
Manufactured Housing	5,863.4	3.6	2,559.2	1.2
Student Loans	13,335.6	8.3	7,947.2	3.8
Other	34,039.2	21.1	39,995.8	18.9
Total:	161,404.2	100.0%	211,123.6	100.0%

Source: Securities Data Corp.

Figure 59. Representative Fixed-Rate ABS Secondary-Market Spreads to Interest-Rate Swaps^a

		AAA					A					BBB				
		3 Aug Swap Spread	Spread Changes Over			1-Year SD of 1-Wk Spread Chgs	3 Aug Spread	Spread Changes Over			1-Year SD of 1-Wk Spread Chgs	3 Aug Spread	Spread Chg Over			1-Year SD of 1-Wk Spread Chgs
			1-Wk	4-Wks	52-Wks			1-Wk	4-Wks	52-Wks			1-Wk	4-Wk	1-Wk	
2-Yr	Retail Auto	52bp	8bp	0bp	-1bp	3bp	1.2bp	36bp	0bp	-4bp	11bp	1.9bp	100bp	0bp	0bp	2.5bp
	Credit Card		5	0	-1	2	0.9	30	0	-2	6	1.6	80	0	-5	2.6
	Equipment		22	0	-2	6	1.1	70	0	-5	29	2.8	120	0	0	1.1
	Stranded Assets		12	0	0	6	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Home Equity		52	0	0	17	2.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Man. Housing		50	0	0	18	2.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Yr	Retail Auto	74	7	0	-1	1	1.5	44	0	0	11	2.3	110	0	0	2.3
	Credit Card		6	0	-2	2	0.8	40	0	0	10	1.8	90	-5	-10	3.0
	Equipment		28	0	-4	6	1.6	80	0	0	24	3.2	130	0	0	3.1
	Stranded Assets		13	0	0	5	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Home Equity		55	0	-3	8	2.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Man. Housing		51	0	-3	7	2.4	NA	NA	NA	NA	NA	NA	NA	NA	NA
5-Yr	Credit Card	79	9	0	-1	3	1.0	45	0	0	5	2.1	95	-5	-15	4.1
	Stranded Assets		16	0	-2	4	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Home Equity		70	0	-8	2	2.8	170	0	0	45	4.2	NA	NA	NA	NA
	Man. Housing		67	0	-8	4	3.2	170	0	0	45	4.7	NA	NA	NA	NA
7-Yr	Credit Card	88	15	-1	-1	3	0.9	52	0	0	2	1.8	115	0	-10	3.3
	Stranded Assets		20	-1	-2	2	1.4	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Home Equity		90	0	-7	0	3.8	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Man. Housing		81	0	-7	-4	3.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
10-Yr	Credit Card	80	24	0	0	8	1.0	65	0	0	5	1.9	140	0	-5	3.2
	Stranded Assets		29	0	0	5	1.7	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Home Equity		100	3	-10	-10	4.5	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Man. Housing		90	0	-10	-10	3.9	NA	NA	NA	NA	NA	NA	NA	NA	NA

^a As of April 14, 2000 spreads are quoted versus interest rate swaps. Historical spread data was converted into spreads to swaps in order to avoid distortions in historical comparisons.

SD Standard Deviation.

Source: Salomon Smith Barney.

Figure 60. Representative Floating-Rate ABS Secondary-Market Discount Margins (Over One-Month LIBOR)

		AAA					A					BBB				
		3 Aug Swap Spread	Spread Changes Over			1-Year SD of 1-Wk Spread Changes	3 Aug Spread	Spread Changes Over			1-Year SD of 1-Wk Spread Changes	3 Aug Spread	Spread Chg Over			1-Year SD of 1-Wk Spread Changes
			1-Wk	4-Wks	52-Wks			1-Wk	4-Wks	52-Wks			1-Wk	4-Wk	1-Wk	
2-Yr	Retail Auto	6bp	0bp	0bp	-2bp	1.4bp	35bp	0bp	0bp	7bp	2.6bp	90bp	0bp	0bp	2.2bp	
	Credit Card		6	0	0	1	0.5	27	0	0	2	1.4	85	0	0	1.6
	Home Equity		23	0	0	-3	0.7	95	0	0	5	1.3	NA	NA	NA	NA
3-Yr	Retail Auto	10	0	0	-2	1.7	60	0	0	24	3.2	115	0	0	2.1	
	Credit Card		7	0	-1	-2	0.5	34	0	0	4	1.7	95	0	0	2.9
	Home Equity		24	0	0	-3	0.7	100	0	0	5	1.5	NA	NA	NA	NA
5-Yr	Credit Card	11	-1	-1	-4	0.6	40	0	0	0	2.4	95	0	-10	4.8	
	Home Equity		30	0	0	-2	1.0	110	0	0	10	1.6	NA	NA	NA	NA
7-Yr	Credit Card	17	0	0	-1	0.7	47	0	0	-5	1.7	115	0	-5	2.9	
10-Yr	Credit Card	25	-2	0	0	0.8	60	0	0	0	1.7	135	0	-5	2.6	

SD Standard deviation.

Source: Salomon Smith Barney.

Figure 61. Recent Issuance

Date	Issuer	Type	Class	Size (\$MM)	Credit Enhance.	WAL (Yrs)	Ratings	Spread
2 Aug 01	Conseco 2001-C	HE	A-1	223.7	Sr./Sub.	1.01	Aaa/AAA	14/1M LIBOR
			A-2	55.2		2.14	Aaa/AAA	62/SWAPS
			A-3	84.8		3.00	Aaa/AAA	60/SWAPS
			A-4	89.0		5.50	Aaa/AAA	78/SWAPS
			A-5	39.1		7.98	Aaa/AAA	110/SWAPS
			A-10	130.0		1.07	Aaa/AAA	N/A
			M-1	45.0		5.38	Aa3/AA+	70/1M LIBOR
			M-2	33.0		5.37	A3/A	115/1M LIBOR
		B	19.5	5.37	Baa1/BBB	185/1M LIBOR		
31 Jul 01	Providian Gateway Master Trust 2001-F	CC	A	350.0	MBIA	2.94	Aaa/AAA	22/1M LIBOR
31 Jul 01	Providian Gateway Master Trust 2001-G	CC	A	400.0	MBIA	6.94	Aaa/AAA	36/1M LIBOR
31 Jul 01	MBNA Class A 2001-3 ^a	CC	A	1,000.0	Sr./Sub.	4.94	Aaa/AAA	11/3M LIBOR
27 Jul 01	Compucredit 2001-1	CC	A	305.0	Sr./Sub.	2.95	Aaa/AAA	39/1M LIBOR
			B	70.0		2.95	A2/A	148/1M LIBOR
27 Jul 01	WFS 2001-C ^a	AL	A-1	180.0	FSA	0.43	P-1/A-1+	-5/5M LIBOR
			A-2	300.0		0.99	Aaa/AAA	12/SYNTH LIBOR
			A-3	410.0		2.03	Aaa/AAA	14/3M LIBOR
			A-4	310.0		3.35	Aaa/AAA	25/SWAPS
25 Jul 01	Chase Credit Card 2001-4 ^a	CC	A	840.0	Sr./Sub.	4.96	Aaa/AAA	10/SWAPS
			B	70.0		5.04	A2/A	38/1M LIBOR
25 Jul 01	Saxon 2001-2	HE	AF1	112.0	Sr./Sub.	0.90	Aaa/AAA	12/1M LIBOR
			AF2	37.2		2.00	Aaa/AAA	52/SWAPS
			AF3	52.8		3.00	Aaa/AAA	55/SWAPS
			AF4	33.0		5.00	Aaa/AAA	70/SWAPS
			AF5	38.6		7.55	Aaa/AAA	90/SWAPS
			AF6	26.0		6.49	Aaa/AAA	63/SWAPS
			A-V1	129.9		2.47	Aaa/AAA	23/1M LIBOR
			A-V2	129.9		2.41	Aaa/AAA	24/1M LIBOR
			M-1	45.5		5.18	Aa2/AA	53/1M LIBOR
			M-2	20.0		5.17	A2/A	85/1M LIBOR
		B-1	19.0	5.16	Baa2/BBB	160/1M LIBOR		
24 Jul 01	Onyx Auto Acceptance Corp 2001-C ^a	AL	A-1	75.0	MBIA	0.34	P-1/A-1+	-3/4M LIBOR
			A-2	115.0		1.09	Aaa/AAA	13/SYNTH LIBOR
			A-3	90.0		2.00	Aaa/AAA	23/SWAPS
			A-4	120.0		3.34	Aaa/AAA	25/SWAPS
24 Jul 01	SLMA 2001-3	SL	A-1L	655.0	Sr./Sub.	2.51	Aaa/AAA	4/3M LIBOR
			A-1T	150.0		2.51	Aaa/AAA	65/TB
			A-2L	688.0		7.28	Aaa/AAA	12/3M LIBOR
			B	46.0		9.23	A2/A+	45/3M LIBOR
24 Jul 01	Colorado Student Loan Auth 2001-VI	SL	A	63.8	Sr./Sub.	4.00	Aaa/AAA	37/SWAPS
19 Jul 01	Option One FSPC T-35 Option One OOMLT 2001-3	ML	A	1,687.0	Freddie Mac Sr./Sub.	3.02	Aaa/AAA	14/1M LIBOR
			A-1	273.0		2.85	Aaa/AAA	26/1M LIBOR
			M-1	9.7		4.60	Aa2/AA	53/1M LIBOR
			M-2	7.5		4.59	Aa2/AA	90/1MLIBOR
		M-3	6.7	4.40	Baa2/BBB	171/1M LIBOR		
19 Jul 01	Chase Auto 2001-A	AL	A-1	279.0	Sr./Sub.	0.35	P-1/A-1+	-4/4M LIBOR
			A-2	243.0		1.01	Aaa/AAA	9/SYNTH LIBOR
			A-3	384.0		2.01	Aaa/AAA	8/SWAPS
			A-4	258.1		3.32	Aaa/AAA	7/SWAPS
			CRTS	36.0		2.54	A2/A	36/SWAPS

^a Salomon Smith Barney has acted as a manager and/or co-manager of debt issues of this issuer within the past three years.

ABS Asset-backed securities. AD Auto dealer floor plan. AIR Airplane leases. AL Auto loan. ALE Automobile lease. BL Boat loan. CA Controlled amortization. CC Credit card. CCA Cash collateral account. CHC Charge card. CIA Collateral invested amount. CON Consumer loans. CP Commercial Paper DF Dealer floor plan. EL Equipment loan. FEL Farm equipment loan. FF Fed funds. FR Franchise loan. HE Home equity. HLC HELOC, HIL Home improvement loan. HLTV High LTV, ML Mortgage loan. MB Mortgage-backed. Mezz. Mezzanine. MH Manufactured housing. MCL Motorcycle loans. NA Not available. O Other. OC Overcollateralized. RIC Retail installment contracts. RV Recreational vehicle. SLRM Second Lien Residential Mortgage, BA Small business association loans. SL Student loan. TS Time Share, TL Truck Lease. Sr./Sub. Senior/Subordinate. UBA Utility bill allocations. WAL Weighted-average life. WHI Wholesale inventory.

Source: MCM "Corporatwatch."