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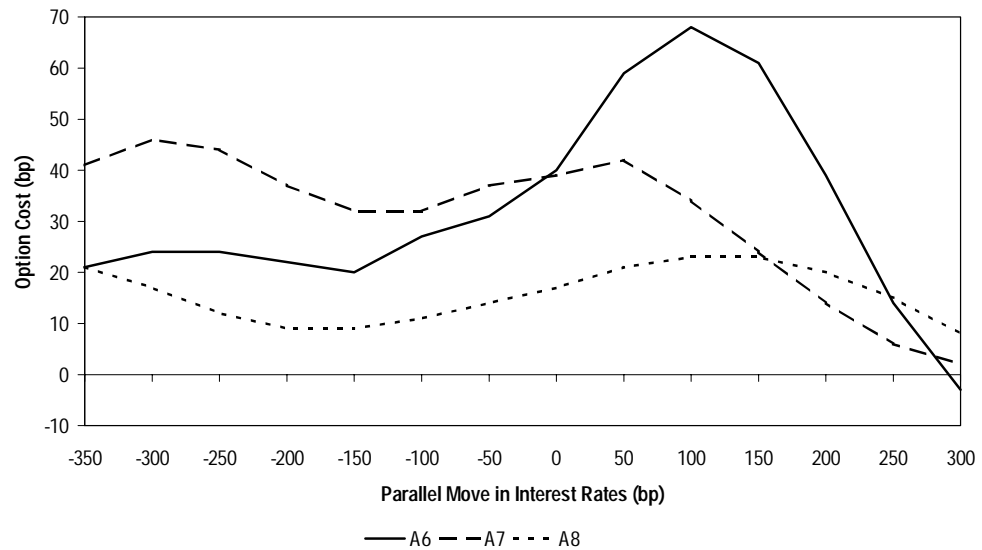
## Differential Performance in HELs

While market conditions remain difficult, portfolio managers presumably must continue to make investment decisions. For all but those who can (and choose to) hold on to marginal cash, such decisions involve selecting the best alternatives under less than optimal circumstances, especially given the potential new issue calendar during the next couple of weeks. Ideally, investors should try to identify securities that either have been or will be mispriced relative to comparable alternatives. One defensive strategy that many market participants appear to have adopted favors short, simple cash flow structures with little duration or credit risk. However, this strategy effectively limits purchases of mortgage-related ABSs, where the greatest market share of supply is likely to be concentrated. For investors who *do* want to participate in this sector, which has cheapened dramatically along with virtually everything else, we take this opportunity to discuss an aspect of home equity loan optionality that is counterintuitive and can have just the sort of relative-value implications that make a difference in this environment.

**Fixed-rate HELs generally exhibit increasing option costs with increasing rates.**

Figure 14 displays option costs of tranches A6, A7, and A8 from IMC 98-3, a fixed-rate HEL, as a function of parallel shifts of the yield curve. A6 and A7 are sequential bonds with original weighted average lives (WALs) of 5.4 and 9.7 years, respectively, and A8 is a NAS bond with an original WAL of 6.4 years. To replicate the market conditions from the time the deal was originated, and thus to assure that the collateral is neither far in the money nor far out of the money in the base case, we use the yield curve and market volatilities from the pricing date of May 29, 1998. Option costs are computed by assuming that option-adjusted spreads (OASs) do not change with a shift of the yield curve.

Figure 14. Option Cost of Three Tranches from IMC 98-3 as a Function of Parallel Move in Interest Rates



Source: Salomon Smith Barney Inc.

**As rates increase, credit-driven refinancings become suppressed. As a result, the sensitivity of prepayments to rising rates may exceed the sensitivity to falling rates.**

In a strong rate rally, the interest rate paths used to compute the OAS are centered on the steepest part of the refinancing curve, leading to high values of the option cost. This feature is common to sequential bonds backed by a wide variety of mortgage collateral<sup>4</sup>. Unique to HELs, however, is that all three curves exhibit an increase in option cost with increasing interest rates. While this behavior may appear counterintuitive at first, it is easily understood in terms of HEL prepayments. In the baseline case, the most significant component of HEL prepayments is credit-driven refinancings. With increasing rates, such refinancings become suppressed, an effect that becomes particularly pronounced after the first 100bp of the runup in rates.<sup>5</sup> Therefore, the sensitivity of prepayments to interest rate movements does not decrease with rising rates. To the contrary, given the size of the refinancing component, the sensitivity to rising rates may exceed the sensitivity to falling rates.

Figure 14 also provides a convenient comparison of option costs of the five- and ten-year sequential. In a market rally, the option cost of the ten-year bond is higher than that of the five-year bond, as expected for a security that is short a prepayment option for a longer period of time starting farther into the future. However, in a selloff, the option cost of the shorter bond increases faster. As the ten-year bond extends, the gradual attenuation of credit-driven refinancings, which begins after the collateral has seasoned to 5–6 years,<sup>6</sup> becomes a significant factor. Finally, Figure 14 shows the generally lower values and lower variability of option costs for the NAS bond throughout the range shown. Nevertheless, the profile is similar to the ones for the sequential bonds, showing increases in option

<sup>4</sup> For collateral that is not fully seasoned, such as IMC 98-3, the prepayment seasoning ramp suppresses the option cost in rate rallies because of the shortening of WALs.

<sup>5</sup> See I. Gjaja, et al., *Modeling of Fixed-Rate HEL Prepayments*, Salomon Smith Barney, August 1998.

<sup>6</sup> Ibid.

costs in both rate rallies and selloffs. One difference is the continued increase of option cost when rates continue dropping past the 300bp range. It is likely that in such extreme scenarios the NAS structure would become less effective at shielding bondholders from prepayments on the collateral.

*The widening of nominal HEL spreads should be equal to that of non-negatively convex ABSs adjusted for the change in option costs as interest rates shift up or down.*

From a relative-value perspective, the nonintuitive option cost profile of at- or near-the-money HELs suggests that investors can potentially take advantage of incorrect spread adjustments as Treasuries rally or sell off. Within the HEL market, spreads among tranches should widen or tighten differentially in response to movements in interest rates depending on the type of bond and its position within the priority of cash flows. To maintain relative OAS relationships in a rallying market with weakening spreads, for example, the widening of nominal HEL spreads should be equal to that of non-negatively convex ABSs adjusted for the change in option costs at the new interest rate level.

By definition, the OAS of a security is equal to its zero volatility OAS minus its option cost. In the absence of nominal spread widening, if the option cost of a HEL declines, then its OAS will widen. Conversely, since the option cost of a non-negatively convex ABS (like a credit card or auto) is zero, its OAS will widen only if its zero volatility OAS widens. For this type of security, the zero volatility OAS is the same as its static spread, which depends primarily on the shape of the yield curve. Given the flatness of the current curve, static and nominal spreads are just about equivalent. As a result, the OASs of non-negatively convex ABSs will widen to the extent that nominal spreads widen. Therefore, to maintain the spread between the OAS of a HEL and that of a non-negatively convex ABS, the OAS of the HEL should widen by an amount that is equal to the spread widening of the non-negatively convex ABS plus the change in the option cost of the HEL. **If the change in option cost is negative, then the nominal spread widening of the HEL should be smaller than that of the non-negatively convex ABS.**

This also implies that, to the extent that the option costs of sequential and NAS bonds change differentially when interest rates move, nominal spreads on these securities should not widen or tighten uniformly. In general, short and at- or near-the-money sequentials should widen less as Treasuries rally than NAS bonds and long sequentials. Because spreads remain a moving target, it is not yet clear whether the market has properly repriced currently outstanding HELs during the recent rally. However, given the time it takes the market to understand and assimilate model-driven subtleties, we suspect that opportunities will have arisen once firm levels are established. Investors who own recently originated NAS bonds, for example, should monitor the relative value of swapping out of the NASs and into effective duration-neutral combinations of five-year and nine- to ten-year sequentials to pick up OAS. Likewise, investors who anticipate that the Treasury rally will continue should consider buying new-issue NAS bonds and later swapping into the same sort of effective duration-neutral combination.

**Figure 15. Percentage of ABS Floating-Rate and Fixed-Rate Issuance, 1996 to Year-to-Date**

	1996-97	1998
Floating-Rate	40.4%	39.2%
Fixed-Rate	59.6	60.8

Source: Salomon Smith Barney Inc.

**Figure 16. Year-to-Date ABS Issuance by Sector, 1997-1998 (Dollars in Billions)**

	1997 (YTD)	%	1998 (YTD)	%
Auto Loans	\$19.8	18.8	\$24.2	20.7
Credit Cards	26.1	24.8	25.3	21.7
Home Equity Loans	33.7	31.9	40.6	34.8
Manufactured Housing	6.1	5.8	8.7	7.5
Student Loans	9.6	9.1	7.9	6.8
Other	10.1	9.6	10.0	8.5
Total	\$105.4		\$116.7	

Source: MCM "Corporatewatch"

**Figure 17. Comparison of Quoted Spreads and Static Spreads**

	Avg. Life (Yrs.)	Quoted Spread (bp/Curve)	Static Spread <sup>e</sup> (bp)	Difference (bp)
3-Year Bullet	3.00	62	46	16
5-Year Bullet	5.00	73	64	9
Wide Window Auto <sup>a</sup>	1.81	80	74	6
Short Auto <sup>b</sup>	1.06	75	79	-4
Wide Window HEL <sup>c</sup>	3.63	130	121	9
Short HEL <sup>d</sup>	1.16	95	97	-2

<sup>a</sup> Assumes collateral original WAM of 60 months and remaining WAM of 54 months, 9% coupon, 1.3% ABS prepayment speed. <sup>b</sup> Assumes collateral original WAM of 60 months and remaining WAM of 30 months, 9% coupon, 1.3% ABS prepayment speed. <sup>c</sup> Assumes collateral remaining WAM of 174 months, 11% coupon, 20% CPR prepayment speed. <sup>d</sup> Assumes collateral remaining WAM of 120 months, 11% coupon, 20% CPR prepayment speed, security maturity in 30 months. <sup>e</sup> Static spread of bullets incorporates the richness or cheapness of the on-the-run Treasury benchmarks.

bp Basis points. CPR Constant prepayment rate. HEL Home equity loan-backed securities. WAM Weighted average maturity.

Source: Salomon Smith Barney Inc.

**Figure 18. Fixed-Rate ABS Secondary Market Spreads to Benchmark Treasuries**

		AAA			A		
		11 Sep 98 Spread	1 Week Change	1 Year SD of 1 Week Spread Changes	11 Sep 98 Spread	1 Week Change	1 Year SD of 1 Week Spread Changes
2-Yr.	Auto	70 bp	0 bp	2.9 bp	85 bp	0 bp	2.6 bp
	Credit Card	60	2	2.2	80	5	2.2
	Home Equity	105	5	3.6	N/A	0	
	Man. Housing	90	5	3.2	N/A	0	
3-Yr.	Wholesale Auto	62	0	2.6	82	2	2.4
	Credit Card	62	0	2.6	82	2	2.4
	Home Equity	115	5	3.7	N/A	0	
	Man. Housing	100	5	3.8	N/A	0	
5-Yr.	Wholesale Auto	73	0	N/A	N/A	0	
	Credit Card	73	0	3.1	95	2	3.5
	Home Equity	130	5	3.2	N/A	0	
	Man. Housing	110	5	3.4	N/A	0	
7-Yr.	Wholesale Auto	85	0	N/A	N/A	0	
	Credit Card	85	0	N/A	110	5	N/A
	Home Equity	150	5	N/A	N/A	0	
	Man. Housing	125	5	N/A	N/A	0	
10-Yr.	Wholesale Auto	95	0	N/A	125	5	N/A
	Credit Card	95	0	4.2	125	5	4.3
	Home Equity	170	5	4.2	N/A	0	
	Man. Housing	145	5	3.4	N/A	0	

Source: bp Basis points. SD Standard deviation. Salomon Smith Barney Inc.

**Figure 19. Floating-Rate ABS Secondary Market Discount Margins (Over One-Month LIBOR)**

		AAA			A		
		11 Sep 98	1 Week	1 Year	11 Sep 98	1 Week	1 Year
		DM	Change	SD of 1 Week	DM	Change	SD of 1 Week
				Spread Changes			Spread Changes
2-Yr.	Auto	7 bp	0 bp	0.8 bp	27 bp	4 bp	1.4 bp
	Credit Card	7	0	0.8	27	4	1.4
	Home Equity	12	0	0.8	32	2	1.1
3-Yr.	Wholesale Auto	10	0	0.8	33	6	1.4
	Credit Card	10	0	0.8	33	6	1.4
	Home Equity	14	1	0.3	38	7	1.3
5-Yr.	Wholesale Auto	14	1	N/A	39	8	N/A
	Credit Card	14	1	0.7	39	8	1.5
	Home Equity	18	2	0.4	43	10	1.4
7-Yr.	Wholesale Auto	17	2	N/A	43	9	N/A
	Credit Card	17	2	0.8	43	9	1.6
10-Yr.	Wholesale Auto	21	1	N/A	50	11	N/A
	Credit Card	21	1	N/A	50	11	N/A

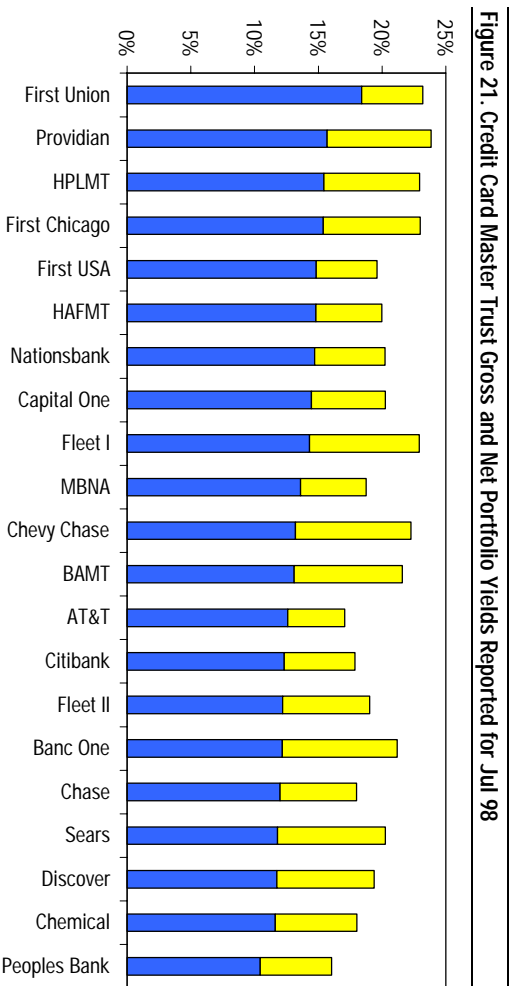
Source: bp Basis points. LIBOR London Interbank Offered Rate. SD Standard deviation. Salomon Smith Barney Inc.

**Figure 20. Representative Secondary Trading Levels**

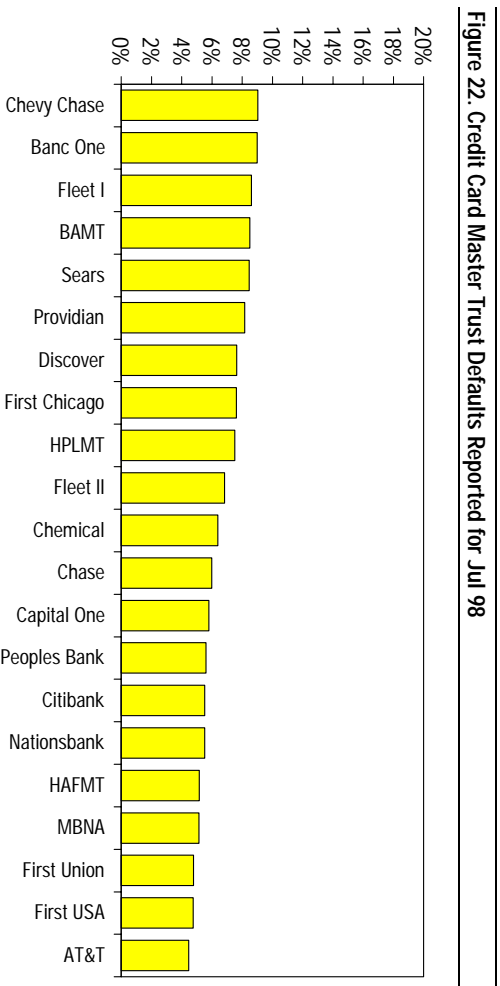
Floating-Rate Issue	Avg. Life	DM	Price	Cap
FUSAM 95-1 A	0.5 Yrs	4	100-01 +	None
ADVCC 95-A A	1.5	8	100-04 +	None
FUSAM 95-2 A	3.5	11	100-13	None
CCIMT 96-5 A	5.0	14	99-27	None
MBNA 96-B A	7.5	17	100-17 +	None

Fixed-Rate Issue	Coupon	Average Life	Spread	Price	Yield	Static Spread
FORD 95-B A	5.90	0.5 @1.5 ABS yrs	65 bp	100-04 +	5.624	67 bp
UAC 96-B A	6.45	1.1@1.6 ABS	75	100-28 +	5.542	80
PRAT 96-4 A4	6.40	1.1@1.6 ABS	70	101-00	5.492	71
CCIMT 94-3 A	6.80	0.6	70	100-20	5.633	69
MBNA 95-D A	6.05	1.8	60	101-14 +	5.233	57
CHEMT 95-3 A	6.23	3.9	70	103-08 +	5.366	70
CCIMT 94-2 A	7.25	7.6	90	109-23 +	5.649	89

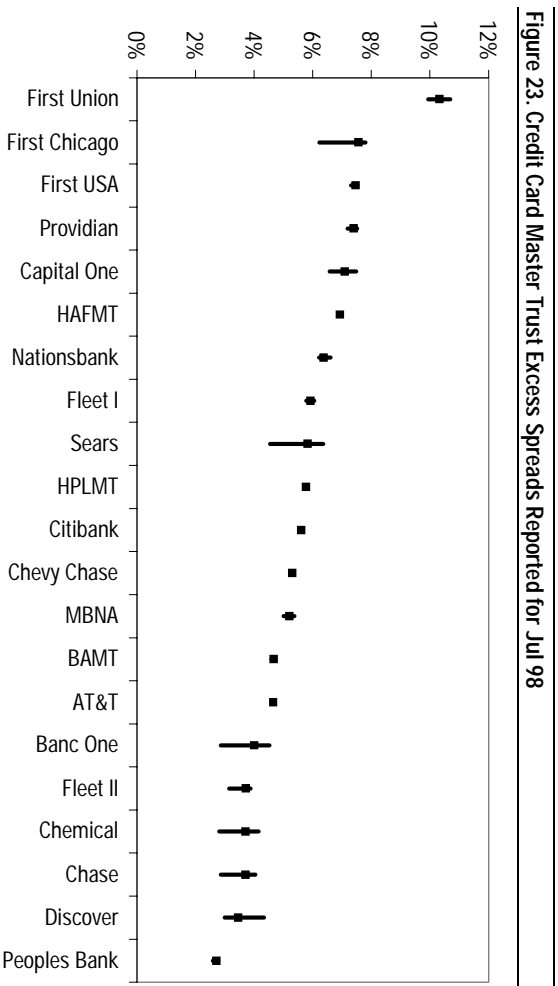
Source: Salomon Smith Barney Inc.



Source: Master Trust 8Ks, Bloomberg, Bloomberg Credit Card Reports.



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Figure 24. Recent Issuance

Date	Issuer	Asset Type	Class	Size Mils.	Credit Enhancement	WAL	Pricing Speed	Spread
9/10/98	Green Tree Financial Corporation 1998-7	MH	A-1	718.00	Sr/Mezz/Sub	6.35	175% MHP	N/A
			M-1	46.75		9.80		160/6.125 8/07
			M-2	25.50		9.80		205/6.125 8/07
			B-1	25.50		5.90		300/7.25 8/04
			B-2	34.00		13.16		Not Offered
9/10/98	GMACM Home Equity Loan Trust 1998-2	HE	A	160.00	100% AMBAC	4.00	N/A	1ML+22
9/10/98	Advanta Mortgage Loan Trust 1998-3	HE	A	500.00	100% MBIA	2.92	100% MBIA	1ML+23
9/10/98	EQCC Home Equity Loan Trust 1998-3	HE	A-1F	706.60	100% AMBAC	2.75	125% PPC	1ML+23
			A-1A	39.30		2.73		27% CPR
9/4/98	Green Tree Recreation & Consumer Trust 1998-C	CON	A-1	122.00	Sr/Mezz/Sub	0.29	100% PPC	4ML-4
			A-2	193.00		1.00		1ML+13
			A-3	150.00		2.01		100/6.25 8/00
			A-4	111.00		3.00		120/6.50 8/01
			A-5	104.00		4.16		130/6.25 8/02
			A-6	36.00		5.68		175/7.25 5/04
			A-7	32.00		6.42		205/7.50 2/05
			B-1	16.00		6.43		315/7.50 2./05
9/3/98	Onyx Acceptance Owner Trust 1998-B	AL	A-1	165.00	100% MBIA	1.07	1.6% ABS	12ML+25
			A-2	72.50		2.94		90/6.625 6/01
			CTFS	12.50		4.20		110/5.75 11/02
9/3/98	First USA Credit Card Master Trust 1998-7	CC	A	750.00	Sr/Sub	3.00	14.4% MPR	1ML+10
			B	67.77		3.00		1ML+30
9/2/98	Premier Auto Trust 1998-4	AL	A-1	360.00	Sr/Sub	0.20	1.5% ABS	Retained
			A-2	550.00		1.00		12ML+15
			A-3	470.00		2.00		80/2yr
			A-4	304.40		3.01		75/6.25 10/01
			B	65.60		3.48		Retained
8/27/98	IMC Home Equity Loan Trust 1998-5	HE	A-1	175.30	Sr/Mezz/Sub	0.90	4%-25% CPR 12 Month Ramp	1ML+7
			A-2	63.97		2.00		84/6.00 8/00
			A-3	77.27		3.00		107/6.375 9/01
			A-4	54.55		5.40		117/5.875 2/04
			A-5	23.92		7.90		146/6.875 5/06
			A-6	35.00		6.30		95/7.50 2/05
			A-7	35.00		10		135/5.875 2/04
			M-1	31.25		5.30		163/5.875 2/04
			M-2	18.75		5.30		203/5.875 2/04
			B-1	20.00		5.30		345/5.875 2/04
			8/27/98	WMC Mortgage 1998-B		HE		A-1
A-2	232.00	4.71			1ML+22			
M-1	64.00	5.37			1ML+34			
M-2	56.00	5.30			1ML+65			
B	48.00	5.27			N/A			
8/26/98	FHLMC Structured Pass-Through Certificates T013	HE	A-1	161.00	FHLMC Wrap	1.00	N/A	67/5.875 8/99
			A-2	25.00		2.15		68/5.75 10/00
			A-3	68.00		3.02		85/6.50 5/01
			A-4	19.00		4.17		94/5.75 10/02
			A-5	25.00		5.05		98/5.75 8/03
			A-6	47.15		9.26		130/6.125 8/07
			A-7	38.35		6.43		85/7.50 2/05
			A-8	38.35		N/A		Private

ABS Asset-backed securities. AD Auto dealer floorplan. 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. DF Dealer floorplan. EL Equipment loan. FEL Farm equipment loan. FF Fed funds. Whole 1st & 2nd liens. HE Home equity. HIL Home Improvement loan. MB Mortgage backed. Mezz. Mezzanine. MH Manufactured housing. ML Motorcycle Loans. N/A Not available. O Other. OC Overcollateralized. RIC Retail installment contracts. RV Recreational vehicle. BA Small business association loans. SL Student loan. TL Truck loan. Sub. Subordinate. UBA Utility bill allocations. WAL Weighted average life. WHL Wholesale inventory. WI When issued. Source: MCM "Corporatwatch."