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Comparison of Effective Durations and WALs for HEL Sequentials

Effective durations of discount HEL sequentials often exceed WALs.

For pass-through and sequential-pay securities backed by agency or manufactured housing (MH) collateral, the weighted average life (WAL) normally exceeds the effective duration. The difference between the two is often substantial. It is, therefore, somewhat unexpected that this relationship does not always hold for bonds backed by home equity loan (HEL) collateral. Effective durations of shorter-WAL HEL sequentials trading at par or at a discount often exceed WALs. In this article, we outline some of the reasons for this ordering.

Effective duration is defined as the change (first-order) in price that would result from a 100bp parallel shift of the par yield curve, keeping the option-adjusted spread (OAS) fixed.[3] The computation of this quantity can be thought of as an evaluation of price change along every interest rate path, divided by the average price, which is independent of path, followed by an averaging over all paths. To compare with WAL, it helps to consider each term contributing to the average as the *effective duration along a given interest rate path*. (The effective duration of a security is then an average of effective durations along individual paths.)

WAL is defined as the average amount of time a dollar of principal for a given security is outstanding.[4] It can be evaluated either for a static rate scenario, such as the current values of interest rates (nominal WAL), or as an average of WALs along different interest rate paths generated from a term structure model. To allow an apples-to-apples comparison between effective durations and WALs, we use the latter definition to calculate WALs.[5] Since interest rate paths are distributed around the forward curve, an upwardly sloping yield curve will generally lead to higher values of the path-averaged WAL compared to the nominal WAL.

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[3] See *Guide to Mortgage-Backed Securities*, Lakhbir Hayre, Salomon Smith Barney, March 1999.
[4] See *Guide to Mortgage-Backed Securities*.
[5] Yield Book users can see this value of WAL by pressing the distribution button after an OAS calculation.

Figure 7 shows prices, WALs and effective durations of several recently-issued HEL sequentials. In all but one of the cases the effective duration is greater than or equal to the path-averaged WAL, indicating that this ordering is common among HEL securities. The difference can be significant, as for EQCC 99.1 A3F, where it represents 25% of the WAL.

Figure 7. WALs and Effective Durations for Triple-A-Rated HEL Sequentials

Security	Price	WAL at Pricing Speed (in yrs.)	Nominal WAL at Model Speed (in yrs.)	Path-Averaged WAL (in yrs.)	Eff. Dur. (in yrs.)
EQCC 99.1 A2F	$98.28	1.62	1.87	1.99	2.49
EQCC 99.1 A3F	97.42	2.60	2.98	3.33	4.17
EQCC 99.1 A4F[a]	95.33	4.54	5.28	6.22	6.42
ADVN 99.3 A2	100.29	1.99	1.83	1.99	2.03
ADVN 99.3 A3	100.56	2.99	2.66	2.95	2.95
ADVN 99.3 A4[a]	100.92	4.99	4.18	4.97	4.38

[a] Priced to call. Prices of August 26, 1999.
Source: Salomon Smith Barney.

Long effective durations are the result of strong extension risk of HEL collateral.

The key reason why effective duration can exceed WAL for a HEL security is the strong extension risk of HEL collateral that is at- or out-of-the-money. On interest rate paths corresponding to significant selloffs, a par or a discount bond will be priced at a significant discount. Since HEL deals are structured so that the sequential bonds are priced very near $100 when the deal is originated, and the collateral is approximately at-the-money, these low discount prices correspond to collateral that is well out-of-the-money. Yet, HELs retain strong rate sensitivity in this regime,[6] suggesting that the bond has some characteristics of a principal-only (PO) structure on the selloff paths.[7]

Figure 8 shows effective durations for EQCC 99.1 A3F along different interest rate paths, identified by the WAL along the path.[8] (Paths corresponding mostly to interest rate declines have long WALs and those corresponding mostly to rate increases have short WALs.) The straight line on the graph is WAL=effective duration, so that points above the line correspond to paths where the effective duration is larger than the WAL, and those below to the reverse. The data shows that for long-WAL paths effective duration exceed the WAL while the opposite is true for short-WAL paths. Averaging over all paths then gives an effective duration that is greater than the WAL.

Figure 8 also offers a reason why effective durations do not exceed WALs for agency and MH pass-throughs and sequentials. Such securities have little extension risk when they are deep discounts because the prepayment speed is only weakly dependent on interest rates for deeply out-of-the-money collateral. Consequently, the very long WALs and effective durations, shown on the far right in Figure 2, are absent from the averaging.

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[6] Because the high level of baseline speeds which corresponds to credit-driven refinancings in the absence of rate incentive becomes attenuated when rates increase. See *Bond Market Roundup: Strategy* April 9, 1999 and April 16, 1999.

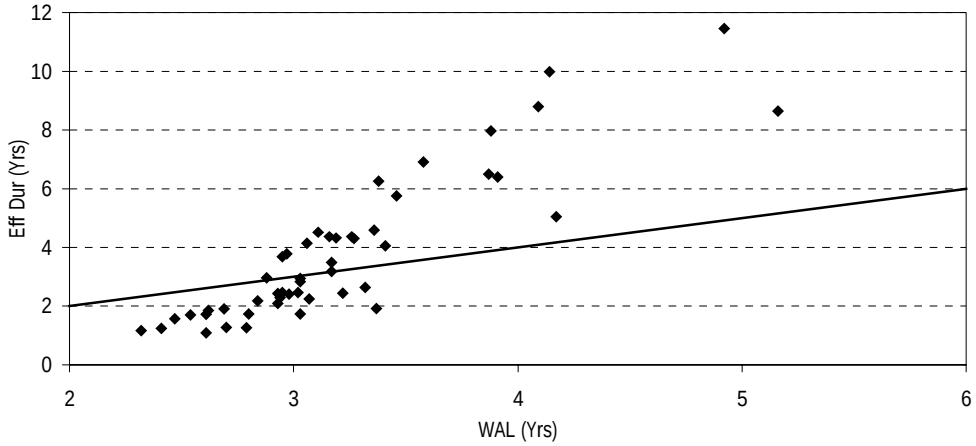
[7] Effective durations of POs are generally larger than WALs.

[8] As noted above, the usually quoted effective duration for a security is the *average of effective durations for individual paths*. Effective duration along a specific path, however, is useful when comparing the contributions of each path to the overall effective duration and the WAL.

The relative magnitude of effective duration and WAL depends on price and prepayment assumptions.

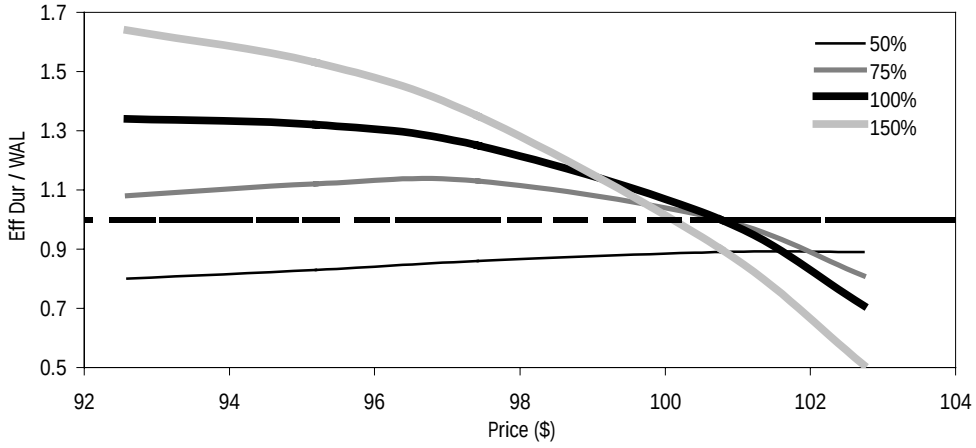
As the discussion above suggests, the relative magnitude of effective duration and path-averaged WAL is not a fundamental property of a security but depends on the prepayment assumptions, the interest rate process and the price of the security. Since effective duration and WAL are computed using nearly unrelated expressions, it may not be surprising that different choices of parameters that enter into the calculation can lead to different relative magnitudes. The dependence of this relationship on parameters is illustrated in Figure 9. We plot the ratio of effective duration and WAL for EQCC 99.1 A3F as a function of price for four different percentages of the prepayment model.[9][10] The ratio takes on a range of values on either side of one. It exceeds one if the price is below or very slightly above par, and the baseline prepayment level and rate sensitivity are sufficiently high. The ratio falls below one in the other cases.

Figure 8. EQCC 99.1 A3F — Effective Durations and WALs Along Different Interest Rate Paths



Source: Salomon Smith Barney

Figure 9. EQCC 99.1 A3F — Ratio of Effective Duration and WAL versus Price for Four Different Prepayment Assumptions



Source: Salomon Smith Barney

[9] Price changes correspond to parallel shifts of the yield curve assuming a constant OAS at 100% of the model.

[10] Changing the percent of the model impacts *both* the baseline prepayment level and rate sensitivity.

Figure 10. Percentage of ABS Floating-Rate and Fixed-Rate Issuance, 1998–1999 Year-to-Date

	1998	1999
Floating-Rate	40.3%	47.8%
Fixed-Rate	59.7	52.2

Source: Salomon Smith Barney.

Figure 11. Year-to-Date ABS Issuance by Sector, 1998–1999 (Dollars in Millions)

	1998 (YTD)	Percentage	1999 (YTD)	Percentage
Auto Loans	$27,485.9	22.4%	$43,496.9	31.9%
Credit Cards	24,411.6	19.9	27,570.1	20.2
Home Equity Loans	51,692.4	42.1	44,691.4	32.7
Manufactured Housing	7,652.1	6.2	7,646.1	5.6
Student Loans	8,361.7	6.8	5,075.8	3.7
Other	3,283.7	2.7	7,997.4	5.9
Total	**$122,887.4**	**100.0%**	**$136,477.7**	**100.0%**

Source: Securities Data Corp.

Figure 12. Comparison of Quoted Spreads and Static Spreads

	Avg. Life	Quoted Spread (bp/Curve)	Static Spread[a]	Difference
Three-Year Bullet	3.00 Yrs	80bp	79bp	1bp
Five-Year Bullet	5.00	98	81	17
Wide Window Auto[b]	1.81	87	86	1
Short Auto[c]	1.06	L+22	73	NA
Wide Window HEL[d]	3.63	190	179	11
Short HEL[e]	1.16	L+40	91	NA

[a] Static spread of bullets incorporates the richness or cheapness of the on-the-run Treasury benchmarks. [b] Assumes collateral original WAM of 60 months and remaining WAM of 54 months, 9% coupon, 1.3% ABS prepayment speed. [c] Assumes collateral original WAM of 60 months and remaining WAM of 30 months, 9% coupon, 1.3% ABS prepayment speed. [d] Assumes collateral remaining WAM of 174 months, 11% coupon, 20% CPR prepayment speed. [e] Assumes collateral remaining WAM of 120 months, 11% coupon, 20% CPR prepayment speed, security maturity in 30 months. CPR Constant prepayment rate. HEL Home equity loan-backed securities. NA Not available. WAM Weighted average maturity.
Source: Salomon Smith Barney.

Figure 13. Fixed-Rate ABS Secondary-Market Spreads to Benchmark Treasuries

		AAA					A				
		27 Aug 99 Spread	Spread Changes Over 1 Week	Spread Changes Over 4 Weeks	Spread Changes Over 52 Weeks	1-Year SD of 1-Week Sprd Chgs	27 Aug 99 Spread	Spread Changes Over 1 Week	Spread Changes Over 4 Weeks	Spread Changes Over 52 Weeks	1-Year SD of 1-Week Sprd Chgs
2-Year	Retail Auto	75bp	-5bp	-7bp	15bp	5.7bp	105bp	0bp	0bp	27bp	9.5bp
	Credit Card	75	-5	0	17	5.2	105	0	10	30	6.0
	Home Equity	130	-10	0	45	9.6	NA				
	Man. Housing	120	-10	0	45	8.8	NA				
3-Year	Wholesale Auto	80	-4	2	17	5.2	110	1	10	32	5.7
	Credit Card	80	-4	2	17	5.2	110	1	10	32	5.7
	Home Equity	140	-10	0	35	9.8	NA				
	Man. Housing	140	0	10	60	8.7	NA				
5-Year	Wholesale Auto	98	-5	0	23	6.6	130	0	7	37	7.9
	Credit Card	98	-5	0	23	6.6	130	0	7	37	7.9
	Home Equity	175	-5	15	60	9.2	NA				
	Man. Housing	150	-15	0	55	9.3	NA				
7-Year	Wholesale Auto	90	-8	-5	5	7.8	125	0	0	22	9.1
	Credit Card	90	-8	-5	5	7.8	125	0	0	22	9.1
	Home Equity	195	-5	15	65	10.9	NA				
	Man. Housing	180	0	10	65	10.8	NA				
10-Year[a]	Wholesale Auto	122	-4	7	22	8.8	157	1	12	37	9.2
	Credit Card	122	-4	7	22	8.8	157	1	12	37	9.2
	Home Equity	210	0	5	65	13.1	NA				
	Man. Housing	200	0	5	75	11.8	NA				

Note: Five- and ten-year spreads are quoted versus on-the-run Treasuries; two-, three-, and seven-year spreads are quoted versus off-the-run Treasuries.[a] On May 21, the benchmark Treasury was changed for the ten-year to the on-the-run bond, causing distortions in historical comparisons. SD Standard deviation.
Source: Salomon Smith Barney.

Figure 14. Floating-Rate ABS Secondary-Market Discount Margins (Over One-Month LIBOR)

		AAA					A				
		27 Aug 99 Spread	Spread Changes Over 1 Week	4 Weeks	52 Weeks	1-Year SD of 1-Week Sprd Chgs	27 Aug 99 Spread	Spread Changes Over 1 Week	4 Weeks	52 Weeks	1-Year SD of 1-Week Sprd Chgs
2-Year	Retail Auto	14bp	-1bp	-1bp	10bp	2.0bp	31bp	0bp	0bp	14bp	2.7bp
	Credit Card	14	-1	0	10	1.9	35	0	0	18	2.8
	Home Equity	35	0	0	27	3.6	90	0	0	62	7.2
3-Year	Wholesale Auto	17	0	0	11	1.9	40	0	0	18	2.7
	Credit Card	17	0	0	11	1.9	40	0	0	18	2.8
	Home Equity	40	0	0	27	3.6	95	0	0	64	7.8
5-Year	Wholesale Auto	23	-1	1	13	2.1	49	0	4	23	3.2
	Credit Card	23	-1	1	13	2.1	49	0	4	23	3.2
	Home Equity	45	0	0	29	4.0	105	0	0	72	8.6
7-Year	Wholesale Auto	28	-1	1	16	2.5	55	0	3	25	4.0
	Credit Card	28	-1	1	16	2.5	55	0	3	25	4.0
10-Year	Wholesale Auto	34	0	2	16	3.9	65	0	0	29	4.1
	Credit Card	34	0	2	16	3.9	65	0	0	29	4.1

LIBOR London Interbank Offered Rate. SD Standard deviation.
Source: Salomon Smith Barney.

Figure 15. Representative Secondary Trading Levels

Floating-Rate Issue		Avg. Life	DM	Price		Cap
MBNA 97-N A		1.3Yrs	11	99-28		None
FUSAM 95-2 A		2.6	17	100-05		None
CCIMT96.5 A		4.1	19	99-20+		None
MBNA 96-B A		6.6	27	99-28		None
FUSAM 98-6 A		9.0	33	98-27		None
Fixed-Rate Issue	**Coupon**	**Avg. Life**	**Spread**	**Price**	**Yield**	**Static Spread**
ONYX 98-1 A	5.95	1.3@1.6 ABSYrs	115bp	100-15	5.62%	8bp
CHAS 98-C A4	5.85	2.2@1.5 ABS	89	98-30+	6.46	84
CCIMT 98-1 A	5.75	1.4	75	99-10	6.27	76
FUSAM 97-6 A	6.42	2.9	83	100-01	6.49	82
MBNA 97-I A	6.55	5.0	99	99-30+	6.65	82
CCIMT 98-2 A	6.05	8.4	118/10Yr	94-05	6.98	97

Source: Salomon Smith Barney.

Figure 16. Floating-Rate CLO and CDO Indicative Discount Margins (Over Three-Month LIBOR)

	US Collateral, Prime-Quality CLO		High Yield Collateral CDO	
	Balance-Sheet-Driven		Investor-Driven	
	3-Year	5-Year	7-Year	10-Year
AAA	28 bp	36 bp	65 bp	80 bp
AA	—	—	90	100
A	60	70	140	160
BBB	—	—	250	260
BB	—	—	550	570

CLO Collateralized loan obligation. CDO Collateralized debt obligation.
Source: Salomon Smith Barney.

Figure 17. Recent Issuance

Date	Issuer	Asset Type	Class	Size (Mil.)	Credit Enhancement	WAL (Yrs)	Pricing Speed	Spread
26 Aug 99	GMAC Capital Auto Receivables Asset Trust 1999-2[a]	AL	A-1	427.00		0.52		Retained by GMAC
			A-2	370.00		1.02		22/EDSF
			A-3	306.50		1.52		77/4.875 3/01
			A-4	400.00		2.02		79/6.375 9/01
			A-5	76.80		3.02		85/5.875 9/02
			CTFS	63.10		1.62		125/6.25 4/01
26 Aug 99	Bombardier 1999-B	MH	A-1A	50.00	Sr/Mezz/Sub	0.91	180% MHP	22/1M LIBOR
			A-1B	40.00		0.91		50/SYNTH LIBOR
			A-2	24.00		2.10		135/6.50 8/01
			A-3	60.00		3.00		150/6.25 8/02
			A-4	21.00		4.00		160/5.75 8/03
			A-5	51.00		5.25		165/7.875 11/04
			A-6	104.40		11.10		212.5/5.50 5/09
			M-1	35.10		10.00		240/5.50 5/09
			M-2	23.40		10.00		NA/5.50 5/09
26 Aug 99	MBNA MCCT 1999-I[a]	CC	A	637.50		2.90		81/6.25 8/02
			B	56.25		2.90		111/6.25 8/02
			C	56.25		2.90		NA
25 Aug 99	Nissan 1999-A	AL	A-1	195.85		0.27		12/3M LIBOR
			A-2	260.00		1.00		30/12M LIBOR
			A-3	206.90		2.10		97/6.375 9/01
25 Aug 99	Onyx Acceptance Owners Trust 1999-C[a]	AL	A-1	62.00	MBIA Wrap	0.24		15/SYNTH 3M LIBOR
			A-2	132.00		1.00		37/SYNTH 12M LIBOR
			A-3	91.00		2.00		107/TSY 6.50 8/01
			A-4	91.00		3.08		120/TSY 5.875 9/02
			A-5	24.00		4.19		147/TSY 5.25 8/03
25 Aug 99	World Omni 1999-A	ALE	A-1	330.00		1.50		25/1M LIBOR
			A-2	310.00		2.00		30/1M LIBOR
			A-3	249.00		2.50		32/1M LIBOR
			A-4	184.00		3.00		35/1M LIBOR
20 Aug 99	Advanta Leasing Receivables 1999-1	EL	A-1	50.92		0.41		15/SYNTH LIBOR
			A-2	38.49		1.51		115/TSY
			A-3	9.44		2.55		130/TSY

[a] Salomon Smith Barney has acted as a manager and/or co-manager of debt issues of this issuer within the past three years.
ABSAsset-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. DF Dealer floor plan. EL Equipment loan. FEL Farm equipment loan. FF Fed funds. Whole first and second liens. FR Franchise loan. HE Home equity. HIL Home Improvement loan. MB Mortgage-backed. Mezz. Mezzanine. MH Manufacture d 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 "Corporatewatch."