

Valuation of subordinates
requires an estimate of
credit drift in a pool.

Credit drift is more
significant for hybrids
than for fixed-rate loans.

Credit Drift In Hybrid Subprime Mortgage Pools

In subprime mortgage deals with a senior/subordinate structure, the subordinate bonds generally pay principal late in the life of the deal, after most of the senior tranches have paid off. Valuation of subordinate bonds in a new deal therefore requires not only a review of the credit composition of the collateral, but also an estimate of the expected *changes* in the credit composition of the deal. In this article we review the evolution of collateral credit during the first few years of loan age for “2/28” hybrid loans, and we point out the role of prepayment penalties in this process.¹⁰ The sample collateral we use was originated by a large subprime mortgage issuer and is broadly representative of higher-credit subprime originations.

Results of the analysis point to a modest impact of credit evolution on the average pool credit during the first three years of loan age. The results are directly applicable to deals in which the subordinate bonds are backed predominantly by hybrid collateral. Issuers that have recently brought such deals to market include Ameriquest (for example, 2000-1 and 2000-2), New Century (2000-1), and Saxon (2000-1, 2000-2 and 2000-3).

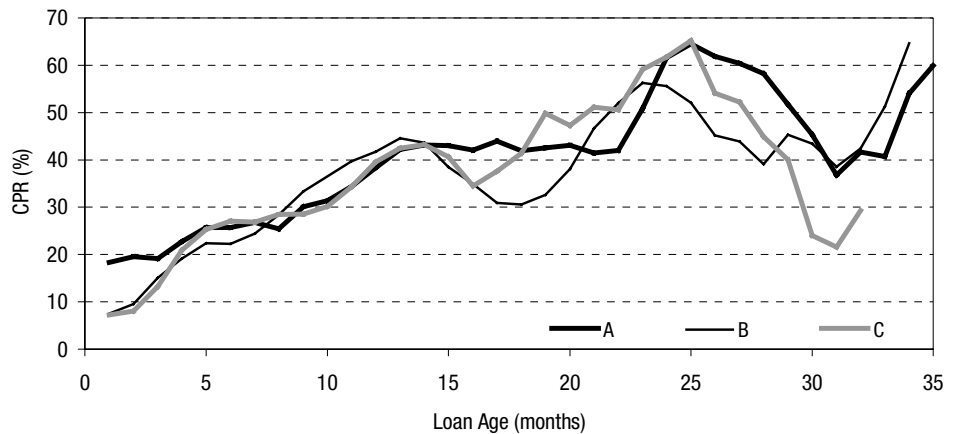
A drift in collateral credit is of particular significance for hybrid collateral. In contrast to fixed-rate loans, for which voluntary prepayments increase with decreasing borrower credit (positive selection),¹¹ empirical evidence indicates that voluntary prepayments on hybrids generally *decrease* with decreasing borrower credit (negative selection).¹² This behavior stands in contrast to defaults, which are always inversely related to credit. **The total prepayments on hybrid loans, given by the sum of voluntary prepayments and defaults, exhibit weak positive correlation with credit.** As higher-credit borrowers exit the pool at slightly higher rates, the credit composition of the pool may deteriorate. Figure 28 shows the prepayment pattern for 2/28 hybrids while controlling for the credit grade of the borrower. The collateral used for the calculation had an average balance of \$117,000, an LTV of 79%, the original WAC of 10.12%, a gross margin of 6.11% over six-month LIBOR, an average FICO score of 597 and a borrower debt-to-income ratio of 40%. No loans were subject to prepayment penalties.

¹⁰ 2/28 hybrids pay a fixed loan rate during the first two years of loan life and a variable rate for 28 years. The variable rate is indexed off six-month LIBOR.

¹¹ See *Prepayments on RFC Subprime/Home Equity Loans*, Salomon Smith Barney, August 2000.

¹² The correlation between borrower credit and voluntary prepayments is weaker than for fixed-rate loans.

Figure 28. Prepayments on 2/28 Hybrids Without Penalty by Borrower Credit



Source: Salomon Smith Barney.

Effect of Prepayment Penalties

Prepayment penalties change the dependence of speeds on credit.

Prepayment penalties have a marked effect on the prepayment pattern of hybrids. Prior to expiration, the penalties slow down voluntary prepayments significantly, while leaving only a small imprint on defaults.¹³ As a result, the dependence of prepayments on credit is reversed. Now lower-credit borrowers exit the pool at a higher rate, leading to a net *positive selection*. This effect is enhanced by the uneven impact of penalties on the voluntary prepayments of different credit grades, in that prepayment penalties seem to impose a weaker constraint on prepayments by lower-credit borrowers.¹⁴ After the expiration of the prepayment penalty, higher-credit borrowers take advantage of refinancing opportunities more readily, leading to a prepayment spike that is *positively* related to credit. Therefore, the penalties introduce a dependence of prepayments stratified by borrower credit on loan age. Figure 29 shows the prepayment behavior of 2/28 hybrids subject to a two-year prepayment penalty, as a function of borrower credit grade.

Credit Implications

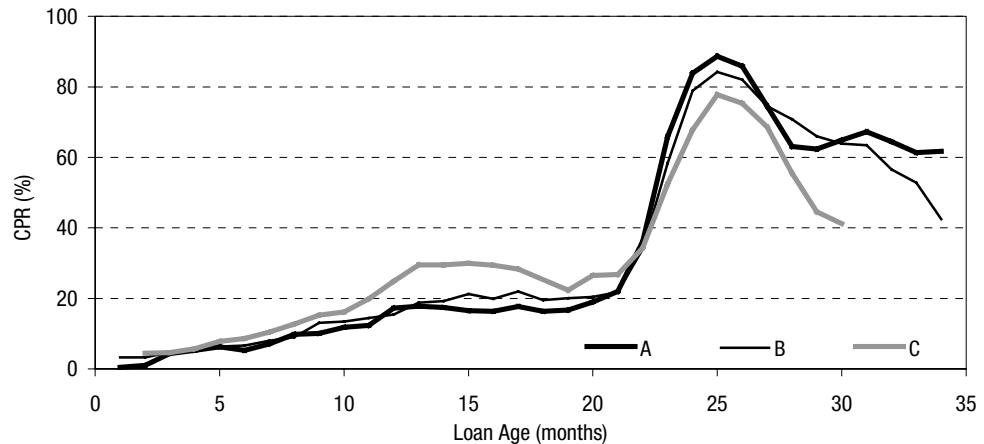
We use credit grades scaled to FICO scores.

Credit implications of the prepayment behavior illustrated in Figures 28 and 29 can be examined by following the credit composition of a hybrid pool as the collateral ages. To measure credit we use the letter credit grades subprime-A, A-, B, C and D and assign to each grade a numerical value such that the difference between the credit grades is scaled to the difference between the average FICO scores for each credit grade. The letter credit grades are therefore assigned the values of 1.00 (A), 0.68 (A-), 0.47 (C), and 0.36 (C/D). The use of letter credit grades rather than FICO scores is dictated by the limited availability of FICO scores for 1997 and earlier vintages. All credit grades refer to the borrower’s credit standing at the time the loan was originated.

¹³ Most penalties are six-months’ interest on 80% of original principal balance.

¹⁴ Lower financial sophistication and greater need for cash of lower-credit borrowers may contribute to the observed behavior.

Figure 29. Prepayments on 2/28 Hybrids With a Two -Year Penalty by Borrower Credit



Source: Salomon Smith Barney.

Historical experience for 2/28 hybrids originated in 1996 and 1997 is shown in Figures 31, 32, and 33. In addition to the average credit for each vintage for loans with and without prepayment penalties, the graphs show the ratio of the pool credit scores for loans with and without prepayment penalties. Penalties in Figures 31 and 32 are two-year penalties and penalties in Figure 33 are three-year penalties.¹⁵ The initial distribution of credit grades for each of the loan pools is given in Figure 30. The loan mix of 1998 and 1999 originations is similar to the loan mix of 1997 originations.

Figure 30. Initial Distribution of Credit Grades by Loan Pool

Collateral	Percent in Each Credit Grade			
	A	A-	B	C/D
1996 No Penalty	46%	41%	8%	5%
1996 2-Yr PP	19	43	30	8
1997 No Penalty	36	33	22	9
1997 2-Yr PP	34	37	20	9
1997 3-Yr PP	32	31	25	12

Source: Salomon Smith Barney.

Although the average initial credit scores for each loan group in the figures is different, the *change* in the credit composition follows a clear pattern:

- The average credit of loans with no penalty declines slowly throughout the first three years of the life of the deal.
- Prior to the expiration of the penalty, the average credit of penalty-protected loans improves. After the expiration of the penalty, however, as higher-credit borrowers start to refinance their loans, the average credit of penalty-protected loans declines rapidly. Three months after the expiration of the penalty, the average credit of penalty-protected loans is not better, relative to no-penalty loans, than it was when the pool was originated.¹⁶

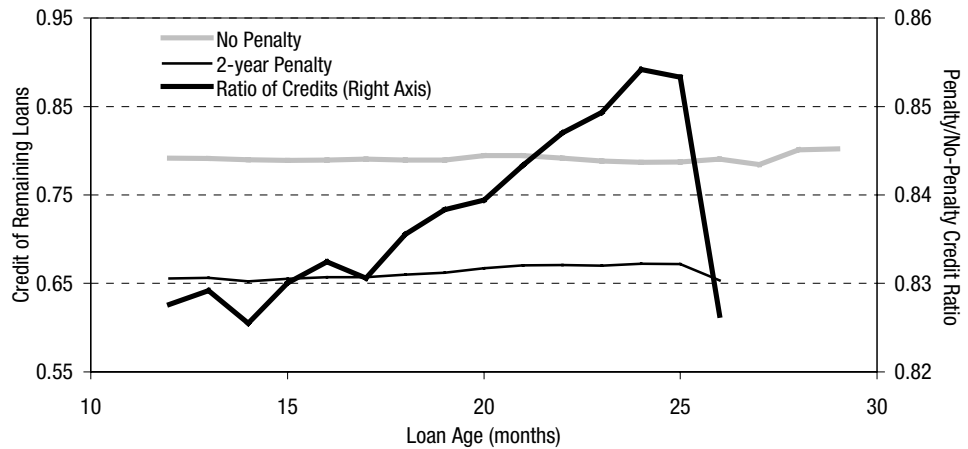
Prepayment penalties do not have a significant effect on the expected credit performance of subordinates.

¹⁵ The penalty term on the majority of recently originated hybrids coincides with the time to first reset. Many outstanding deals, however, still have a significant number of 2/28 hybrids subject to a three-year penalty.

¹⁶ Figure 33 also demonstrates that penalty expiration, rather than the first reset, triggers a significant decline in the credit composition.

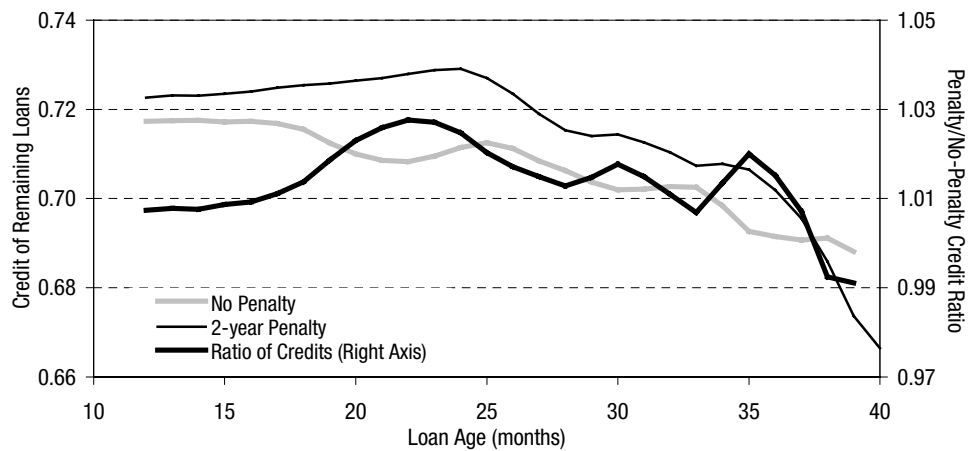
Since most mezzanine and subordinate bonds do not start receiving principal until three years after deal issue, **prepayment penalties do not have a significant beneficial effect on the expected credit performance of these securities.** Indirect benefits of prepayment penalties, however, may include: (1) The stable excess spread prior to penalty expiration enhances the likelihood that overcollateralization or other required support is built up according to schedule. (2) The large spike in prepayment speeds after penalty expiration implies a shortening of long cashflows, relative to what would be implied by a constant CPR or a simple seasoning ramp (these are typical pricing conventions).

Figure 31. Credit Evolution of No-Penalty and Two-Year Penalty 2/28 Hybrids, 1996 Origination



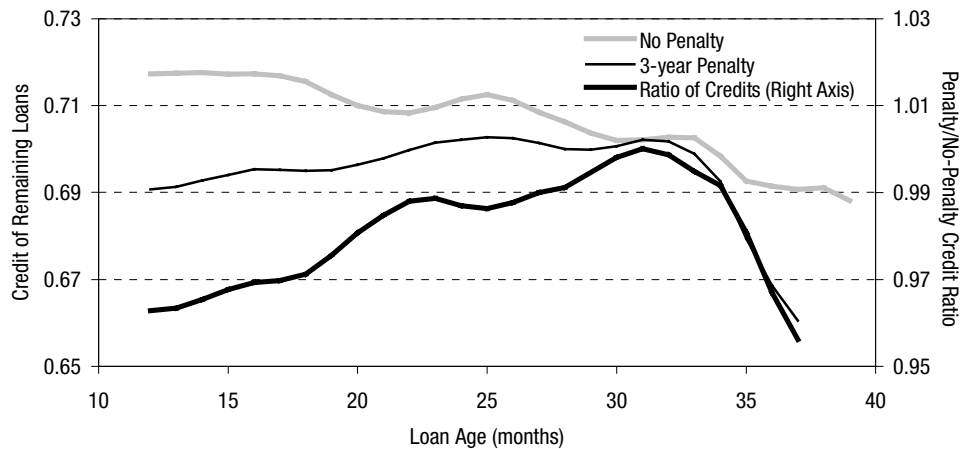
Source: Salomon Smith Barney.

Figure 32. Credit Evolution of No-Penalty and Two-Year Penalty 2/28 Hybrids, 1997 Origination



Source: Salomon Smith Barney.

Figure 33. Credit Evolution of No-Penalty and 3-Year Penalty 2/28 Hybrids, 1997 Origination



Source: Salomon Smith Barney.

How Significant Is the Credit Drift?

Credit drift is small compared to the variation of credit across a deal or across different vintages.

Based on figures 31, 32, and 33, the drift in average credit score is about -0.01 after two years (no penalty) and about -0.03 after three years (with or without penalty). This change is small compared to the variation of scores across loans of a given vintage or compared to differences in average scores across vintages. For example, the standard deviation of credit scores for the loan pools used in figures 31, 32, and 33 ranges from 0.20 (2/28 of 1996 with two-year penalty) to 0.24 (2/28 of 1997 with three-year penalty). Similarly, the no-penalty loans of 1996 have an average credit score of 0.80, compared to the average credit score of 0.72 for no-penalty loans in 1997. Both of these variations easily overshadow the drift of credit scores for either vintage. For reference, in FICO scores, the drift of -0.03 corresponds to a decrease of FICO score of 4 points.

Although a full determination of the effect of credit drift requires a review of the *distribution of loan credits* for each loan age, rather than a calculation of the average credit score, the example presented here suggests that **credit drift is not a key factor in the credit performance of hybrid subprime collateral over the first three years of loan age.**¹⁷ The initial credit composition, the detailed dependence of defaults on loan age, and the macroeconomic factors likely play more significant roles.

Figure 34. Percentage of ABS Floating-Rate and Fixed-Rate Issuance, Year to Date, 1999–2000

	1999 (YTD)	2000 (YTD)
Floating-Rate	49.7%	69.9%
Fixed-Rate	50.3	30.1

Source: Salomon Smith Barney.

¹⁷ The effect may be more pronounced for other issuers, particularly those that underwrite a higher fraction of loans to low-credit borrowers and whose pools have a higher dispersion of borrower credits.

Figure 35. Year-to-Date ABS Public Issuance by Sector, 1999–2000 (Dollars in Millions)

	1999 (YTD)	Percentage	2000 (YTD)	Percentage
Auto/Vehicle Loans	43,571.8	25.9%	47,113.5	28.0%
Equipment Loans	8,346.6	5.0	7,321.8	4.3
Credit Cards	33,468.5	19.9	35,171.1	20.9
Home Equity Loans	57,890.7	34.4	52,865.3	31.4
Manufactured Housing	10,726.6	6.4	7,952.2	4.7
Student Loans	6,075.8	3.6	14,077.5	8.4
Other	8,362.0	5.0	3,944.5	2.3
Total	168,442.0	100%	168,445.9	100%

Source: Securities Data Corp.

Figure 36. Representative Fixed-Rate ABS Secondary-Market Spreads to Interest-Rate Swaps^a

		AAA					A					BBB				
		6-Oct Swap Sprd	Spread Changes Over			1-Year SD of 1-Wk Sprd Chgs	6-Oct Sprd	Spread Changes Over			1-Year SD of 1-Wk Sprd Chgs	6-Oct Sprd	Spread Changes Over			1-Year SD of 1-Wk Sprd Chgs
			1 Wk	4 Wks	52 Wks			1 Wk	4 Wks	52 Wks			1 Wk	4 Wk		
2-Yr	Retail Auto	75	7bp	-1bp	1bp	-1	3.2bp	27bp	0bp	0bp	-21	3.3bp	72bp	0bp	0bp	NA
	Credit Card		2	-1	-1	-6	2.3	25	0	1	-8	2.8	64bp	0bp	-6bp	NA
	Equipment		17	0	1	NA	NA	36	0	-4	NA	NA	85bp	0bp	0bp	NA
	Stranded Assets		12	0	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Home Equity		30	0	0	-23	4.0	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Man. Housing		27	0	0	-16	4.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Yr	Retail Auto	81	9	0	0	2	2.8	32	0	-3	-1	3.2	77bp	0bp	-5bp	NA
	Credit Card		4	-1	-1	-3	2.4	26	0	-2	-7	3.1	68bp	0bp	-7bp	NA
	Equipment		22	0	-2	NA	NA	40	0	-5	NA	NA	90bp	0bp	-7bp	NA
	Stranded Assets		15	0	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Home Equity		45	0	0	-13	3.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Man. Housing		40	0	0	-8	3.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
5-Yr	Credit Card	95	7	-1	-1	0	2.6	33	0	-4	-1	4.2	74bp	0bp	-11bp	NA
	Stranded Assets		18	0	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Home Equity		70	0	0	-6	5.3	130	0	0	NA	NA	NA	NA	NA	NA
	Man. Housing		60	0	2	-16	5.4	130	0	0	NA	NA	NA	NA	NA	NA
7-Yr	Credit Card	103	13	0	0	2	3.0	44	0	-4	3	3.5	93bp	0bp	-7bp	NA
	Stranded Assets		26	-1	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Home Equity		85	0	-2	-16	7.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Man. Housing		75	0	-4	-26	6.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
10-Yr	Credit Card	113	18	0	1	5	3.4	55	0	2	12	3.9	110bp	0bp	-6bp	NA
	Stranded Assets		31	1	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Home Equity		95	0	-13	-38	6.9	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Man. Housing		90	0	-2	-28	5.6	NA	NA	NA	NA	NA	NA	NA	NA	NA

^a As of April 14, 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 37. Representative Floating-Rate ABS Secondary-Market Discount Margins (Over One-Month LIBOR)

		AAA					A					BBB				
		6-Oct Spread	Spread Changes Over			1-Year SD of 1-Wk Sprd Chgs	6-Oct Spread	Spread Changes Over			1-Year SD of 1-Wk Sprd Chgs	6-Oct Spread	Spread Changes Over			1-Year SD of 1-Wk Sprd Chgs
			1 Wk	4 Wks	52 Wks			1 Wk	4 Wks	52 Wks			1 Wk	4 Wk		
2-Yr	Retail Auto	7bp	0bp	0bp	-6bp	0.7	26bp	0bp	0bp	-12bp	1.6	78	0bp	0bp	NA	
	Credit Card	5	1	1	-8	0.6	24	0	0	-14	1.2	67	0	-7	NA	
	Home Equity	22	0	-1	-13	0.9	92	0	-3	2	1.6	NA	NA	NA	NA	
3-Yr	Retail Auto	12	0	0	-4	0.7	34	0	-3	-7	1.8	79	0	0	NA	
	Credit Card	7	-1	-1	-9	0.6	30	0	-2	-11	1.3	70	0	-8	NA	
	Home Equity	23	0	-1	-13	0.9	95	0	-5	0	1.9	NA	NA	NA	NA	
5-Yr	Credit Card	13	0	0	-6	0.6	35	0	-4	-12	2.5	76	0	-14	NA	
	Home Equity	25	0	-2	-18	1.3	101	0	-4	-4	3.0	NA	NA	NA	NA	
7-Yr	Credit Card	17	0	0	-6	0.7	48	0	-4	-5	1.6	93	0	-12	NA	
10-Yr	Credit Card	24	1	-1	-8	1.1	58	0	-4	-2	2.2	114	0	2	NA	

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

Figure 38. Recent Issuance

Date	Issuer	Type	Class	Size (\$ Mil.)	Credit Enhancement	WAL (Yrs)	Ratings	Spread
28 Sep 00	Bombardier 2000-1	DF	A	374.6	Sr./Sub.	2.95	Aaa/AAA	17/1M LIBOR
27 Sept 00	Chase Credit Card Owners Trust 2000-3 ^a	CC	A	750.0	Sr./Sub.	4.95	Aaa/AAA	13/1M LIBOR
			B	62.0		5.04	A2/A	35/1M LIBOR
			C	80.0		5.04	Baa2/BBB	70/1M LIBOR
27 Sept 00	Conseco Finance Securitizations 2000-5	MH	A-1	130.0	Sr./Mezz/Sub.	0.95	AAA	30/SYNTH LIBOR
			A-2	67.0		2.3	AAA	43/SWAPS
			A-3	67.0		3.3	AAA	57/SWAPS
			A-4	101.0		5.0	AAA	78/SWAPS
			A-5	40.0		7.0	AAA	95/SWAPS
			A-6	117.0		10.0	AAA	113/SWAPS
			A-7	104.2		12.9	AAA	133/SWAPS
			M-1	37.5		9.3	AA	260/6.00 8/09
			M-2	30.0		9.3	A	325/6.00 8/09
			B-1	22.5		5.6	BBB	450/6.88 5/06
27 Sept 00	First Franklin Mtge Loan Trust 2000-FF1	HEL	A	464.7	Sr./Sub.	2.58	AAA	23/1M LIBOR
			M1	22.3		4.24	AA	55/1M LIBOR
			M2	7.4		3.66	A	95/1M LIBOR
26 Sept 00	Toyota Auto Owners Trust 2000-B ^a	AL	A-2	429.0	Sr./Sub.	1.00	Aaa/AAA	8/SYNTH LIBOR
			A-3	407.0		2.00	Aaa/AAA	10/2YR SWAPS
			A-4	209.0		3.00	Aaa/AAA	12/3YR SWAPS
26 Sept 00	Providian Gateway 2000-B	CC		625.0	MBIA	5.00	Aaa/AAA	28/1M LIBOR
26 Sept 00	Providian Gateway 2000-C	CC		575.0		3.00	Aaa/AAA	22/1M LIBOR
26 Sept 00	Oakwood 2000-C	MH	A-1	189.2	Sr./Mezz/Sub.	4.46	Aaa/AAA	92/SWAPS
			M-1	26.6		9.62	Aa3/AA	265/6.50 2/10
			M-2	14.6		9.62	A3/A	345/6.50 2/10
22 Sept 00	Conseco 2000-C	HIL	A-1	114.8	Sr./Mezz/Sub.	0.77	AAA	33/SYNTH LIBOR
			A-2	31.5		2.00	AAA	40/SWAPS
			A-3	43.0		3.00	AAA	65/SWAPS
			A-4	33.4		5.00	AAA	88/SWAPS
			A-5	33.0		5.80	AAA	220/7.00 7/06
			M-1	18.6		4.75	A	239/6.75 5/05
			M-2	7.8		4.74	A	330/6.75 5/05
			B-1	7.3		4.73	BBB	460/6.75 5/05
21 Sep 00	Citibank Card Card Issuance Trust 2000-A1 ^a	CC		1,500.0	Sr./Sub.	5.00	Aaa/AAA	9/SWAPS
18 Sep 00	Citibank Card Issuance Trust Series 2000-B1 ^a	CC		350.0	Sub.	5.00	A2/A	28/SWAPS
				150.0	Sub.	5.00	A2/A	25/3M LIBOR
18 Sep 00	Citibank Card Issuance Trust Series 2000-C1 ^a	CC		600.0		5.00	Baa2/BBB	68/SWAPS
				200.0		5.00	Baa2/BBB	68/3M LIBOR

^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. 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. NA 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."