Quantitative Financial Research
Criteria Report

Basis Risk In Structured Finance Transactions: T-Bill, CP, and Prime versus USD LIBOR

Analysts

QFR

Ahmet E. Kocagil, PhD
+1 212 908-0406
ahmet.kocagil@fitchratings.com

Vadim Mezrin, PhD
+1 212 908-0650
vadim.mezrin@fitchratings.com

Asset-Backed Securities

Ebru Demir
+1 212 908-0682
ebru.demir@fitchratings.com

Claire J. Mezzanotte
+1 212 908-0503
claire.mezzanotte@fitchratings.com

Related Research

- "Interest Rate Risk in Structured Finance Transactions: USD LIBOR," dated May 15, 2006

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Summary

Fitch Ratings announces new structured finance basis risk stress criteria for securitizations involving USD London Interbank Offered Rate (LIBOR). In establishing new basis risk stress criteria, Fitch developed a methodology that reflects the historical dynamics of spread movements — i.e. commercial paper versus LIBOR, T-Bill versus LIBOR, and Prime versus LIBOR — driven by the underlying levels of interest rate changes. The proposed basis risk criteria is an adjunct to Fitch's newly introduced interest rate stress criteria report for transactions involving USD LIBOR, which was published on May 15, 2006. Since June 2006, Fitch started publishing vectors of shifts to spot LIBOR for each rating level. The basis risk stresses are also updated each month. All stresses are available for download from Fitch's web site at www.fitchratings.com.

Basis Risk

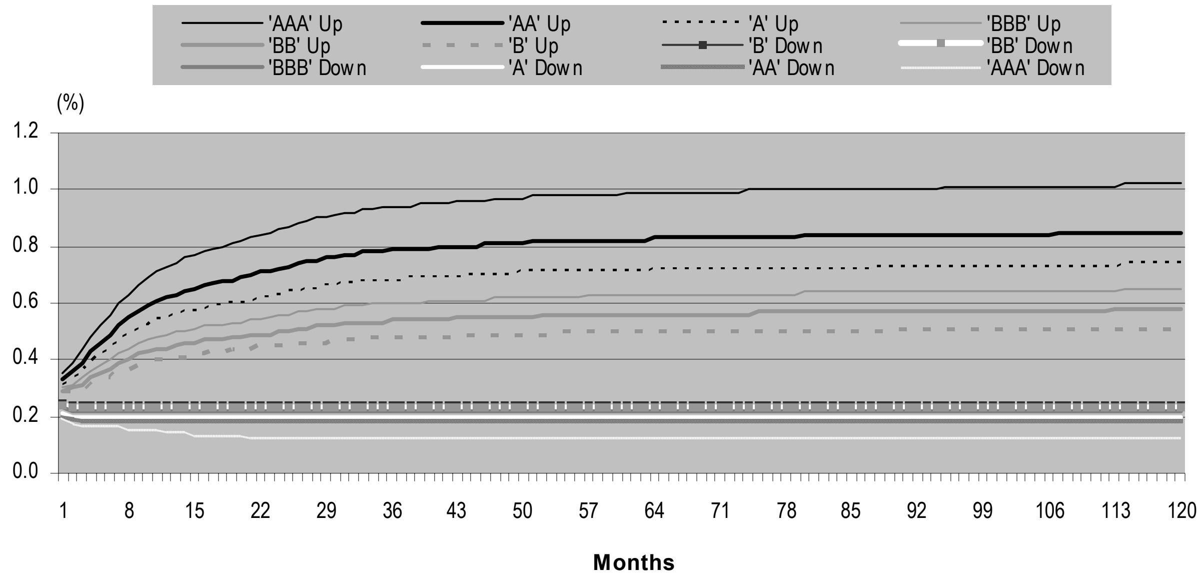
The majority of U.S. consumer asset-backed securities (ABS) transactions, including credit card receivables, student, auto, and home equity loans, are exposed to basis risk due to mismatches between the asset and liability coupon rates. On the asset side, the rate paid by credit card holders is usually indexed to the Prime rate. For student loan borrowers, the loans are usually indexed to the bond equivalent yield of three-month T-Bill, three-month CP, Prime, or LIBOR. More specifically, for securitizations backed by Federal Family Education Loan Program student loans, basis risk is reduced but not completely eliminated by the presence of special allowance payments (SAP). Paid by the U.S. Department of Education, SAP provides loan holders with a market rate of return indexed to the three-month CP rate. Auto loans are fixed rate in nature, and most home equity loans are subject to basis risk, as assets are fixed or floating rate based on six-month LIBOR. On the liability side, most of the ABS structures are indexed to the one- or three-month LIBOR rate. Therefore, the spread between LIBOR and CP, LIBOR and three-month T-Bill, and Prime and LIBOR is the largest component of basis risk for consumer ABS structures.

Basis Risk Stress Methodology

Fitch's Quantitative Financial Research Group analyzed the historical relationship observed for the following indexes, commonly seen in ABS, over a 15-year period:

- Three-Month CP vs. Three-Month LIBOR.
- Three-Month LIBOR vs. Three-Month T-Bill.
- Three-Month CP vs. One-Month LIBOR.
- One-Month LIBOR vs. Three-Month T-Bill.
- One-Month Prime vs. One-Month LIBOR.
- One-Month Prime vs. Three-Month LIBOR.

Basis Risk Stresses
(Three-Month LIBOR vs. Three-Month T-Bill)



The analysis of spreads between LIBOR and three-month T-Bill, CP, and Prime shows that there is a significant relationship between the magnitude of spread and the underlying interest rate indexes over the past 15 years *(see LIBOR/T-Bill Spreads vs. USD LIBOR and T-Bill Rates chart, page 4)*. This relationship is revealed by the high correlation coefficients between the spread and the underlying interest rate levels. The methodology is outlined in the Appendix on page 4, and the chart above illustrates widening and compressing basis risk stress scenarios for three-month LIBOR versus three-month T-Bill. For each pair of interest rates, the magnitude of spreads over the next 120-month period is obtained through the estimation process *(see Appendix on page 4 of this report and Fitch Research on "Interest Rate Risk in Structured Finance Transactions: USD LIBOR," dated May 15, 2006, available on Fitch's web site at www.fitchratings.com)*.

Fitch's basis risk criteria stress the spreads between the relevant indexes in a given transaction at each rating level. Fitch's criteria include increasingly widening and compressing the gap between floating-rate liabilities and fixed-/floating-rate assets at each successively higher rating level *(for three-month LIBOR vs. three-month T-Bill basis risk stresses, see chart above)*. Compressing this gap is a critical component in the analysis of a transaction that incorporates an interest rate swap.

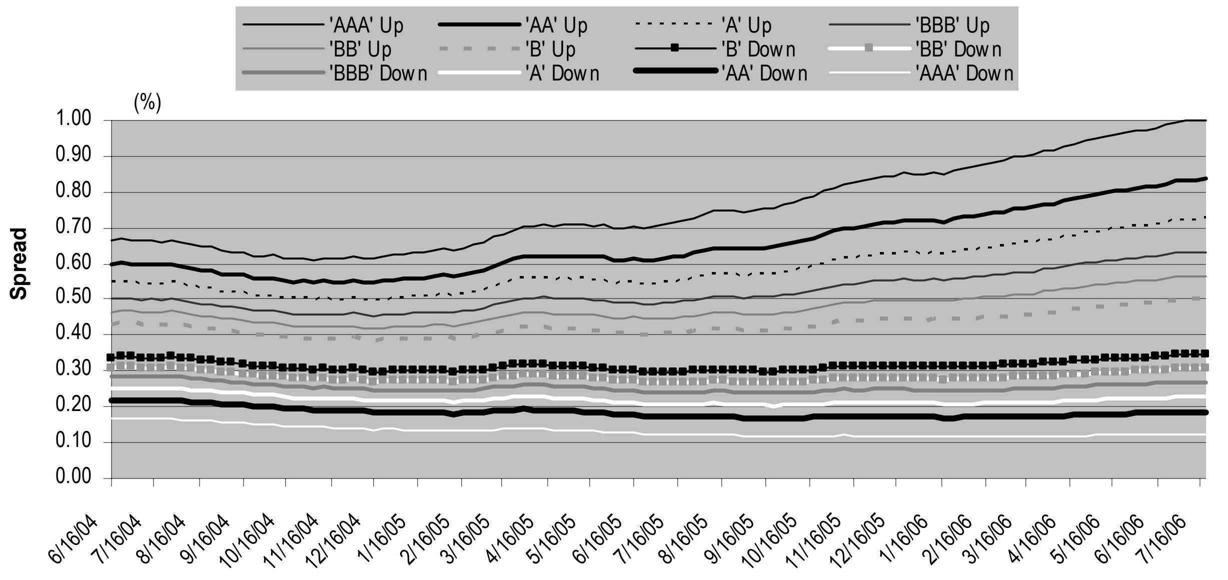
The spread between Prime and LIBOR presents a slightly different dynamic when compared to the other spreads between relevant indexes. Basis risk, where the asset returns are indexed to the Prime rate, such as in credit card ABS and private student loans, arises due to the possibility that the spread might become compressed. Therefore, Fitch applies Prime-LIBOR basis risk stresses by compressing the spread's magnitude, which would result in more severe stresses for a transaction when spreads are compressed as opposed to widened. This is contrary to the relationship discussed above for three-month LIBOR and 90-day T-Bill.

The new basis risk stresses will be dynamic and reflect the most recent market movements, in addition to reflecting historically observed spikes. Fitch's criteria incorporates robust analysis to address basis risk exposure in various securitizations, including those structured with swaps, as both rising and falling interest rate scenarios are stressed utilizing the new interest rate criteria.

■ Swaps

ABS issuers usually enter into swap agreements if the assets and liabilities are not match funded. Basis swaps are used to hedge against floating-rate assets and liabilities where the trust pays interest to investors based on one index and receives payment based on a different index. In the presence of fixed-

Three-Month LIBOR to Three-Month T-Bill Historical Spread Projection



rate assets and floating-rate liabilities, fixed to floating swaps are used when the trust pays to the counterparty a fixed interest rate and receives a floating interest rate. While interest rate swaps may serve to mitigate basis risk, they are not used in every transaction. However, the existence of interest rate swaps may lead to situations where the swap generates excess cash for a transaction in an environment where spreads widen (LIBOR vs. a fixed interest rate). Swaps may also lead to potential liquidity shortages in scenarios with compressed spreads. Fitch's basis risk methodology, utilizing both widening and compressed spread scenarios for each rating level, mitigates the transaction's exposure to basis risk.

■ Impact of Methodology Change

Fitch currently incorporates basis risk by applying a vector of spread spikes based on historical spread volatility, as well as default speeds specific to the securitized asset pools. As noted, Fitch developed the new basis risk criteria in conjunction with the new interest rate stress methodology. The new methodology takes advantage of the relationship between spread and the underlying interest rate levels where the projections of interest rate stresses come from information in the options market about term structure and volatility to determine scenarios based on the probability of future rate movements. The major advantage of the new basis risk methodology is that the basis risk assumptions are applied uniformly over different securitized products based on past occurrences and future projections of market interest rate dynamics.

The chart above shows the stresses the methodology would have produced since mid-2004. Starting from the first quarter of 2005, basis risk stresses reflect the increase in spread between three-month LIBOR and three-month T-Bill rates (41 basis points [bps] in April 2005), reaching 66 bps by December 2005. The methodology projects 'AAA' basis stresses of 70 bps in April 2005 and 85 bps in December 2005. The shifts in basis are mainly driven by the increasing rate environment since early 2005.

■ Monthly Updates of Stress Scenarios

Similar to the interest rate stresses, basis risk stresses are available monthly for download from Fitch's web site at www.fitchratings.com.

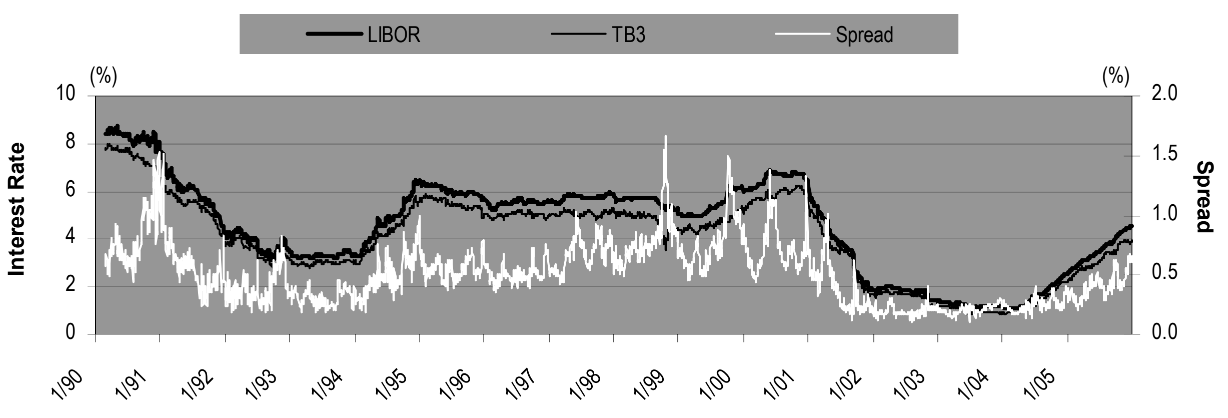
Appendix

■ Basis Risk Estimation Methodology

As a starting point of the analysis, the historical levels of LIBOR/T-Bill basis and the underlying interest rates should be compared, an approach that relies purely on the analysis of historical spreads without paying attention to the levels of the underlying interest rates might omit the dependence between the two.

Over the 15-year period, there is a significant correlation between magnitude of the spread and individual interest rates *(see chart below)*.

LIBOR/T-Bill Spreads vs. USD LIBOR and T-Bill Rates



The magnitude of the correlation exhibited in the chart above is shown in the table below:

Correlation Between Spread and USD LIBOR, Spread, and T-Bill
(%)

Spread vs. LIBOR	77.06
Spread vs. T-Bill	71.00

The significant correlation between the spreads and underlying interest rates suggests that the basis risk should be adjusted based on the interest rates as well as its independent movement. The results of the regressions are outlined in the table below:

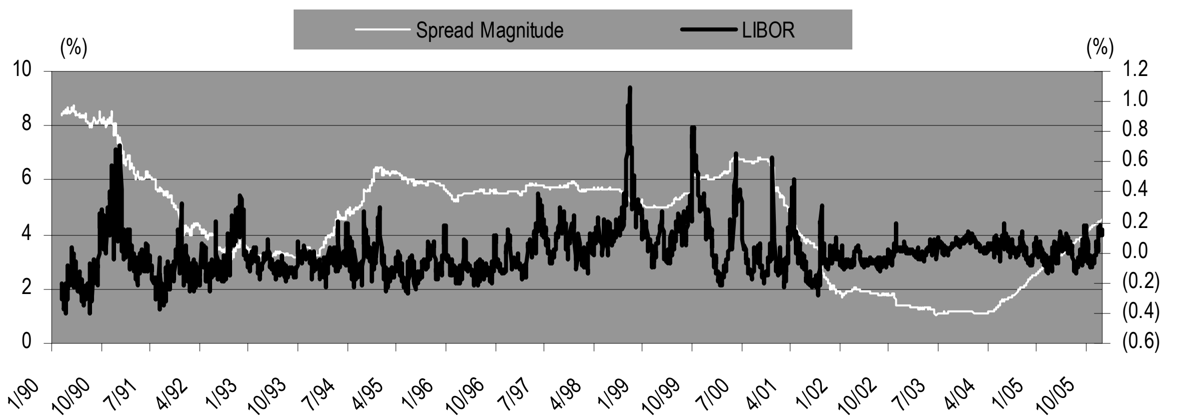
Regression Estimate of Three-Month LIBOR Spreads vs. Three-Month LIBOR

Variable	Parameter DF	Standard Estimate	Error	t Value	Pr > |t|
Intercept	1	0.00051	0.00006359	8.05	<.0001
LIBOR	1	0.09866	0.00128	76.84	<.0001

As the table above shows, LIBOR is a statistically significant explanatory variable of LIBOR T-Bill spread behavior.

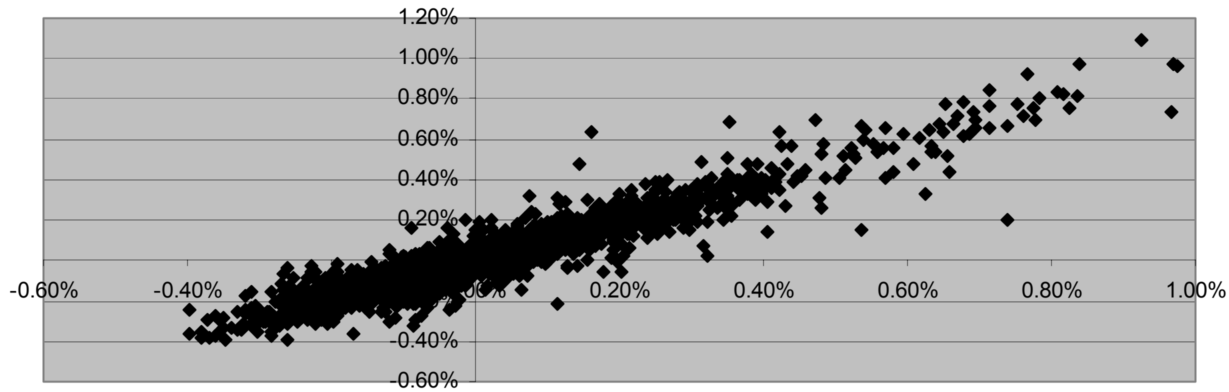
Once the dependence on LIBOR is taken out of the LIBOR/T-Bill basis, the resulting series is plotted in the chart below:

Detrended Spreads vs. LIBOR



The spreads in the chart below are indicative of a presence of autoregressive process in the spreads. To confirm this, the graph of spreads can be plotted against lagged values *(see chart below)*. The observations are situated around the 45-degree line that would reaffirm the presence of an auto correlated process. A Vasicek mean reversion model can be used to obtain the distribution of spreads for future points in time *(see Vasicek, Oldrich A. [1977]. "An Equilibrium Characterization of the Term Structure." Journal of Financial Economics, 5 [November], pp. 177–88)*.

Cross-Plot of Spread and Its Lagged Value



Once the spreads are regressed against their lagged values, the following result is obtained:

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	3.18E-07	0.00000787	0.04	0.9678
Spread Lag	1	0.94942	0.00494	192.16	<.0001

Based on the following table, statistical significance of the estimates is confirmed.

Regression Estimate of Spread Against Its Lagged Value
(Analysis of Variance)

Source	DF	Sum of Squares	Mean Square	F Value	PR > F
Model	1	0.00925	0.00925	36924.7	<.0001
Error	4037	0.00101	2.50E-07	—	—
Corrected Total	4038	0.01026	—	—	—
Root MSE	—	0.00050038	R-Square	0.9014	—
Dependent Mean	—	2.45E-07	Adj R-sq	0.9014	—

From these, the parameters of the Vasicek model are estimated, as shown in the table at the bottom on page 5.

Vasicek Parameter Estimates for Detrended Spreads

θ	0.0629%
α	12.97600179
σ	0.007911702

Where Vasicek model is given as:

$$dS = \alpha\,(\theta - S)\,dt + \sigma dW$$

The final basis risk would have to be estimated using the USD LIBOR stresses with data shown in the Regression Estimates of Spreads vs. LIBOR table on page 4 and the Vasicek Parameter Estimates for Detrended Spreads table above.