The Determinants of Expected Returns on Mortgage-Backed Securities: An Empirical Analysis of Option-Adjusted Spreads

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The 1998 liquidity crisis in the bond markets resulted in wider spreads across all spread product sectors. This article provides evidence that the option-adjusted spread (OAS) on residential mortgage-backed securities (MBS) is highly correlated with corporate spreads over a long time period that does not include the 1998 liquidity crisis. Using weekly OAS estimates from MBS brokers over the 1993-1997 time period for GNMA and FNMA collateral, I show that both market conditions and contract-specific factors are related to the expected excess return on MBS.

The OAS on an MBS is designed to measure the expected excess return over the return on a portfolio of Treasury STRIPS with the same expected cash flows from the MBS (see Finnerty and Rose [1991] and Waldman and Modzelewski [1985]). Breeden [1994], Hayre and Lauterbach [1990], and Jacob, Latainer, and Toevs [1988] demonstrate that brokers' estimates of OAS are significantly related to subsequent actual returns on MBS. This evidence, along with the fact that OAS estimates are widely used by traders, suggests that broker OAS estimates are reasonable proxies for market participants' views of the expected excess returns on MBS.

The analysis finds that the MBS OAS is positively related to the difference between corporate bond yields and Treasury bond yields (the "quality spread"). Assuming that the default risk of bonds with the same credit rating remains relatively constant over time, the quality spread is the time-varying market price of credit risk. Fama [1986] and Keim and Stambaugh [1986] report that the quality spread is a good predictor of the excess returns to corporate bonds, and Fama and French [1989] report that the quality spread is related to future excess equity returns.

In simple terms, when the expected return premium on corporate bonds is large, the expected excess return on MBS is also large. There are three non-mutually exclusive explanations for this finding. First, when the market price of credit risk is high, the market price of prepayment risk is also high. Second, there is a time-varying premium for liquidity. Under this view, the OAS and quality spread widen when the superior liquidity of Treasury bonds is particularly valuable. Third, to the extent that the supply of spread products relative to Treasuries is correlated across spread product sectors, the changes in corporate bond and MBS OAS will be correlated over time.

I also find that the OAS increases with the option value of the prepayment call option on the underlying collateral. First, the OAS is positively related to the implied volatility of interest rates obtained from Treasury bond option contracts. Second, across contracts, the OAS is wider for MBS when the call option on the underlying collateral is at or near the money, and decreases

as the call option becomes out of the money. The empirical relationship between the OAS and the MBS relative coupon supports the notion of Kon and Polek [1998] that the accuracy of the model duration of an MBS is limited by the assumption that the OAS is independent of rate changes.

The relationship between the OAS and the option value of the prepayment call option on the underlying collateral is consistent with the idea that prepayment modeling risk is priced. Uncertainty about prepayment rates is high when the option value of the prepayment is high. When the prepayment rate uncertainty is high, 1) the variability of future cash flows is high, making the security unattractive for certain buyers, and 2) the market may become thin as only those investors who perceive that they have the most accurate prepayment models are willing to trade.

I. EXPECTED DETERMINANTS OF THE OPTION-ADJUSTED SPREAD

A variety of marketwide and contract-specific factors are expected to influence the OAS on MBS. I describe those that are expected to influence the expected return premium.

The discussion focuses on the possibility that MBS have greater expected returns than Treasury securities as compensation for their inherent cash flow uncertainty. I describe in particular 1) the extent to which prepayment risk is priced, and 2) when the market price of prepayment risk is large.

Prepayments occur when borrowers pay off their home mortgage debt early (exercise their option to call). The uncertainty of future prepayments is a source of risk to the MBS holder. When future prepayments are difficult to estimate, 1) the variability of future cash flows is high, and 2) the market may become thin, as only investors who think they have the most accurate prepayment models are willing to trade. Both these factors could cause MBS with high prepayment modeling risk to have a higher expected return or OAS.

Prepayment uncertainty or modeling risk comes from both the difficulty of predicting prepayments at current rates, and the possibility that unanticipated changes in interest rates will lead to changes in the prepayment rate. Both these sources of uncertainty are greatest when the borrower is indifferent between prepaying the mortgage and continuing to make payments. In other words, prepayment modeling risk and the OAS are expected to be the greatest when the borrower's prepayment option is just in the money.

To the extent that it is difficult to predict a mortgage pool's prepayment rate as interest rates change, interest rate volatility creates prepayment uncertainty. Thus, increases in the expected volatility of future interest rates should result in a wider OAS. In addition, increases in the volatility of interest rates should cause greater increases in the OAS for contracts in which the prepayment option is close to being in the money. Interest rate uncertainty maps into greater prepayment uncertainty when interest rate changes are likely to have profound effects on prepayment rates.

The OAS should be related to both the risks inherent in the MBS and the current market price of these risks. Assuming that the default risk of a cohort of bonds with the same credit rating remains relatively constant over time, changes in the quality spread (the difference between the yield on corporate bonds of a certain credit rating minus the yield on similar-maturity Treasury bonds) measure changes in the market price of credit risk. A wide quality spread implies a high market price of credit risk.

Consistent with this, Fama [1986] and Keim and Stambaugh [1986] provide evidence that the quality spread is related to the relative returns on bonds with different amounts of default risk. If changes in the quality spread over time were driven largely by changes in credit quality, then the quality spread would not be strongly related to subsequent bond returns. Fama and French [1989] find that the expected excess returns on corporate bonds and stocks move together. Specifically, dividend yields, commonly used to forecast stock returns, predict excess returns on corporate bonds, and predictable changes in stock returns are related to the quality spread.

Given the evidence that 1) the quality spread is a reasonable measure of the expected excess returns on corporate bonds, and 2) excess returns on corporate bonds and equities are related over time, I address whether the OAS on MBS is related to the expected excess return on corporate bonds. A positive relationship between the OAS and the quality spread could be viewed as evidence that when the market price of credit risk is high, the market price of prepayment risk is high as well. Or, such a finding could be taken as evidence of a time-varying premium for liquidity. That is, the OAS and quality spread widen when the superior liquidity of Treasury bonds is particularly valuable.

In summary, the OAS is a measure of the expected excess returns to MBS. The OAS is expected to be related to 1) the extent to which the prepayment option on the underlying collateral is near the money; 2) the expected volatility of interest rates; and 3) the quality spread.

II. DATA

Option-Adjusted Spread Data

There are five sets of weekly OAS data analyzed in this study. The OAS estimates come from four different MBS brokers. The data provided by each firm cover slightly different time periods: Firm 1 (11/1/93 to 8/13/97); Firm 2 (9/23/94 to 6/17/97); Firm 3 (1/4/94 to 8/27/97); and Firm 4 (1/6/95 to 8/15/97). The OAS estimates are for various coupon rate GNMA and FNMA collateral.

Four of the data sets use fixed interest rate volatility in the OAS estimates. In addition, Firm 4 provides OAS estimates using volatility estimates from interest rate option contracts that vary over time. This "implied volatility" series is the most important. To the extent that the market anticipates interest rates to be more (less) volatile than the fixed volatility assumed in the other series, the estimated OAS overstates (understates) the true expected excess return.

Summary statistics for the OAS estimates are provided in Exhibit 1. The OAS estimates on GNMA collateral vary between –10 and 112 basis points for the Firm 1 estimates; 27 and 130 basis points for the Firm 2 estimates; –30 and 78 basis points for the Firm 3 estimates; 23 and 90 basis points for the Firm 4 fixed volatility estimates; and between 23 and 69 basis points for the Firm 4 implied volatility estimates.

Negative OAS estimates are very rare and are observed only on the highest contract rate collateral. The FNMA estimates exhibit similar patterns. With the exception of some Firm 2 estimates, the OAS on GNMA collateral are slightly higher.

While each firm's estimates cover slightly different time periods, the average OAS for each coupon MBS is similar across firms, and the time series standard deviation is the highest for the highest-coupon collateral. Finally, the estimated OAS from Firm 2 are roughly 20 to 40 basis points higher than the other broker estimates across various contract rates.

Variable Definitions

The relative coupon rate, the contract rate on the mortgage underlying the MBS minus the market rate on new mortgages, measures the extent to which the prepayment option is in or out of the money. The market rate on new mortgages is the weighted average of the surveys of mortgages originated by major institutional lender groups for the purchase of newly built homes compiled by the Federal Housing Finance Board.

The analysis creates dummy variables for three relative coupon rate groups. MBS with coupon rates 100 basis points or more below market coupon rates are in relative coupon group one; i.e., DRCOUP1 equals one if the relative coupon rate is less than –100 bp and zero otherwise. I refer to MBS securities with relative coupon rates below –100 bp as deep discount MBS. DRCOUP2 equals one if an MBS has a relative coupon rate greater than –100 bp but less than +50 bp and zero otherwise. I refer to these MBS as discount MBS. DRCOUP3 equals one if an MBS has a relative coupon rate greater than +50 bp. I refer to these MBS as premium MBS.

The option value of the option to prepay is highest for MBS in the DRCOUP3 group, and thus the OAS is expected to be the widest. When the rates on new mortgages are relatively low for the sample period, the option to prepay is well in the money for the very high coupon rates in the DRCOUP3 group. However, a fourth relative coupon group (premium MBS) is not created so that each relative coupon group contains at least one coupon per time period in the data sets. This biases against a finding that the OAS will be largest for this group.

The empirical model of the OAS is estimated with the DRCOUP1 and DRCOUP2 dummy variables. Thus, the estimated coefficients indicate the extent to which the OAS on these two relative coupon groups differs from the OAS on the benchmark relative coupon group in which the relative coupon is 50 basis points or higher. If the OAS increases with prepayment risk, the coefficients on the DRCOUP1 and DRCOUP2 dummy variables should be negative. Further, the coefficient on the DRCOUP1 variable should be more negative than the coefficient on the DRCOUP2 variable.

Two measures of the quality spread are used. ($QUALITY\ SPREAD_{AAA}$) is the yield on AAA-rated corporate bonds minus the yield on thirty-year maturity Treasury bonds. ($QUALITY\ SPREAD_{BBB}$) is the

EXHIBIT 1
Option-Adjusted Spread Summary Statistics

		Contract Rate						
		6.0%	6.5%	7.0%	7.5%	8.0%	8.5%	9.0%
Panel A. GNMA Collateral								
Firm 1	Mean	46.14	45.50	47.75	51.01	52.60	51.86	45.48
11/1/93-8/13/97	Standard Deviation	8.01	7.10	9.76	12.96	15.43	15.20	20.03
n = 201	Minimum	28	28	29	29	26	23	–10
	Maximum	64	64	79	101	112	105	89
Firm 2	Mean		64.85	70.53	76.30	80.10	89.38	
9/23/94-6/17/97	Standard Deviation		17.70	16.07	15.16	18.36	21.45	
n = 143	Minimum		27	37	40	40	45	
	Maximum		90	98	107	118	130	
Firm 3	Mean	40.01	39.97	40.88	41.01	38.69	37.76	39.30
1/4/94-8/27/97	Standard Deviation	7.67	7.06	8.46	9.92	9.32	12.99	18.96
n = 200	Minimum	26	25	25	19	13	–7	–30
	Maximum	65	71	76	78	65	67	72
Firm 4	Mean	48.09	50.43	52.31	50.39	48.62	50.47	61.07
(Constant-Volatility)	Standard Deviation	7.56	8.15	10.25	10.34	11.89	13.51	16.13
1/6/95-8/15/97	Minimum	33	32	31	31	25	23	25
n = 137	Maximum	70	65	70	71	73	77	90
Firm 4	Mean	47.01	49.23	50.75	48.19	45.93	47.59	58.69
(Implied Volatility)	Standard Deviation	7.09	6.40	7.88	7.69	9.08	10.10	11.18
1/6/95-8/15/97	Minimum	31	35	34	25	23	29	27
n = 137	Maximum	64	63	69	68	68	72	79
Panel B. FNMA Collateral								
Firm 1	Mean	36.61	40.69	42.57	44.79	45.80	44.03	33.38
11/1/93-8/13/97	Standard Deviation	12.57	8.91	8.96	10.33	12.91	13.85	16.79
n = 201	Minimum	12	19	20	20	14	10	–15
	Maximum	72	59	64	73	82	88	76
Firm 2	Mean		68.87	78.08	75.40	80.26	88.69	
9/23/94-6/17/97	Standard Deviation		10.38	12.85	12.19	16.17	18.05	
n = 143	Minimum		35	44	49	52	57	
	Maximum		87	100	100	114	129	
Firm 3	Mean	32.32	35.07	36.07	37.82	37.29	37.17	37.47
1/4/94-8/27/97	Standard Deviation	13.02	10.07	9.25	9.71	10.01	14.35	21.11
n = 200	Minimum	5	15	18	19	14	–9	–33
	Maximum	63	67	74	75	68	82	91
Firm 4	Mean	40.09	47.94	48.69	48.91	47.88	48.28	46.12
(Constant-Volatility)	Standard Deviation	11.57	9.24	9.74	10.04	11.32	12.89	17.67
1/6/95-8/15/97	Minimum	21	27	27	28	27	26	18
n = 137	Maximum	66	67	71	69	73	77	87
Firm 4	Mean	39.28	47.02	47.70	47.47	45.94	45.99	43.98
(Implied Volatility)	Standard Deviation	11.52	9.37	9.53	8.49	7.50	8.48	14.47
1/6/95-8/15/97	Minimum	20	29	32	30	26	24	15
n = 137	Maximum	67	74	79	72	63	64	75

yield on BBB-rated corporate bonds minus the yield on thirty-year Treasury bonds. The corporate and Treasury bond yields are obtained from the Board of Governors of the Federal Reserve. The quality spread on corporates is expected to be positively related to the MBS OAS to the extent that when the market places a higher premium on credit risk, it also places a higher premium on prepayment risk.

Finally, the volatility of interest rates (VOLATILITY) is the implied volatility from the ten-year Treasury bond option contract. The OAS is expected to be positively related to the implied volatility of interest rates. The coefficients on the two variables that interact interest rate volatility and the relative coupon rate (DRCOUP1 × VOLATILITY and DRCOUP2 × VOLATILITY) are expected to be negative. A negative sign on the interactive variables means that the difference between the OAS on the discount MBS and the OAS on the at-the-money MBS increases (assuming that, on average, the discount MBS have lower OAS) as interest rates become more volatile.

Summary statistics for the interest rate variables are provided in Exhibit 2. There is considerable variation in these variables over time. The spread between the yield on the AAA corporate bonds and the thirty-year Treasury bond yield varies between 53 and 79 basis points during the sample period, while the spread between the yield on the BBB corporate bonds and the thirty-year Treasury bond varies between 118 and 147 basis points. The implied volatility of interest rates varies considerably over the sample period; the minimum value is 4.69%, and the maximum value is 9.31%.

The average rate on new mortgages over the sample period is 7.94%, varying between 6.74% and 9.25%. Given that the OAS estimates are for seven collateral percentages between 6% and 9%, there are a wide range of relative coupon rates, although there are relatively few premium MBS observations in the sample.

III. RESULTS

The basic model estimated is:

$$\begin{aligned} OAS_{j,t} = {} & \alpha + \beta_1(\text{Prepayment Risk}_{j,t}) + \beta_2(\text{Quality Spread}_t) + \\ & \beta_3(\text{Interest Rate Volatility}_t) + \\ & \beta_4(\text{Prepayment Risk}_{j,t} \times \text{Interest Rate Volatility}_t) + \\ & \beta_5(\text{GNMA Dummy}_{j,t}) + \\ & \beta_6(\text{GNMA Dummy}_{j,t} \times \text{Interest Rate Volatility}_t) \end{aligned}$$

$OAS_{j,t}$ is the option-adjusted spread on contract j at time t. Prepayment $risk_{j,t}$ is the prepayment risk proxy, either DRCOUP1 or DRCOUP2, on contract j at time t. Interest rate $volatility_t$ is the implied volatility of interest rates at time t. The data from GNMA and FNMA collateral are pooled. An intercept dummy is included to estimate the expected difference between the OAS on FNMA and GNMA collateral. In addition, the GNMA dummy is interacted with the relative-coupon dummies to determine whether the differences between the OAS on GNMA and FNMA collateral differ by relative coupon.

The results of the regression analysis for each data set are presented in Exhibits 3-7. In the most important regression, the OAS is estimated using an implied interest rate volatility (Exhibit 3). When the OAS is estimated using a constant interest rate volatility assumption (Exhibits 4–7), the positive relationship between the volatility of interest rates and the OAS is either 1) the result of a higher expected return as interest rate volatility increases, or 2) an artifact of the OAS calculation.

Both quality spread variables are significantly positively related to the OAS in all the specifications reported. When Treasuries are cheap (expensive) compared to corporate bonds, Treasuries are also cheap (expensive) compared to MBS. Further, the estimated coefficients are economically reasonable.

The estimated coefficient on QUALITY $SPREAD_{AAA}$ (the yield spread on AAA corporates over

EXHIBIT 2
Interest Rate Summary Statistics

	Quality $Spread_{AAA}$	Quality $Spread_{BBB}$	Mortgage Rate (%)	Volatility (%)
Mean	65.38	130.50	7.94	6.64
Standard Deviation	6.19	7.18	0.59	0.87
Minimum	53	118	6.74	4.69
Maximum	79	147	9.25	9.31

EXHIBIT 3
Firm 4 Data (Implied Volatility)

	Model					
	1	2	3	4	5	6
Intercept	–33.42**	–14.53**	–20.46**	–40.69**	–21.99**	–42.21**
	(–8.02)	(–4.89)	(–4.76)	(–7.73)	(–5.12)	(–8.09)
QUALITY $SPREAD_{AAA}$		42.78**	42.62**		42.62**	
		(11.45)	(11.41)		(11.47)	
QUALITY $SPREAD_{BBB}$	41.17**			41.28**		41.28**
	(3.42)			(12.08)		(12.14)
Vol	3.95**	4.99**	5.94**	5.07**	5.94**	5.07**
	(11.71)	(15.94)	(10.09)	(8.48)	(10.14)	(8.53)
DRCOUP1	–0.51	–0.81	8.44	11.07*	10.18	12.81*
	(–0.91)	(–1.46)	(1.60)	(2.11)	(1.94)	(2.44)
DRCOUP2	–1.40**	–1.55**	6.23	7.44	8.52	9.74*
	(–2.74)	(–3.04)	(1.30)	(1.55)	(1.77)	(2.03)
FNMA	4.29**	4.29**	4.29**	4.29**	7.34**	7.34**
	(10.53)	(10.50)	(10.50)	(10.54)	(9.22)	(9.25)
DRCOUP1 x Vol			–1.45	–1.81*	–1.45	-1.81*
			(–1.77)	(–2.23)	(–0.178)	(–2.24)
DRCOUP2 x Vol			–1.22	–1.39	–1.22	–1.38
			(–1.63)	(–1.86)	(–1.64)	(–1.87)
DRCOUP1 x FNMA					–3.49**	–3.49**
					(–3.23)	(–3.25)
DRCOUP2 x FNMA					–4.59**	–4.59**
					(–4.54)	(–4.56)
Adjusted R^2	0.2387	0.2336	0.2371	0.2401	0.2419	0.2477

T-statistics are reported in parentheses. **denotes significance at the 1% level, and * denotes significance at the 5% level.

Treasuries) is very close to 1.0; a one-basis point increase in QUALITY $SPREAD_{AAA}$ results in a one-basis point increase in the OAS in three of the five models. The average coefficient on the QUALITY $SPREAD_{AAA}$ variable is 0.94 for the model using data from Firm 1, 1.02 for the model using fixed volatility estimates from Firm 4, and 1.38 using data from Firm 2. In the other two models, the estimated coefficient is considerably smaller (0.24 for the data from Firm 3 and 0.43 for the implied volatility estimated data from Firm 4). The estimated coefficients on QUALITY $SPREAD_{BBB}$ are 1.02 using the Firm 4 fixed-volatility estimates; they are much smaller in the other models (between 0.15 and 0.41).

There is some evidence that the explanatory power of the QUALITY $SPREAD_{AAA}$ variable is better than the explanatory power of the QUALITY $SPREAD_{BBB}$ variable. The adjusted R^2 in models using either variable is very similar in the two models using Firm 4 data and the models using Firm 2 data. In the Firm 1 and Firm 3 models, however, the adjusted R^2 is more than 10% higher in the models using QUALITY $SPREAD_{AAA}$. QUALITY $SPREAD_{AAA}$ is more likely to be a proxy for a liquidity premium than for the mar-

EXHIBIT 4
Firm 1 Data

	Model					
	1	**2**	**3**	**4**	**5**	**6**
Intercept	–25.38**	–64.23**	–79.45**	–53.25**	–80.88**	–54.67**
	(–8.42)	(–20.25)	(–18.31)	(–11.51)	(–18.65)	(–11.82)
$QUALITY\ SPREAD_{AAA}$		95.18**	92.94**		92.94**	
		(27.23)	(26.45)		(26.57)	
$QUALITY\ SPREAD_{BBB}$	26.36**			25.89**		25.88**
	(14.56)			(14.36)		(14.41)
Vol	5.24**	6.80**	9.44**	9.74**	9.44**	9.74**
	(19.65)	(26.95)	(16.20)	(15.48)	(16.28)	(15.54)
DRCOUP1	–6.45**	–4.65**	9.35*	23.62**	12.10**	26.37**
	(–10.49)	(–8.13)	(2.00)	(4.72)	(2.59)	(5.25)
DRCOUP2	–2.24**	–1.30**	24.87**	36.62**	25.99**	37.74**
	(–3.86)	(–2.42)	(5.57)	(7.63)	(5.80)	(7.84)
FNMA	7.26**	7.26**	7.26**	7.26**	10.10**	10.10
	(16.35)	(17.76)	(17.87)	(16.54)	(12.04)	(11.14)
DRCOUP1 x Vol			–2.26**	–4.73**	–2.26**	–4.73**
			(–3.16)	(–6.20)	(–3.18)	(–6.22)
DRCOUP2 x Vol			–4.07**	–6.06**	–4.07	–6.06**
			(–5.88)	(–8.17)	(–5.91)	(–8.20)
DRCOUP1 x FNMA					–5.50**	–5.50**
					(–5.08)	(–4.70)
DRCOUP2 x FNMA					–2.22*	–2.23*
					(–2.13)	(–1.97)
Adjusted R^2	0.2512	0.3653	0.3731	0.2685	0.3789	0.2742

T-statistics are reported in parentheses. **denotes significance at the 1% level, and * denotes significance at the 5% level.

ket price of default risk since AAA corporates have very little credit risk.

The volatility of interest rates is significantly positively related to the OAS in all the regression models for all five data sets. For the regressions run on OAS that assume a constant volatility, the positive relationship between the OAS and the volatility of interest rates could occur for two reasons. Either mortgage market investors require a higher expected return when interest rates are more volatile, or the OAS estimates are based on calculations that assume a constant interest rate volatility.

In the regressions estimated using the implied volatility of interest rates, there is a significant positive relationship between interest rate volatility and the OAS. These results are consistent with the idea that the expected excess return on MBS is higher in more volatile interest rate environments. Interestingly, the estimated coefficients on the interest rate volatility variable are smaller in the models using current volatility of interest rates than models run on the four fixed-volatility OAS samples. This suggests that, in part, the positive coefficient on the interest rate variable in the models using OAS generated from con-

EXHIBIT 5
Firm 2 Data

	Model					
	1	**2**	**3**	**4**	**5**	**6**
Intercept	–5.52 (–1.875)	–2.55 (–0.75)	–22.95 (–4.95)	–30.79* (–6.80)	–21.65** (–4.66)	–29.49** (–6.50)
QUALITY SPREAD$_{AAA}$		27.15** (7.21)	22.88** (6.07)		22.88** (6.08)	
QUALITY SPREAD$_{BBB}$	18.05** (10.07)			17.64** (9.97)		17.64** (9.99)
Vol	2.57** (9.79)	3.01** (11.11)	6.69** (10.69)	6.65** (10.75)	6.69** (10.72)	6.65** (10.77)
DRCOUP1	–0.41 (–0.68)	–0.25 (–0.40)	38.82** (7.76)	41.86** (8.53)	36.61** (7.29)	39.65** (8.05)
DRCOUP2	1.64** (2.88)	1.74** (3.02)	22.63** (4.73)	24.78** (5.26)	21.37** (4.44)	23.50** (4.97)
FNMA	3.47 (7.95)	3.47** (7.88)	3.47** (7.97)	3.47** (8.06)	0.87 (0.96)	0.87 (0.97)
DRCOUP1 x Vol			–6.00** (–0.784)	–6.48** (–8.65)	–6.00** (–7.85)	–6.48** (–8.67)
DRCOUP2 x Vol			–3.33** (–4.49)	–3.68** (–5.05)	–3.33** (–4.50)	–3.68** (–5.06)
DRCOUP1 x FNMA					4.43** (3.81)	4.43** (3.85)
DRCOUP2 x FNMA					2.53* (2.25)	2.53* (2.28)
Adjusted R^2	0.0926	0.0749	0.0951	0.1150	0.0992	0.1191

T-statistics are reported in parentheses. **denotes significance at the 1% level, and * denotes significance at the 5% level.

stant volatilities is an artifact of the OAS calculation.

There is some evidence that the OAS is lower for the discount MBS, where the value of the option to prepay is not as great. The estimated coefficients on the DRCOUP1 and DRCOUP2 dummy variables are negative in nearly all cases, and are significantly different from zero, for four of the five data sets. The coefficient on DRCOUP1 is negative but not significantly different from zero, and the coefficient on DRCOUP2 is positive and significantly different from zero, in the models estimated using the data from Firm 3. Further, the estimated coefficient on the DRCOUP1 variable is more negative than the estimated coefficient on the DRCOUP2 variable (except Exhibit 3).

Interestingly, the difference between the OAS across the different relative-coupon groups depends on the volatility of interest rates. The coefficient on the interest rate variable interacted with the out-of-the-money contract rate dummy variables is negative. This means that, on average, the OAS on the discount MBS is lower than the OAS on the near- or in-the-money contract rate MBS as interest rate volatility increases, and the OAS is higher for the discount MBS as interest rate volatility increases.

EXHIBIT 6
Firm 3 Data

	Model					
	1	**2**	**3**	**4**	**5**	**6**
Intercept	–5.09	–85.85**	–101.45**	–27.82*	–102.93**	–29.30*
	(–1.04)	(–17.32)	(–10.09)	(–2.34)	(–10.34)	(–2.48)
QUALITY SPREAD$_{AAA}$		138.69**	138.45**		138.44**	
		(26.34)	(26.34)		(26.66)	
QUALITY SPREAD$_{BBB}$	14.61**)			15.34**		15.34**
	(5.45)			(5.71)		(5.76)
Vol	12.69**	13.18**	15.62**	16.06**	15.63**	16.06**
	(20.18)	(25.93)	(10.76)	(9.17)	(10.89)	(9.24)
DRCOUP1	–31.32**	–23.96**	4.75	8.09	8.85	12.19
	(–28.26)	(–24.60)	(0.432)	(0.59)	(0.79)	(0.90)
DRCOUP2	–18.66**	–15.11**	–2.63	–1.08	–2.18	–0.62
	(–18.54)	(–17.88)	(–0.25)	(–0.09)	(–0.21)	(–0.05)
FNMA	–2.03**	–2.03**	–2.03**	–2.03**	0.94	0.94
	(–2.93)	(–3.54)	(–3.55)	(–2.94)	(0.65)	(0.54)
DRCOUP1 x Vol			–4.34*	–6.00**	–4.34*	–6.00
			(–2.53)	(–2.89)	(–2.56)	(–2.91)
DRCOUP2 x Vol			–1.94	–2.73	–1.94	–2.73
			(–1.21)	(–1.41)	(–1.23)	(–1.42)
DRCOUP1 x FNMA					–8.19**	–8.19**
					(–4.62)	(3.81)
DRCOUP2 x FNMA					–0.91	–0.91
					(–0.56)	(–0.46)
Adjusted R^2	0.4592	0.6288	0.6303	0.4622	0.6392	0.4709

T-statistics are reported in parentheses. **denotes significance at the 1% level, and * denotes significance at the 5% level.

IV. CONCLUSION

Using weekly data between 1993 and 1997 for GNMA and FNMA collateral with various coupons, I provide evidence that both marketwide and contract-specific factors affect the expected excess return on MBS, i.e., the OAS. The OAS is positively related to the spread between corporate bond yields and Treasuries (the quality spread). This suggests that when the market prices of credit risk or liquidity are high, the market price of prepayment risk is also high.

The OAS is positively related to the implied volatility of interest rates obtained from Treasury bond option contracts. Across contracts, controlling for marketwide factors, the OAS is higher for MBS when the interest rate on new mortgages relative to the contract rate on the MBS is such that the call options on the underlying mortgages are at or near the money. Further, the OAS is lower for deeper-discount MBS when the call option is well out of the money.

These results and the finding that the expected excess return on MBS widens with the volatility of interest rates indicate that the OAS increases with the option value of the call options on the underlying collateral.

EXHIBIT 7
Firm 4 Data (Constant-Volatility)

	Model					
	1	**2**	**3**	**4**	**5**	**6**
Intercept	–116.55**	–70.01**	–85.99**	–136.04**	–87.31**	–137.36**
	(–30.86)	(–25.49)	(–21.85)	(–29.06)	(–22.20)	(–29.41)
$QUALITY\ SPREAD_{AAA}$		106.57**	106.10**		106.10**	
		(30.86)	(31.03)		(31.16)	
$QUALITY\ SPREAD_{BBB}$	102.09**			102.48**		102.48**
	(32.91)			(33.54)		(33.69)
Vol	5.14**	7.71**	10.27**	8.12**	10.27**	8.12**
	(16.79)	(26.63)	(19.06)	(15.19)	(19.14)	(15.26)
DRCOUP1	–5.62**	–6.35**	24.12**	30.66**	25.72**	32.25**
	(–11.19)	(–12.45)	(5.01)	(6.54)	(5.34)	(6.88)
DRCOUP2	–4.92**	–5.29**	11.93**	14.94**	13.85**	16.87**
	(–10.64)	(–11.21)	(2.71)	(3.49)	(3.14)	(3.94)
FNMA	4.78**	4.78**	4.78**	4.78**	7.42**	7.42**
	(12.94)	(12.66)	(12.79)	(13.14)	(10.18)	(10.46)
DRCOUP1 x Vol			–4.76**	–5.65**	–4.76**	–5.66**
			(–6.37)	(–7.79)	(–6.40)	(–7.82)
DRCOUP2 x Vol			–2.71**	–3.12**	–2.71**	–3.12**
			(–3.95)	(–4.68)	(–3.97)	(–4.70)
DRCOUP1 x FNMA					–3.19**	–3.19**
					(–3.23)	(–3.32)
DRCOUP2 x FNMA					–3.85	–3.85
					(–4.16)	(–4.28)
Adjusted R^2	0.5805	0.5613	0.5700	0.5930	0.5737	0.5966

T-statistics are reported in parentheses. **denotes significance at the 1% level, and * denotes significance at the 5% level.

ENDNOTE

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