

Correlation Report 11/30/11

Primary Mortgage Rate Modeling



Primary Mortgage Rate

Predicted Variable: 30Y FHLMC Primary Mortgage Rate Survey Weekly Change*

Data Period	MTGEFNCL CC Δ		10Y Swap Δ		10Y Tsy Δ	
	R ²	SE	R ²	SE	R ²	SE
1Y	0.80	3.8	0.70	4.6	0.65	5.0
3Y	0.61	6.0	0.49	6.9	0.46	7.1
10Y	0.60	6.9	0.54	7.4	0.50	7.7

* All Data From Bloomberg; For Comparison to PMMS, CC Lagged 2 Days

Predicted Variable: 15Y FHLMC Primary Mortgage Rate Survey Weekly Change*

Data Period	MTGEFNCL Δ		7Y Swap Δ		5Y Tsy Δ	
	R ²	SE	R ²	SE	R ²	SE
1Y	0.65	4.4	0.71	4.0	0.69	4.2
3Y	0.55	5.6	0.41	6.4	0.45	6.2
10Y	0.56	7.3	0.55	7.4	0.51	7.7

* All Data From Bloomberg; For Comparison to PMMS, CC Lagged 2 Days

Primary-Secondary Spread

Predicted Variable: 30Y FHLMC Primary Mortgage Rate Survey Spread to CC*

Data Period	Coefficient	Constant (bp)	R ²	SE (bp)
3M	(0.29)	184	0.38	4.3
1Y	(0.30)	185	0.88	5.1
3Y	(0.22)	164	0.31	14.4

$Y = mx + b$

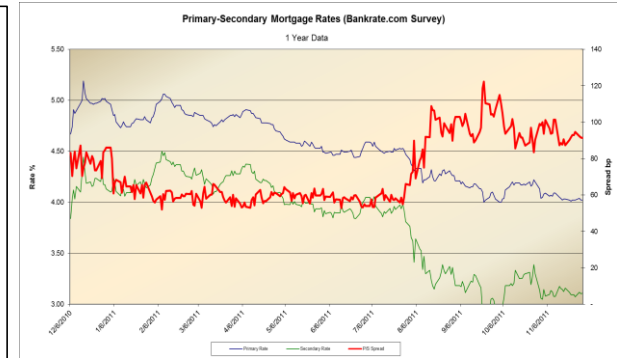
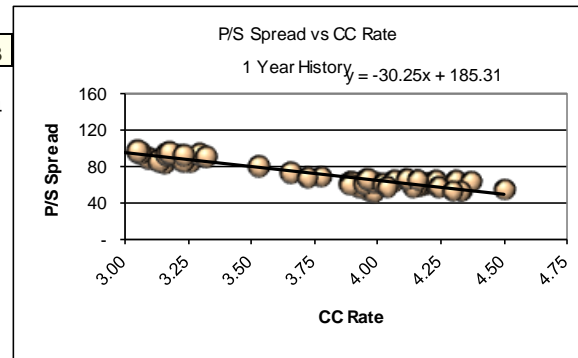
$Y = \text{Primary-Secondary Spread}$

$x = \text{CC Yield}$

$b = \text{Constant}$

* All Data From Bloomberg, CC Lagged 2 Days

The Current Coupon yields exhibit the closest relationship to the primary mortgage rates – opportunities available to the customer; Appropriate swap rates next best



Primary/Secondary spread widens .3bp for every 1bp decline in CC rate level over last three months, more than double the long-term relationship

Primary-Secondary is drifting lower, consistent with historical experience; Usually, competitive pressures eventually drive p/s spreads back towards historical norms

•Mortgage TBAs (constitute the Current Coupon) maintain the strongest relationship with retail (primary) mortgage rates even in the most recent rally, and despite their convexity

•Primary-Secondary spread directionality has declined significantly as yields have stabilized; This continues the historically observed relationship as spreads widen significantly in a large rally and then revert to a 1:4 to 1:5 directionality relationship

Questions: Greg Harris
(303) 633 4724

Correlation Report 11/30/11

Current Coupon Mortgage Rate Modeling



Secondary Mortgage Rate

Predicted Variable: 30Y Current Coupon Rate Daily Change*

Data Period	10Y Swap Δ		10Y OTR Tsy Δ		TY1 Δ	
	R ²	SE	R ²	SE	R ²	SE
1Y	0.84	2.8	0.79	3.1	0.61	4.2
3Y	0.65	5.0	0.62	5.2	0.50	5.9
10Y	0.72	4.0	0.67	4.3	0.51	5.4

Predicted Variable: 30Y Current Coupon Weekly Change*

Data Period	10Y Swap Δ		10Y OTR Tsy Δ		TY1 Δ	
	R ²	SE	R ²	SE	R ²	SE
1Y	0.88	4.4	0.86	4.8	0.70	7.0
3Y	0.77	7.6	0.66	9.1	0.61	9.8
10Y	0.81	6.3	0.72	7.7	0.56	9.5

* All Data From Bloomberg

10y swaps exhibit stronger correlation with 30y CC rates than 10y OTR Treasuries or the yield on the 10y Treasury note futures contract

Predicted Variable: 15Y Current Coupon Rate Daily Change*

Data Period	7Y Swap Δ		5Y OTR Tsy Δ		FV1 Δ	
	R ²	SE	R ²	SE	R ²	SE
1Y	0.70	4.0	0.65	4.2	0.47	5.2
3Y	0.55	5.3	0.50	5.6	0.40	6.2
10Y	0.61	4.8	0.59	5.0	0.42	5.8

Predicted Variable: 15Y Current Coupon Weekly Change*

Data Period	7Y Swap Δ		5Y OTR Tsy Δ		FV1 Δ	
	R ²	SE	R ²	SE	R ²	SE
1Y	0.76	6.5	0.74	6.7	0.64	7.9
3Y	0.69	7.8	0.63	8.4	0.48	10.1
10Y	0.80	6.6	0.68	8.3	0.51	9.8

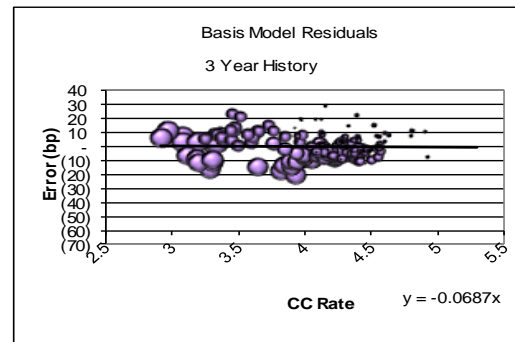
7y swaps exhibit stronger correlation with 15y CC rates than 5y OTR Treasuries or the yield on the 5y Treasury futures contract

Mortgage 30Y CC Rate Model

(weekly series)

$$Y = m_1x_1 + m_2x_2 + m_3x_3 + m_4x_4 + b$$

Definiton	Constant	Coefficient	R ²	SE
Y = CC Yield			0.94	11
b = Constant	1.76			
x ₁ = 10Y swap yield		0.62		
x ₂ = 2y swap yield		0.22		
x ₃ = 6m5y swaption normalized vol		0.01		
x ₄ = 2y10y swaption normalized vol		(0.01)		



•Mortgage CC modeled vs multiple swap curve inputs as well as short and long expiry options

- 10Y swap by far the key driver of mortgage CC, 2Y adds to ability to project; Sum of coefficients .84
- Neither long nor short expiry normalized vol a key driver of CC yields

Questions: Greg Harris
(303) 633 4724

Correlation Report 11/30/11

Mortgage Mean Reversion Update



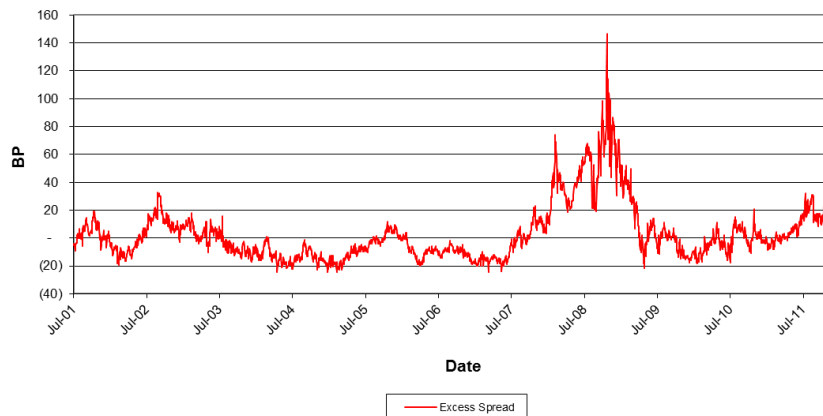
Mean Mortgage Spread History (bps)

Spread Relationship	Maximum				
	Data* (1993)	Last 10 Years	Last 5 Years	Last 3 Years	Last 1 Year
30Y CC Minus 10Y swap	68	76	84	80	81
30Y CC LIBOR OAS	7	8	19	29	34

Spread Relationship	Maximum				
	Data* (1993)	Last 10 Years	Last 5 Years	Last 3 Years	Last 1 Year
15Y CC Minus 7Y swap	41	48	57	53	50
15Y CC LIBOR OAS	12	16	27	41	36

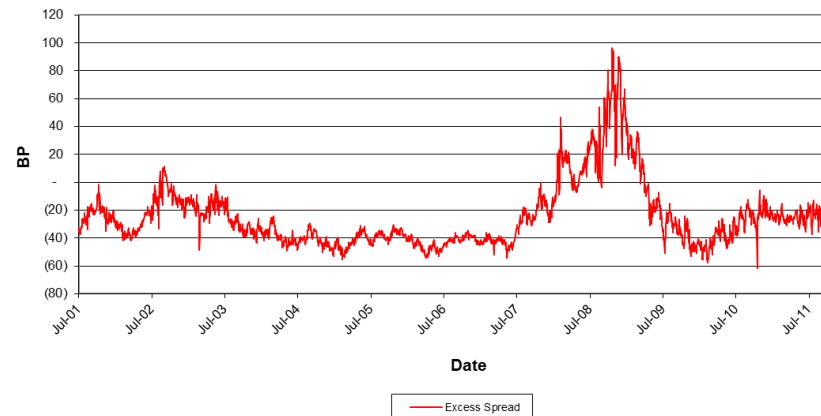
- Current coupon spreads to 10y and 7y swaps exhibit remarkable consistency over time (tables on the left)
- Graphs below plot positive or negative “excess” spreads, defined as current spreads relative to long-term mean levels

30Y CC Excess Spread



Bloomberg data

15Y CC Excess Spread



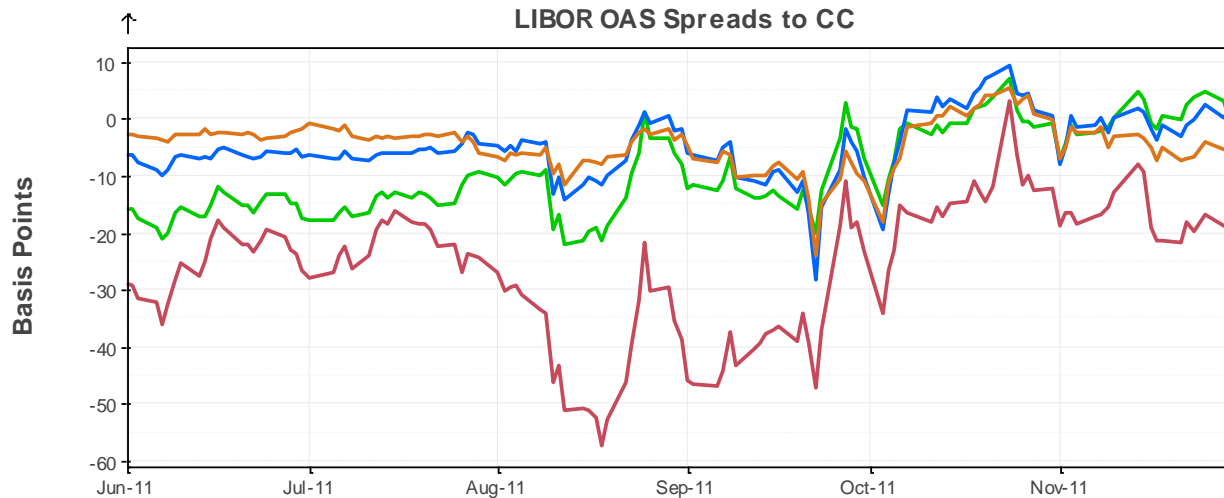
Bloomberg data

- 30y CC spreads a few bp wide to historical averages, 15y a few bp narrow to historical averages
- Mean-reversion tendency continues to be very strong

Questions: Greg Harris
(303) 633 4724

Correlation Report 11/30/11

Inter-Coupon Passthru Spreads



Key	Axis	Name	Last	Minimum	Maximum	Mean	SD	SD Change
—	Left	LIBOR OAS Spread 5.5s to CC	-17.094	-57.506	3.024	-26.019	11.524	4.598
—	Left	LIBOR OAS Spread 5.0s to CC	-0.351	-21.926	7.033	-9.235	7.457	2.913
—	Left	LIBOR OAS Spread 4.5s to CC	1.942	-28.323	9.403	-4.867	5.533	3.072
—	Left	LIBOR OAS Spread 4.0s to CC	-4.507	-23.963	5.333	-4.547	4.252	2.331

Barclays Live

- Up-in-coupon widened on initial news of HARP II, has since stabilized and begun to narrow
- Inter-coupon volatility remains relatively low

Questions: Greg Harris
(303) 633 4724