



# Debt Funding Update

November 3, 2003

## Bond Market Launches New Callable Pricing Guidelines

### Introduction:

In an effort to improve transparency and liquidity in the callable debt market, Freddie Mac participated in the Callable Agency Taskforce, which was formed by the U.S.-based Bond Markets Association (BMA), representing dealers, investors, brokers, vendors and issuers. The result of those efforts was the November 3<sup>rd</sup> launch of standard guidelines for pricing and trading of callable debt issued by Government Sponsored Enterprises (GSEs). The guidelines are intended for use by market participants in order to promote the smooth functioning of the secondary market for GSE callable securities. Improvements provided by the new guidelines include issuer specific curves, updated volatility levels and skew adjustments.

The new guidelines apply to securities issued by the GSEs that meet the following requirements:

- The security's issue size is at least \$1 billion.
- The security is callable one time only (European call) at Par.
- The call date is a coupon payment date.
- The security's call notification date is no more than 10 business days prior to the call date.
- The call notification date for the security has not yet occurred.
- A designated bullet yield curve, base volatility and skew adjusted volatility are each generally available to market participants for such securities.

All currently outstanding Freddie Mac's Syndicated Callable securities with a European style call (table) will be traded by market participants according to the new guidelines.

CUSIP	Coupon	Maturity	Call Date	Amount Outstanding
3128X1C21	3.125%	08/25/2006	08/25/2004	\$1,500,000,000
3128X15Y9	2.875%	11/03/2006	11/03/2004	\$2,000,000,000
312925A34	4.500%	07/23/2007	07/23/2004	\$2,500,000,000
3128X0FB0	4.000%	10/29/2007	10/29/2004	\$2,000,000,000
3128X0L31	3.250%	02/25/2008	02/25/2005	\$2,000,000,000
3128X03N7	3.500%	04/01/2008	04/01/2005	\$2,000,000,000
312925JK7	5.750%	04/29/2009	04/29/2004	\$1,433,000,000
3128X0B40	4.375%	02/04/2010	02/04/2005	\$1,900,000,000
312925QA1	6.000%	05/25/2012	05/25/2004	\$1,775,000,000
312925W71	5.125%	08/20/2012	08/20/2004	\$3,000,000,000
3128X0BD0	4.750%	10/11/2012	10/11/2005	\$3,395,000,000
3128X1KG1	4.000%	06/12/2013	06/12/2006	\$2,500,000,000

In addition, Freddie Mac will apply the new guidelines when pricing future syndicated callable offerings.

### What is the BMA model and what does it do?:

The new BMA model sets guidelines for calculating a price for European-style callable notes, and it allows users to calculate an option adjusted spread of a callable note to the underlying bullet curve of a specific issuer. The model's inputs include the underlying bullet curve (supplied by Agency dealers) and volatility (derived from the option-based derivatives market).

The model is a lognormal skew adjusted calculator, based on Black's continuous time model. It computes the value of a call option as the residual between the discounted present value of a bullet bond and the market price of the callable bond. To employ this valuation technique the model assumes that the forward par yields are log-normally distributed and also adjusts the volatility input by a skew-adjustment factor to compensate for the varying swaption volatility levels for different option strikes.

Freddie Mac's European style Syndicated callable notes will be priced at an Agency Option Adjusted Spread (referred to as Agency OAS or AOAS) to the Freddie Mac Reference curve, which is available via numerous pricing vendors. A detailed description of the BMA pricing model can be found on the Bond Market Association's website at [www.bondmarkets.com/market/government.shtml](http://www.bondmarkets.com/market/government.shtml)

### Advantages:

*Liquidity and uniformity:* The new guidelines will promote greater market efficiency as a result of the broad application and common adherence to uniform standards. Freddie Mac will support the new standard by pricing new issues of European style syndicated callable notes according to the guidelines.

*Volatility input:* Valuing eligible securities under the new guidelines by using pricing vendors such as TradeWeb and Bloomberg automatically uses the market volatility levels from a swaption matrix (provided by pricing vendors such as Tullett&Tokyo) most relevant to the structure being valued; furthermore, the volatility level is adjusted by a skew factor (described in detail in the BMA guidelines) to compensate for varying swaption volatility levels at different strike prices. For example, if valuing a 3-year non-call 1-year European-style callable note, the most relevant volatility input is the implied volatility of a 1-year option on a 2-year interest rate swap, which is automatically loaded from the swaption matrix into the BMA calculator. This volatility is further adjusted by a skew factor, as the security's coupon is usually not the same as the forward rate.

*Issuer specific underlying curves:* According to the new guidelines, callable notes are valued at an option-adjusted spread to the underlying bullet curve of the callable note's issuer. The Freddie Mac Reference curve (called FHLMC on TradeWeb and I267 on Bloomberg) is the default underlying bullet curve for valuing Freddie Mac European callable securities; however, it can also be used to price other Agency European style callable notes.

*Multiple pricing vendors:* There are a number of pricing vendors that provide platforms for the BMA model for valuing eligible European callable notes using issuer specific bullet curves, including TradeWeb, Bloomberg and BrokerTec.

### Applicability:

By construct, this model is applicable to pricing only European style callable notes because it makes an assumption about the distribution of rates at the option expiration date. This assumption makes it difficult to value Bermudan- or American-style callable notes with multiple expiration dates.

At present, the existing platforms use live input only during New York trading hours as the pricing vendors rely on direct issuer curve and volatility feeds from the dealer community in New York. Naturally, the model can be used outside of the New York trading hours using static underlying curve and volatility input. Freddie Mac is working with all participants to provide pricing capability in all time zones as a future enhancement.

### Illustration:

Depicted below are screens prints from TradeWeb, Bloomberg and BrokerTec using the BMA model to value Freddie Mac's recently issued 3-year non-call 1-year syndicated callable note. Users can select this security (CUSIP: 3128X15Y9) or any other eligible security and automatically obtain the appropriate Agency's maturity adjusted underlying reference curve, skew-adjusted mid-market swaption volatility pertaining to the callable structure, and the market price on the pricing screen. Users can then solve for Agency OAS given the price, or solve for price given a specific Agency OAS level.

To arrive at the TradeWeb screen depicted below (Picture 1):

1. Click on the "Agcy" tab at the bottom of the main screen
2. Click on the "Callable" tab
3. Click on the (bid or offer side) OAS for FHLMC 2.875 11/06-04

To arrive at the Bloomberg screen depicted below (Picture 2):

1. Type: FHLMC 2.875 11/04 <Corp> AOAS <Go>

On the BrokerTec inter-dealer application, the bid/offer columns represent the Agency OAS level inputted by traders. The OAP bid / OAP Offer columns represent the live, updated prices for the Agency OAS based on the respective agency curve and the appropriate swaption volatility number. BrokerTec employs a timer mechanism in the upper right corner of the trading page communicating to traders when the agency curve and swaption volatility will be polled for updates. These updates occur several times each minute. Callable Agency trade prices are captured and weighted automatically against swap legs with all data points sent to all callable traders post trade initiation.

### Additional information:

Freddie Mac is pleased to introduce the new Agency Callable Pricing Guidelines, and we look forward to the increased transparency and liquidity that these guidelines are expected to contribute to the market. If you have any questions regarding pricing of callable notes, please contact any major securities dealer, the Bond Market Association or our Debt Investor Hotline at 1-888-882-6275 or via email at [debt\\_securities@freddiemac.com](mailto:debt_securities@freddiemac.com). You may also contact pricing vendors at the following numbers: Bloomberg – Brian Devers at (212) 893-4851; TradeWeb – Peter Pujols at (201) 536-6556; and BrokerTec – Steve Cooper at (201) 209-7868.

Definitions:

*Lognormal Volatility:* Percentage Volatility is constant with regard to yield levels i.e. a 10% constant volatility at 7.00% yield is 70bps but only 50bps at 5.00% yield.

*Skew:* Percentage Volatility is negatively correlated with yield levels or option strike levels i.e. the percentage volatility is lower at high rate levels than at low rate levels. To illustrate application of Skew: As the coupon of a callable security is typically lower than the forward Agency rate at option expiration date, the skew factor is an incremental adjustment upwards to the percentage volatility level to more accurately value the embedded option.

*European option:* Exercisable only on one pre-specified date – the expiration date of option.

*Bermudan option:* Exercisable discretely on pre-specified dates after the initial lockout period.

*American option:* Exercisable any time after the initial lockout period.

**Picture 1 - TradeWeb Screen**

TradeWeb v5.40L5 (245632) (FREDDIE MAC (PORT.))

File Bookmark Composite Dealers Analytics SecList Msg Admin Windows Help

FHLMC 2.875 11/06-04 1Sec ?

Tkt Calc OAS Sens Hor COC HVol SDesc Chart OAS AXEit

Agency Benchmark OAS

Calculate OAS Price dec OAS Vol\*  
Settlement 11/06/2003 - + 99.65300 0.5 40.61

Buy Tkt Sell Tkt

Ref. Curve

FR20031105195300

FHLMC REFRESH

Date 11/05/2003  
Time 14:53:0

Shift 1 Up Dn (bp)

	Yield	Adjust
3m	1.1010	0.00
6m	1.1550	1.30
1yr	1.4330	0.00
2yr	2.1820	-1.90
3yr	2.6690	12.70
4yr	3.2160	6.40
5yr	3.6430	5.40
7yr	4.2800	3.60
10yr	4.8670	-0.30
30yr	5.7170	5.20

Spread vs T 1 5/8 10/31/05 2 FHLMC 2.750 08/15/04

	To Call	Ref@99.414	To Maturity	Ref@100.195
Yield	3.2332	1.9274	2.9971	2.6757
Spread	130.5800	.0000	32.1400	.0000
Mod. Dur.	0.9690	1.9410	2.8450	2.6400
Risk	0.9660	1.9300	2.8350	2.6610
Convexity	1.4190	4.7540	9.6690	8.4410

Synthetic Save Delete \*Swaption Volatilities provided by Tullett SwapMarker

10:40 Customer Relations, TradeWeb>Freddie Mac 10nc2 Priced at -2 AOAS<more>

Mem Copy Arty MBS OP ADM Tkt Blot Book Mkt Perf Calc

Picture 2 - Bloomberg Screen (AOAS)

<HELP> for explanation. P060 Corp AOAS

### AGENCY OPTION-ADJUSTED SPREAD

FREDDIE MAC FHLMC 2 7/8 11/06 99.6500/99.9000 (3.00/2.91) BGN @14:00

Calculate Price OAS (bp) Fwd ATM Skew Adj  
 (P,O,V)  P) 99.65300 0) + .6 Strike Vol Vol  
 Use Skew Adj Vol  Y

Cusip / ID# 3128X15Y9 Option Px Value: 0.58  
 Settle 11/ 6/2003  
 Spread 65.2bp vs 3Y T 2 3/8 08/15/06 Govt @100-2+ ( 2.345)

2 <GO> Customize  
 Curve 1267 Semi  
 BMA-FHLMC REFEREN  
 A 11/ 5/2003  
 Shift +0 (bps)  
 Yield Adjust

3m	1.190	-7.9
6m	1.254	-8.5
1y	1.522	-7.0
2y	2.180	-1.8
3y	2.667	12.8
4y	3.215	6.4
5y	3.644	5.4
7y	4.281	3.6
10y	4.866	-0.3
20y	5.292	2.5
30y	5.719	5.3

BLOOMBERG  
 AGENCY COMPOSITE  
 MID YIELDS  
 SEE AGPX<GO>

(NUM)<GO> for:  
 0) Call Schedule  
 1) 11/ 3/ 4 100.00

OAS Method	Option Free	To Call on 11/ 3/2004	To Mty
Yld	2.795	3.233	2.997
Sprd	0.3	178.4	20.6
M Dur	2.52	0.97	2.84
Risk	2.52	0.97	2.84
Cnvx	-0.26	0.01	0.10

Model  S S=Black Swaption

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 920410  
 Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2003 Bloomberg L.P.  
 0944-730-3 05-Nov-03 14:53:53

Picture 3 - BrokerTec Screen

BrokerTec (TEST) - SCOOPER (BURAIDR SCO) - SCOOPER [ scooper]

8/8/03 07:AM [AOAS] XMC 4.000 06/13\_10M OA price 92.0971, Hedge MC 10Y 4.1/2.0713 87.802

BENCHMARKS

Security	QSize	Bid	Offer	QSize	Last	LSize	Volume
2_YEAR	5	100.17	100.17+ 5		100.17	1	127
3_YEAR	5	100.07+	100.00 5		99.27		
5_YEAR	5	99.266	99.272 5		99.28+	1	1

Stack Window [AGCY\_AOAS]

Security	OAP Bid	Bid	Offer	OAP Offer	QSize	LSize	Last	Volume
XFN 2.875 03/06_2Y	99.5207	9.50	7.00	99.5696	5	5		
XFN 2.750 08/06_2Y			5.00	99.8014	5	20	5 5.00	5
XFN 5.000 01/07_2Y	101.3037	20.00	18.00	101.3135	5	11		
XMC 4.000 10/07_5M			11.00	100.9003	5	5		
XFN 3.500 10/07_5F	99.6977	8.00			5	5		
XMC 3.250 02/08_5M	98.3511	5.00	3.50	98.4069	29	5		
XFN 2.875 05/08_5F	96.5092	3.50	2.50	96.5494	14	7		
XFN 6.000 01/12_10F	103.6508	11.00			76	5	12 11.00	12
XFN 6.250 03/12_10F	104.5692	14.50	14.00	104.5892	5	10		
XMC 6.000 05/12_10M	102.1173	12.50			5	5		
XFN 5.500 07/12_10F	101.9153	8.50			16	5	6 8.50	6
XMC 5.125 08/12_10M			5.50	99.583	5	5		
XFN 4.750 02/13_10F	97.5305	4.00			27	5		
XMC 4.000 06/13_10M	92.063	TAK	-0.50	92.0971	5	42	58 -0.50	
XFN 4.375 07/13_10F	94.9287	-3.00			5	5	5 -3.00	5

XFN 2.875 05/08\_5F  
 Yield 3.50 Size 5 Hidden 0 Type FaS  
 Leave Order Only Best Custom Delete Delete All My Orders  
 BID SELL Delete Bid 5 10 25 50 100 Clear  
 Deleta Offer OFFER BUY  
 Bought 58 XMC 4.000 06/13\_10M @ 0.50

Log Book

Time	Security	QSize	QSize	TPrice	P/A	ISIN/CUSIP	Settlement
8:43:12 AM	FN_10Y_4_3/8_03/13		4.80	96.162	A	31359HRG0	9/10/03
8:43:12 AM	FN7/13_10F_INDIC	5		94.7712	A	31359HSL8	9/10/03
8:43:11 AM	XFN 4.375 07/13_10F	5		-3.00	A	31359HSL8	9/10/03
8:17:50 AM	FN_10Y_4_3/8_03/13		4.50	96.111	A	31359HRG0	9/10/03
8:17:50 AM	FN7/12_10F_INDIC	6		101.6944	A	31359HSL8	9/10/03
8:17:49 AM	XFN 5.500 07/12_10F	6		8.50	A	31359HSL8	9/10/03
8:17:30 AM	FN_10Y_4_3/8_03/13		6.70	96.107	A	31359HRG0	9/10/03

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