



# Simplified Hedging

**STRATEGIES & OPPORTUNITIES IN LIGHT OF NEW RULES**

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# Simplified Hedging

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## **FIRST**

A quick reminder of the basics

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## **THEN**

A brief overview of the new rules in this area

3

## **FINALLY**

Ryan's usual brilliant risk management strategies you may not have thought of



# The Brief Refresher

- Oversimplified definition – A derivative is a contract that derives its value from something else (e.g., changes in interest rates)
- Derivatives are marked to market on the balance sheet
- The offset goes through earnings unless hedge accounting is applied



# The Brief Refresher

## TYPES OF HEDGES

- **Fair value hedge**
  - Protects the institution against changes in the fair value of a recognized item or commitment, e.g., a fixed-to-variable swap hedging a fixed-rate loan portfolio
  - Hedged item is also marked-to-market through earnings, offsetting the effect of the derivative MTM adjustment
- **Cash flow hedge**
  - Protects the institution against variability in future cash flows, e.g., a variable-to-fixed swap hedging variable-rate debt
  - The offset to the derivative's MTM adjustment goes through other comprehensive income rather than earnings
- **Foreign currency hedge**



## SOME OF THE Restrictions

- Must fully document the hedge at inception
- Must be highly effective, at inception and throughout term
  - Ineffectiveness is run through earnings
  - Quarterly effectiveness testing can be complex
- For interest-rate-risk hedges, must hedge either “benchmark” rate or total change in fair value/cash flows
- For fair value hedges, the method of determining changes in fair value of the hedged item make effectiveness testing complex/problematic (especially if the hedged item is prepayable)



## THE IMPROVEMENTS

- Cash flow hedges – can designate change in contractual rate as the hedged risk
- Fair value hedges
  - SIFMA rate added to list of benchmark rates
  - Can designate benchmark rate component of contractual cash flows at inception as the hedged risk
- For prepayable hedged items
  - Can limit consideration of effect of prepayment feature on fair value to likelihood of prepayment based on changes in the benchmark rate
  - If you can identify a portion of the portfolio that isn't expected to have prepayments or defaults, can designate that portion as the hedged item
- Partial-term hedges are easier to achieve



## MORE IMPROVEMENTS

- Cash flow hedges - if highly effective, entire MTM adjustment related to hedged risk is run through OCI
- Effectiveness testing
  - Initial – can be done at end of quarter, but use data available at date of inception
  - Ongoing - can be qualitative, as long as you can support it
- “Critical terms match” method – timing of cash flows related to the derivative and the hedged item is considered to match if within 31 days of each other



# Other Changes

- Income statement effect of derivative and hedged item must be in the same **income statement line**
- When **shortcut method** used, should identify which quantitative effectiveness testing method you will use if shortcut method fails in the future; can then retain hedge accounting if that happens, as long as still highly effective under quantitative method
- More **robust disclosures** that help users understand the effect of hedging and where those effects are reported in the financial statements
- Amounts excluded from hedge accounting (e.g., initial payment for an option or for a derivative that isn't at the market at inception) – can elect to classify in OCI and amortize, or recognize in earnings immediately



## *New Hedge Accounting Rule Changes*

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# ~~Potential~~ Hedge Accounting Changes = Greater Ease of Hedging

- On September 8, 2016, the FASB issued the exposure draft “Derivatives and Hedging – Targeted Improvements to Accounting for Hedging Activities”, with comments due November 22, 2016.

- On June 7, 2017, the FASB voted to issue the final standard in August of 2017.

- **Final standard released on August 28, 2017.**

- “The new standard will take effect for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018, for public companies and for fiscal years beginning after December 15, 2019 (and interim periods for fiscal years beginning after December 15, 2020), for private companies. ***Early adoption will be permitted in any interim period or fiscal years before the effective date of the standard.***”<sup>1</sup>

## Timeline of Recent FASB Board Meetings

\*March 22, 2017

Board Meeting—Decisions regarding cross currency basis spreads and the recognition of amounts excluded from assessments of effectiveness

March 8, 2017

Board Meeting—Decisions regarding the market yield test for use of benchmark coupon cash flows and the “last of layer” approach for fair value hedges of interest rate risk of prepayable instruments.

February 15, 2017

Board Meeting—Decisions regarding returning to qualitative assessments of hedge effectiveness after performing a quantitative assessment of hedge effectiveness and changes to the requirements for private company hedge documentation.

January 25, 2017

Board Meeting—Discussion about the feedback received on September 8, 2016 proposed Accounting Standards Update, and discuss items for affirmation and potential items for redeliberation based on the feedback received on the proposed Update.

# Decisions Reached on Fair Value Hedges of Interest Rate Risk

## Hedges of Callable Debt

- For prepayable financial instruments, an entity may consider only how changes in the benchmark interest rate affect a decision to settle a debt instrument before its scheduled maturity in calculating the change in the fair value of the hedged item attributable to interest rate risk

## Partial Term Fair Value Hedges

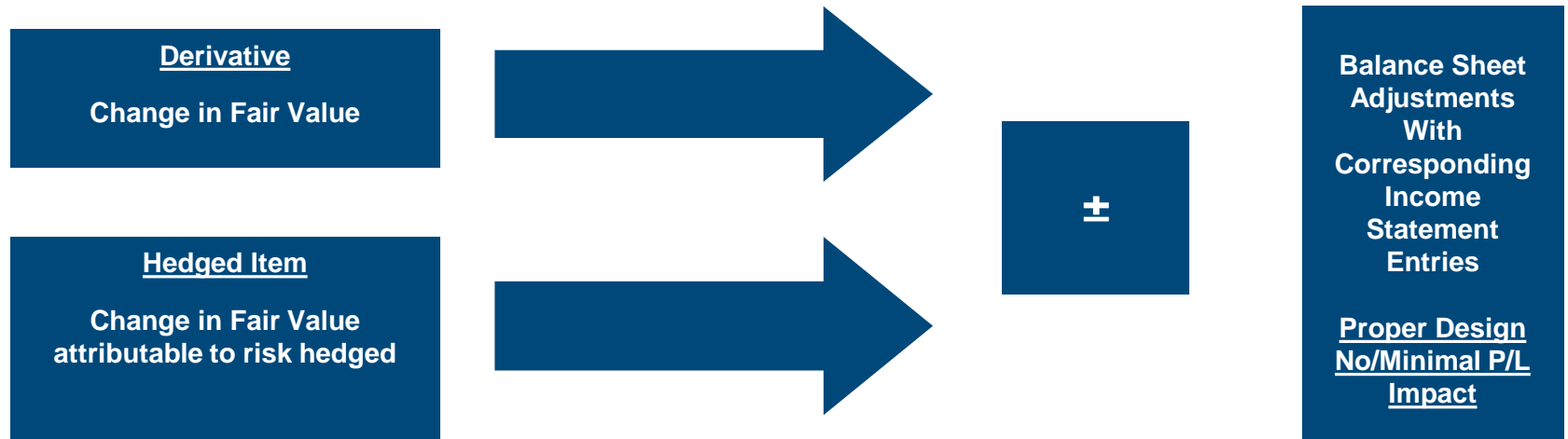
- An entity may measure the hedged item in a partial-term fair value hedge of interest rate risk by assuming the hedged item has a term that reflects only the designated cash flows being hedged

## “Last of Layer” Approach for Fair Value Hedges of IRR of Prepayable Assets

- The last of layer approach would allow an entity to designate as the hedged item the last dollar amount of either a prepayable asset or a closed portfolio of prepayable assets.
- An entity would be able to assume that if prepayments occur, they are first applicable to the portion of the prepayable asset or to a closed portfolio of prepayable assets that is not part of the designated hedged layer.
- On each hedge effectiveness assessment date, an entity would use its expected performance of the asset(s) to determine if the amount remaining at hedge maturity is still expected to exceed or be equal to the last of layer.
- In combination with the Board’s previous decisions on partial term and benchmark coupon cash flow designations, an entity also would be able to apply the “similar assets” test to the closed portfolio qualitatively and only at inception of the hedging relationship.

# Fair Value Hedge

- Used to reduce exposure from changes in asset/liability fair value due to changes in specified risk
- Hedges fixed rate instrument
- Hedging instrument always required to be measured at fair value
- Adjustment to periodic carrying value of hedged item recognized in P&L
- Easy to remember: alters a fixed rate instrument to floating



## *Swapped Callable Brokered CD Funding*

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## Example: Brokered CD Issuance Swapped to Float

- Note the relationship between sub Libor funding and the level of volatility in the market.
- The graph below highlights the swaption normal volatility for an at-the-money European 1 year Term, 5 year Tenor fixed/float instrument. We've highlighted the respective dates on the following slide.



- As volatility elevates, opportunities will arise leading to significant sub Libor funding by issuing callable brokered CDs (own the option) and swapping to float (with corresponding mirror image option sold).

(1) Source: Bloomberg

## Example: Brokered CD Issuance Swapped to Float

- The grid below illustrates the process of swapping fixed rate callable brokered CD issuances to floating with an interest rate swap. For debentures with embedded call options, the option is mirrored within the swap.
- This sub 1 Mo LIBOR funding is relatively attractive when contrasted to other sources of wholesale funding, especially when one considers that this funding instrument would not require collateralization.
- Below, we illustrate swapping 5 yr non-call 1 yr brokered CD issuance to floating:

Full Term Hedge of Callable Brokered CD Issuance						
Date	Structure	Tenor	Fixed Coupon	Floating Swap Rate	Annualized Brokered CD Issuance Fee	Net Funding Cost
5/30/2017	5nc1	5Y	ATM	1 Mo LIBOR - 0.02%	0.14%	1 Mo LIBOR + 0.12%
2/7/2017	5nc1	5Y	ATM	1 Mo LIBOR - 0.15%	0.14%	1 Mo LIBOR – 0.01%
12/15/2016	5nc1	5Y	ATM	1 Mo LIBOR - 0.30%	0.14%	1 Mo LIBOR – 0.16%

- Given that the hedge accounting rule changes will allow an entity to focus on changes in the value of a prepay option solely as it relates to changes in the designated benchmark interest rate, this will provide the ability to create the funding structure illustrated above with clean hedge accounting.
- Note: since brokered CD issuances include a death put, one must be mindful of the impact of death puts over the passage of time.

## *Partial Term Hedging*

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# Partial Term Fair Value Hedge: Application of Relevant Language

**815-20-25-12** An asset or a liability is eligible for designation as a hedged item in a fair value hedge if all of the following additional criteria are met:

- a. The hedged item is specifically identified as either all or a specific portion of a recognized asset or liability or of an unrecognized firm commitment.
- b. The hedged item is a single asset or liability (or a specific portion thereof) or is a portfolio of similar assets or a portfolio of similar liabilities (or a specific portion thereof), in which circumstance:

1. If similar assets or similar liabilities are aggregated and hedged as a portfolio, the individual assets or individual liabilities shall share the risk exposure for which they are designated as being hedged. The change in fair value attributable to the hedged risk for each individual item in a hedged portfolio shall be expected to respond in a generally proportionate manner to the overall change in fair value of the aggregate portfolio attributable to the hedged risk. See the discussion beginning in paragraph 815-20-55-14 for related implementation guidance. An entity may use different stratification criteria for the purposes of Topic 860 impairment testing and for the purposes of grouping similar assets to be designated as a hedged portfolio in a fair value hedge.

2. If the hedged item is a specific portion of an asset or liability (or of a portfolio of similar assets or a portfolio of similar liabilities), the hedged item is one of the following:

- i. A percentage of the entire asset or liability (or of the entire portfolio). An entity shall not express the hedged item as multiple percentages of a recognized asset or liability and then retroactively determine the hedged item based on an independent matrix of those multiple percentages and the actual scenario that occurred during the period for which hedge effectiveness is being assessed.

- ii. One or more selected contractual cash flows, including one or more individual interest payments during a selected portion of the term of a debt instrument (such as the portion of the asset or liability representing the present value of the interest payments in any consecutive two years of a four-year debt instrument). Paragraph 815-25-35-13B discusses the measurement of the hedged item in hedges of interest rate risk**

- iii. A put option or call option (including an interest rate cap or price cap or an interest rate floor or price floor) embedded in an existing asset or liability that is not an embedded derivative accounted for separately pursuant to paragraph 815-15-25-1.

- iv. The residual value in a lessor's net investment in a direct financing or sales-type lease.

# Partial Term Fair Value Hedge: Application of Relevant Language

ii. One or more selected contractual cash flows, including one or more individual interest payments during a selected portion of the term of a debt instrument (such as the portion of the asset or liability representing the present value of the interest payments in any consecutive two years of a four-year debt instrument). Paragraph **815-25-35-13B** discusses the measurement of the hedged item in hedges of interest rate risk

## Partial-Term Hedges of Interest Rate Risk

**815-25-35-13B** For a fair value hedge of interest rate risk in which the hedged item is designated as selected contractual cash flows in accordance with paragraph 815-20-25-12(b)(2)(ii), **an entity may measure the change in the fair value of the hedged item attributable to interest rate risk using an assumed term that begins with the first hedged cash flow and ends with the last hedged cash flow. The assumed maturity of the hedged item occurs on the date in which the last hedged cash flow is due and payable.**

Description	Notional	Fixed Rate	Maturity Date
10yr sub debt issuance	25,000	5.50%	4/30/2027

### Hedging Strategy: Partial-Term Hedge of Sub Debt Issuance (Fair Value Hedge)

Hedged Item				
Description	Notional	Fixed Rate	Hedged Risk	Assumed Maturity Date
10yr sub debt issuance (first 5yrs)	25,000	1.99%	1 Mo LIBOR	7/7/2022

Fair Value Change (Up 200)
2,263,598

Hedge Instrument				
Description	Notional	Fixed Rate	Floating Leg	Maturity Date
5yr rec fixed/pay float swap	25,000	1.99%	1 Mo LIBOR	7/7/2022

Fair Value Change (Up 200)
(2,263,598)

### Hedging Strategy: Results

Description	Notional	Fixed Rate	Floating Rate	Difference
Partial Term Hedge of Sub Debt (First 5yrs)	25,000	1.99%	1.23%	-0.76%

Note: The hedge accounting rule changes also permit an entity to measure the change in fair value of the hedged item on the basis of the benchmark rate component of the contractual coupon cash flows determined at hedge inception, rather than on the full contractual coupon cash flows as required by current GAAP.

## *Last Layer Approach: Swapping Mortgage Pools*

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## Last of Layer Approach: Application of Relevant Language

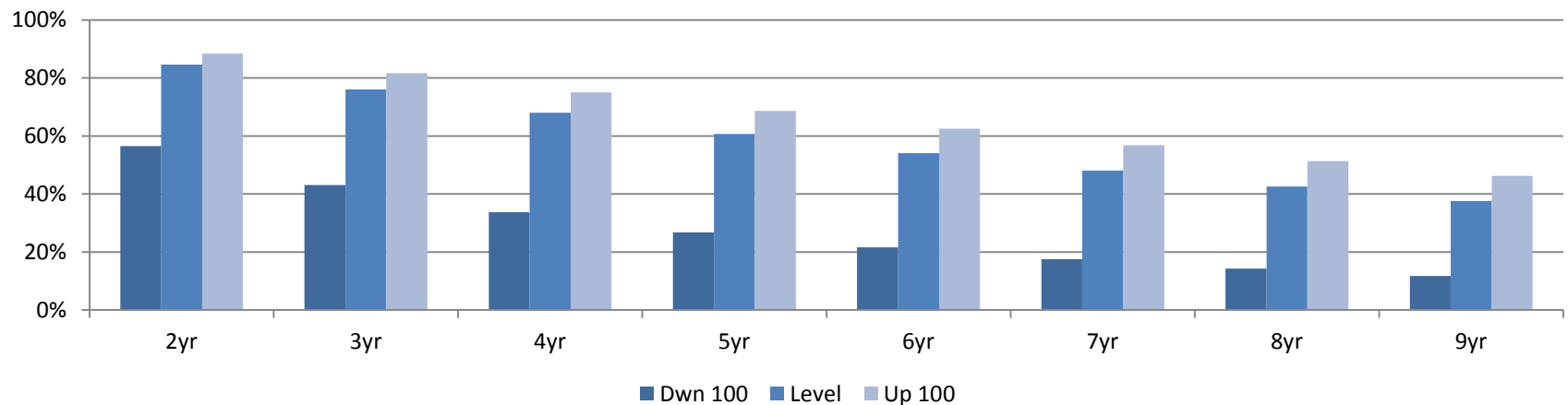
**815-20-25-12A** For a closed portfolio of **prepayable** financial assets or one or more beneficial interests secured by a portfolio of prepayable financial instruments, an entity may designate as the hedged item a stated amount of the asset or assets that are not expected to be affected by prepayments, defaults, and other factors affecting the timing and amount of cash flows if the designation is made in conjunction with the partial-term hedging election in paragraph 815-20-25- 12(b)(2)(ii) (this designation is referred to throughout Topic 815 as the “last-of-layer method”).

- a. As part of the initial hedge documentation, an analysis shall be completed and documented to support the entity’s expectation that the hedged item (that is, the designated last of layer) is anticipated to be outstanding as of the hedged item’s assumed maturity date in accordance with the entity’s partial-term hedge election. That analysis shall incorporate the entity’s current expectations of prepayments, defaults, and other events affecting the timing and amount of cash flows associated with the closed portfolio of prepayable financial assets or beneficial interest(s) secured by a portfolio of prepayable financial instruments.
- b. For purposes of its analysis, the entity may assume that as prepayments, defaults, and other events affecting the timing and amount of cash flows occur, they first will be applied to the portion of the closed portfolio of prepayable financial assets or one or more beneficial interests that is not part of the hedged item (that is, the designated last of layer).

# Last of Layer Approach: Last Dollar Outstanding Analysis

- As stated in the FASB language, an analysis must be completed that supports the last dollar amount will be outstanding at the stated maturity of the hedging relationship based upon current expectations of the portfolio or collateral performance.
- The chart below illustrates the performance of a new issue 30yr 3.67% WAC 1-4 family residential fixed rate mortgage pool from down 100 to up 100 interest rate scenarios using prepayment analytics provided by The YieldBook. In practice, this analysis would be completed quarterly to serve as the hedge effectiveness testing for the associated hedge.

**Projected Remaining Balance: 30yr Fixed Rate Mortgage Pool, 3.67% WAC**



- As illustrated on the following slide, the hedge should be sized conservatively according to expected collateral performance to a given hedge maturity point

## Last of Layer Approach: \$100mm floating mortgage pool example

- Using the projected remaining balance (level rates) at each tenor on the 30yr 3% pool as detailed on the previous slide, one can construct a ~\$100mm floating rate mortgage by hedging the last layer of “sub pools” within a \$200mm 30yr residential mortgage loan pool (3.67% WAC).

Term	Level Remaining Balance	Sub Pool	Hedged %	Hedged Amount	Fixed Swap Rate	Spread vs. Mtg Coupon
Year 2	85%	30,000,000	75%	22,500,000	1.54%	2.13%
Year 3	76%	20,000,000	65%	12,929,737	1.65%	2.02%
Year 4	68%	20,000,000	60%	12,000,000	1.74%	1.93%
Year 5	61%	20,000,000	50%	10,000,000	1.83%	1.84%
Year 6	54%	20,000,000	45%	9,000,000	1.91%	1.76%
Year 7	48%	45,000,000	40%	18,000,000	1.98%	1.69%
Year 9	38%	45,000,000	35%	15,750,000	2.10%	1.57%
		200,000,000		100,179,737	1.81%	1.86%

- By spreading the ~\$100mm of swap notional across 2yr, 3yr, 4yr, 5yr, 6yr, 7yr, and 9yr swap tenors, **\$100mm of this \$200mm mortgage pool can be transformed to a floating rate of 1 Mo LIBOR + 186 bps**

# Last of Layer Approach: \$100mm floating mortgage pool example

## Yield and Effective Duration

	Base Case			Scenario Yields					Scenario Effective Duration				
	Yield	WAL	Eff. Dur.	-100	0	+100	+200	+300	-100	0	+100	+200	+300
30yr MBS	3.66	8.4	6.9	2.43	3.66	4.71	5.73	6.76	3.11	6.87	7.85	8.04	7.68
30yr MBS and Swaps	3.37	8.4	4.5	1.64	3.37	4.92	6.44	7.97	0.80	4.49	5.49	5.70	5.36
<b>Difference vs. 30yr MBS</b>	<b>-0.29</b>	<b>0.0</b>	<b>(2.4)</b>	<b>(0.79)</b>	<b>(0.29)</b>	<b>0.21</b>	<b>0.71</b>	<b>1.21</b>	<b>(2.31)</b>	<b>(2.38)</b>	<b>(2.36)</b>	<b>(2.35)</b>	<b>(2.33)</b>

## Yield and Price Change

	Base Case			Scenario Yields					Scenario Price Change				
	Yield	WAL	Eff. Dur.	-100	0	+100	+200	+300	-100	0	+100	+200	+300
30yr MBS	3.66	8.4	6.9	2.43	3.66	4.71	5.73	6.76	4.5%	0.0%	-7.2%	-14.2%	-21.0%
30yr MBS and Swaps	3.37	8.4	4.5	1.64	3.37	4.92	6.44	7.97	2.0%	0.0%	-4.9%	-9.8%	-14.5%
<b>Difference vs. 30yr MBS</b>	<b>-0.29</b>	<b>0.0</b>	<b>(2.4)</b>	<b>(0.79)</b>	<b>(0.29)</b>	<b>0.21</b>	<b>0.71</b>	<b>1.21</b>	<b>-2.5%</b>	<b>0.0%</b>	<b>2.3%</b>	<b>4.5%</b>	<b>6.5%</b>

## Total Return (1 yr and 3 yr horizon)

	Base Case		1yr TRR					3yr TRR				
	Yield	WAL	-100	0	+100	+200	+300	-100	0	+100	+200	+300
30yr MBS	3.66	8.4	6.92%	3.69%	-2.78%	-9.41%	-16.17%	3.99%	3.70%	2.21%	0.58%	-1.16%
30yr MBS and Swaps	3.37	8.4	4.05%	3.26%	-0.85%	-5.17%	-9.68%	2.82%	3.34%	2.66%	1.83%	0.89%
<b>Difference vs. 30yr MBS</b>	<b>-0.29</b>	<b>0.0</b>	<b>-2.87%</b>	<b>-0.44%</b>	<b>1.93%</b>	<b>4.24%</b>	<b>6.50%</b>	<b>-1.17%</b>	<b>-0.36%</b>	<b>0.45%</b>	<b>1.25%</b>	<b>2.05%</b>

## “Last of Layer” Approach – Forecasted Notional Incorrect

- The final standard added a significant degree of flexibility for situations in which the forecasted balance is no longer expected to occur during the life of the hedge.

### 815-25-40-8

For a hedging relationship designated under the last-of-layer method in accordance with paragraph 815-20-25-12A, an entity shall discontinue (or partially discontinue) hedge accounting in either of the following circumstances:

- If the entity cannot support on a subsequent testing date that the hedged item (that is, the designated last of layer) is anticipated to be outstanding in accordance with paragraph 815-25-35-7A, it shall at a minimum discontinue hedge accounting for the portion of the hedged item no longer expected to be outstanding at the hedged item’s assumed maturity date.***
- b. If on a subsequent testing date the outstanding amount of the closed portfolio of prepayable financial assets or one or more beneficial interests is less than the hedged item, the entity shall discontinue hedge accounting.

### 815-25-40-9

If a last-of-layer method hedging relationship is discontinued (or partially discontinued), the outstanding basis adjustment (or portion thereof) as of the discontinuation date shall be allocated to the individual assets in the closed portfolio using a systematic and rational method. ***An entity shall amortize those amounts over a period that is consistent with the amortization of other discounts or premiums associated with the respective assets in accordance with other Topics (for example, Subtopic 310-20 on receivables–nonrefundable fees and other costs).***



## “Last of Layer” Approach – HTM to AFS Redesignation

- An entity may reclassify a debt security from held-to-maturity to available-for-sale if the debt security is eligible to be hedged under the last-of-layer method in accordance with paragraph 815-20-25- 12A. Any unrealized gain or loss at the date of the transfer shall be recorded in accumulated other comprehensive income in accordance with paragraph 320-10-35-10(c).

### **Board Commentary:**

BC258. Certain financial institution stakeholders classify certain beneficial interests in the held-to-maturity category rather than the available-for-sale category because prepayment features embedded in the collateral make fair value hedge accounting difficult to obtain. By introducing the last-of-layer method in this Update, applying the fair value hedging model for beneficial interests will be less burdensome. Financial institution stakeholders requested transition relief to reclassify beneficial interests from the held-to-maturity category to the available-for-sale category. **The Board concluded that an entity should be able to reclassify held-to-maturity securities that qualify for the last-of-layer method.**

# Last of Layer Approach: Concluding Thoughts

- **Broader Balance Sheet Hedging**

- For residential 1-4 family lenders, hedge accounting has always proven difficult when attempting to apply derivatives to the balance sheet.
- The existing accounting model for hedging a pool of 1-4 family mortgages is/was flawed (either in whole loan form or in securitized Mortgage Backed Security form)
- The proposed rule will create an avenue to hedge this type of exposure with great efficiency

- **MBS/CMO Relative Value**

- The new accounting model will also allow one to swap a component of a fixed rate MBS or CMO to floating based on the same construct.
- This will create new ways to extract relative value within the investment portfolio, providing the ability to build hybrid exposures such as a fixed rate MBS 4% coupon pool with 50% of the notional swapped to floating for the first three years.
- We will continue exploring the investment iterations that become available and provide analogous generic structures to contrast against and highlight relative value.

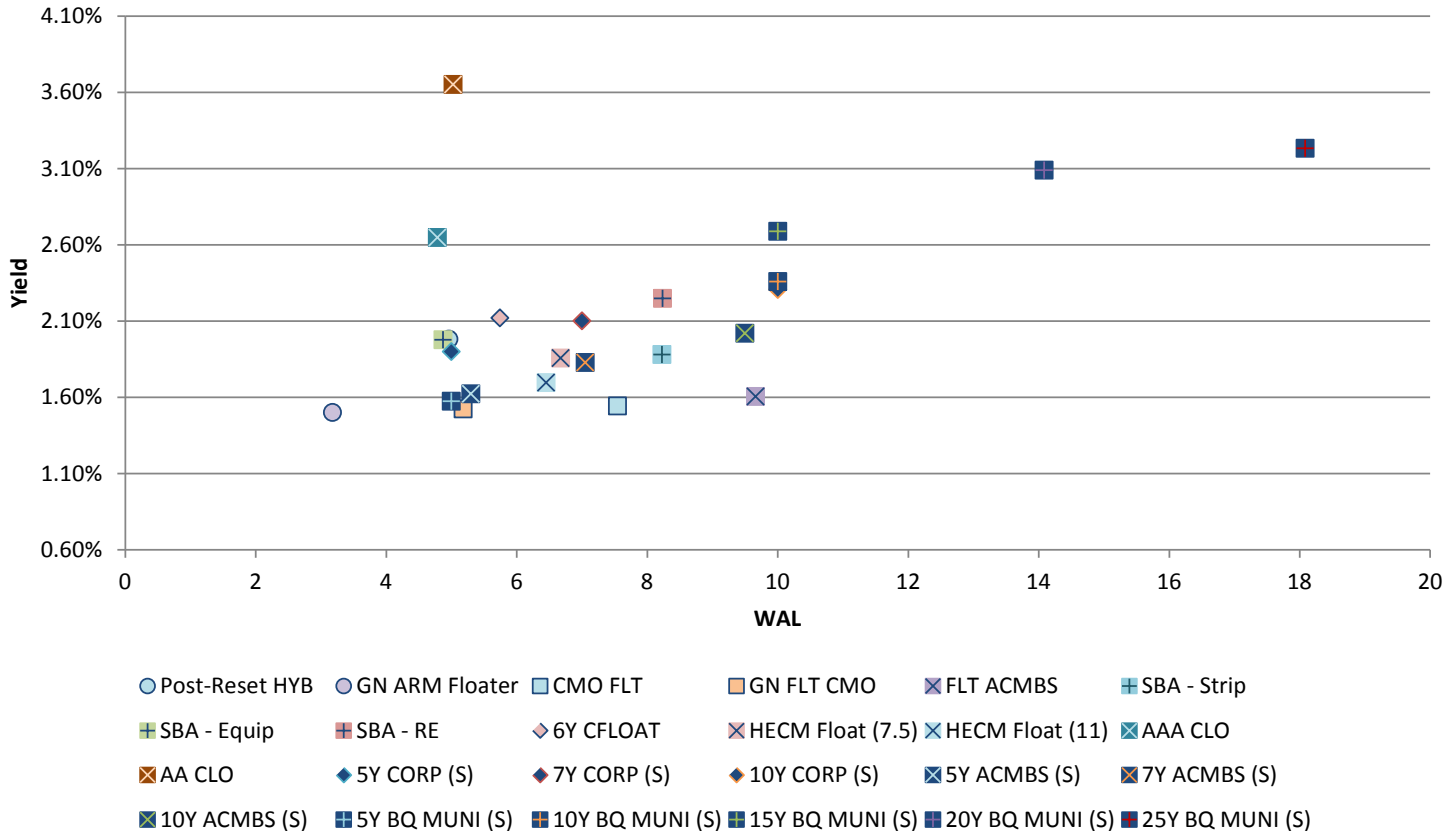
## *Investment Portfolio*

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# Application and Relative Value

- The ability to create synthetic floating rate instruments opens up a multitude of securities applications
- In some cases, entirely new instruments can be created (i.e., floating rate municipals)
- In others, synthetic structures may mimic existing instruments, but generate superior relative value

**Yield / WAL Comparison for Structural and Synthetic Floaters**



## Relative Value Comparison: Corporate Sector

- In the Corporate sector, synthetic floaters offer comparable relative value to their structural counterparts
- However, given the relative scarcity of longer floating rate issues, the creation of synthetic floaters drives greater availability of floaters where they may not have existed previously
- When combined with the updated standard on partial term hedges, the new rules should also allow for more efficient execution on fixed-to-float structures
  - However, operating within the Standard will sacrifice the ability to “juice” fixed or floating spreads

Type	Price	Yield	WAL	DM (3mL)
6 Year Financial Floater (A)	100.50	2.12%	5.7	81
5 Year Financial (A) - Swapped	100.00	1.90%	5.0	59
7 Year Financial (A) - Swapped	100.00	2.10%	7.0	79
10 Year Financial (A) - Swapped	100.00	2.31%	10.0	99

## Relative Value Comparison: Agency CMBS Sector

- In the Agency CMBS sector, synthetic floaters create two potential relative value plays
  1. Synthetic floaters can be used to nearly match Discount Margins (DMs) of longer structural floaters with meaningfully shorter WALs and less spread duration
  2. Synthetic floaters with a comparable WAL to their structural brethren can generate DMs that present much more compelling relative value
- In Agency CMBS, additional factors to consider include scheduled principal amortization, call protection / open prepayment windows, and the basis between 1 and 3 month LIBOR

Type	Price	Yield	WAL	DM (3mL)
Floating ACMBS	100.38	1.60%	9.7	29
5Y Agency CMBS (Swapped)	103.20	1.57%	5.3	26
7Y Agency CMBS (Swapped)	105.01	1.74%	7.1	42
10Y Agency CMBS (Swapped)	102.80	1.96%	9.5	65

## Relative Value Comparison: Municipal Sector

- While synthetic municipal floaters do not offer a meaningful increase in DM at short or intermediate maturity points, the value in longer maturities allows for the creation of synthetic floating rate instruments with spreads that rival CLOs
  - While AAA/AA CLOs frequently carry a 20% risk weight, they are subject to SSFA, whereas municipal GOs carry a fixed 20% risk weight under Basel III
- If hedging to maturity, instruments with a call option must feature a mirrored option in the derivative paired with it to avoid ineffectiveness, though further clarity is needed regarding sinking fund provisions

Type	Price	Yield	WAL	DM (3mL)
AAA CLO	101.10	2.65%	4.8	133
AA CLO	100.63	3.65%	5.0	234
5 Year BQ Muni (AA) - Swapped	107.71	1.57%	5.0	26
10 Year BQ Muni (AA) - Swapped	108.10	2.36%	10.0	104
15 Year BQ Muni (AA) - Swapped	104.96	2.69%	10.0	137
20 Year BQ Muni (AA) - Swapped	98.51	3.09%	14.1	178
25 Year BQ Muni (AA) - Swapped	99.15	3.23%	18.1	192

(1) Source: Bloomberg, ZM Financial Systems as of 7/24/2017

(2) Assumes 35% tax rate and makes no adjustments for TEFRA disallowance

(3) Assumes General Obligation issues with a 10 year call option on structures with a maturity >10 years

# Relative Value Comparison: Agency MBS

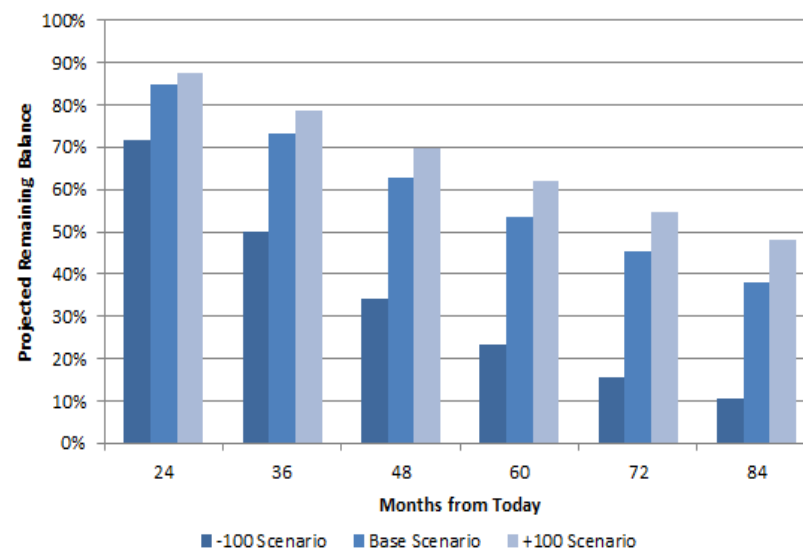
- This 20 year 3% MBS Passthrough has the following risk/return characteristics and the expected remaining balance at each horizon point.

## Sample 20y 3% MBS

FN MA3100 101-26 <sup>7</sup> / <sub>8</sub> 101-24 <sup>3</sup> / <sub>8</sub> / 101-29 <sup>3</sup> / <sub>8</sub> Yield 2.675/2.648 Coupon 3.000% BVAL									
As of 27 Jul Fannie Mae Pool Prepay 177PSA									
FN MA3100 Mtge Export Page 1/2 Security Description									
FNCT 3 N 3.760(239)N.A. CUSIP 31418CNS9 Pool Level Buy Sell									
Summary Comments									
Pool FN MA3100 (i) Seasoning FNCT 3 N As Of 07/2017									
Type (CT) Conventional Conv 20 years Level pay (j) Vintage FNCT 3 2017 Issue Date 07/01/2017									
Traits 30/360 Maturity Date 08/01/2037									
(iii) Seller Multiple									
(i) Pool Information									
Balance									
Coupon	3.000	WAC	3.760	Orig WAC	3.760	Factor	1.00000000		
		WARM	239	Orig WAM	239	Orig Amt	513,017,502		
		WALA	0			Curr Amt	513,017,502		
(ii) Collateral Information									
WAOLTV	70	AOLS	252,290	Orig TPO	32.22	Prepay	CPR	PSA	
WAOLTV-HPI	70	WAOLS+	293,106	Curr TPO	32.22	1 Month			
WAOLTV	70	MAXLS	621,000			3 Month			
WAOLTV	762	WAOLTV	240			6 Month			
						1 Year			
						Life			
(iii) # Loans 2,037 Delay 54 ( 24 )									
(iv) States %UPB									
California 15.9									
Texas 8.6									
New York 5.0									
TRACE Eligible									
(v) Paydown Information *Value calculated by Bloomberg									
Prepay History Jul17									
1 Month CPR									
3 Month CPR									
6 Month CPR									
12 Month CPR									
Life CPR									

Source: Bloomberg

## Projected Remaining Balance: 20y 3% MBS



Source: Bloomberg

## 20y 3% MBS Risk/Return Analytics

	Base Case		Scenario Price Change				
	Yield	WAL	-100	0	+100	+200	+300
20 Year MBS	2.62	6.1	2.7%	0.0%	-5.1%	-11.0%	-16.9%

Source: Yieldbook and ZM



# Relative Value Comparison: Agency MBS DN 100 Scenario

- Below we compare the 20 year 3% MBS Passthrough on the prior slide, teamed with the appropriately calibrated notional amount of a pay fixed swap to each horizon (focused on DN 100 bps scenario), to a new issue 15 year 2.5% MBS Passthrough.

20y MBS/Interest Rate Swap vs. 15y MBS			Risk/Return Analytics				
	Base Case		Scenario Price Change				
	Yield	WAL	-100	0	+100	+200	+300
20 Year MBS	2.62	6.1	2.7%	0.0%	-5.1%	-11.0%	-16.9%
15 Year MBS	2.33	5.3	3.1%	0.0%	-4.6%	-9.4%	-14.2%
20 Year MBS and 4 Year Swap	2.43	6.1	1.4%	0.0%	-3.8%	-8.5%	-13.3%
<i>Difference vs. 15 Year MBS</i>	<i>0.10</i>	<i>0.8</i>	<i>-1.8%</i>	<i>0.0%</i>	<i>0.8%</i>	<i>0.9%</i>	<i>0.9%</i>
20 Year MBS and 5 Year Swap	2.47	6.1	1.6%	0.0%	-4.0%	-8.9%	-13.9%
<i>Difference vs. 15 Year MBS</i>	<i>0.14</i>	<i>0.8</i>	<i>-1.6%</i>	<i>0.0%</i>	<i>0.6%</i>	<i>0.5%</i>	<i>0.3%</i>
20 Year MBS and 6 Year Swap	2.51	6.1	1.8%	0.0%	-4.2%	-9.3%	-14.5%
<i>Difference vs. 15 Year MBS</i>	<i>0.18</i>	<i>0.8</i>	<i>-1.4%</i>	<i>0.0%</i>	<i>0.3%</i>	<i>0.1%</i>	<i>-0.3%</i>
20 Year MBS and 7 Year Swap	2.54	6.1	2.0%	0.0%	-4.4%	-9.8%	-15.1%
<i>Difference vs. 15 Year MBS</i>	<i>0.21</i>	<i>0.8</i>	<i>-1.1%</i>	<i>0.0%</i>	<i>0.1%</i>	<i>-0.3%</i>	<i>-0.9%</i>

Source: Yieldbook and ZM

- As can be seen above, the 20 year MBS paired with swap outperforms the 15 year MBS on both a static yield basis but also on an UP 300 price risk (% volatility) measure.
- However, we wanted to explore other measures that may more appropriately capture the dynamics of the declining MBS notional amount through time in contrast to the static swap notional amount.

# Relative Value Comparison: Agency MBS DN 100 Scenario

- With the total rate of return (ROR) calculations below, we are capturing the immediate return metrics of the instruments but also the remaining risk profile of the longer 20 year MBS after the swap matures on the horizon.

20y MBS/Interest Rate Swap vs. 15y MBS								Total ROR				
	Base Case		1yr TRR					3yr TRR				
	Yield	WAL	-100	0	+100	+200	+300	-100	0	+100	+200	+300
20 Year MBS	2.62	6.1	3.81%	2.79%	-1.53%	-6.90%	-12.56%	2.09%	2.68%	1.86%	0.68%	-0.66%
15 Year MBS	2.33	5.3	4.43%	2.54%	-1.22%	-5.41%	-9.71%	2.36%	2.46%	1.83%	1.07%	0.23%
20 Year MBS and 4 Year Swap	2.43	6.1	2.18%	2.51%	-0.49%	-4.56%	-8.93%	1.42%	2.45%	2.09%	1.35%	0.46%
<i>Difference vs. 15 Year MBS</i>	<i>0.10</i>	<i>0.8</i>	<i>-2.25%</i>	<i>-0.03%</i>	<i>0.73%</i>	<i>0.85%</i>	<i>0.77%</i>	<i>-0.94%</i>	<i>0.00%</i>	<i>0.26%</i>	<i>0.28%</i>	<i>0.23%</i>
20 Year MBS and 5 Year Swap	2.47	6.1	2.45%	2.56%	-0.64%	-4.93%	-9.52%	1.52%	2.49%	2.05%	1.23%	0.27%
<i>Difference vs. 15 Year MBS</i>	<i>0.14</i>	<i>0.8</i>	<i>-1.98%</i>	<i>0.02%</i>	<i>0.58%</i>	<i>0.49%</i>	<i>0.19%</i>	<i>-0.83%</i>	<i>0.03%</i>	<i>0.22%</i>	<i>0.17%</i>	<i>0.04%</i>
20 Year MBS and 6 Year Swap	2.51	6.1	2.73%	2.62%	-0.81%	-5.31%	-10.12%	1.64%	2.53%	2.01%	1.13%	0.09%
<i>Difference vs. 15 Year MBS</i>	<i>0.18</i>	<i>0.8</i>	<i>-1.70%</i>	<i>0.08%</i>	<i>0.42%</i>	<i>0.10%</i>	<i>-0.41%</i>	<i>-0.72%</i>	<i>0.07%</i>	<i>0.19%</i>	<i>0.06%</i>	<i>-0.14%</i>
20 Year MBS and 7 Year Swap	2.54	6.1	2.97%	2.67%	-0.96%	-5.66%	-10.67%	1.74%	2.57%	1.98%	1.03%	-0.07%
<i>Difference vs. 15 Year MBS</i>	<i>0.21</i>	<i>0.8</i>	<i>-1.46%</i>	<i>0.13%</i>	<i>0.26%</i>	<i>-0.25%</i>	<i>-0.96%</i>	<i>-0.61%</i>	<i>0.11%</i>	<i>0.15%</i>	<i>-0.04%</i>	<i>-0.31%</i>

Source: Yieldbook and ZIM

- For example, the 20 year MBS paired with 5 year swap outperforms in base case and all rising rate scenarios for both 12 month and 36 month horizons.

# Relative Value Comparison: Agency MBS Base Scenario

- Below we compare the 20 year 3% MBS Passthrough on the prior slide, teamed with the appropriately calibrated notional amount of a pay fixed swap to each horizon (we focused on the Base Case scenario), to a new issue 15 year 2.5% MBS Passthrough.

20y MBS/Interest Rate Swap vs. 15y MBS			Risk/Return Analytics				
	Base Case		Scenario Price Change				
	Yield	WAL	-100	0	+100	+200	+300
20 Year MBS	2.62	6.1	2.7%	0.0%	-5.1%	-11.0%	-16.9%
15 Year MBS	2.33	5.3	3.1%	0.0%	-4.6%	-9.4%	-14.2%
20 Year MBS and 4 Year Swap	2.27	6.1	0.2%	0.0%	-2.7%	-6.4%	-10.2%
<i>Difference vs. 15 Year MBS</i>	<i>-0.06</i>	<i>0.8</i>	<i>-2.9%</i>	<i>0.0%</i>	<i>1.8%</i>	<i>3.0%</i>	<i>4.0%</i>
20 Year MBS and 5 Year Swap	2.28	6.1	0.1%	0.0%	-2.6%	-6.3%	-10.0%
<i>Difference vs. 15 Year MBS</i>	<i>-0.05</i>	<i>0.8</i>	<i>-3.0%</i>	<i>0.0%</i>	<i>1.9%</i>	<i>3.2%</i>	<i>4.2%</i>
20 Year MBS and 6 Year Swap	2.30	6.1	0.1%	0.0%	-2.6%	-6.3%	-10.1%
<i>Difference vs. 15 Year MBS</i>	<i>-0.03</i>	<i>0.8</i>	<i>-3.0%</i>	<i>0.0%</i>	<i>1.9%</i>	<i>3.1%</i>	<i>4.1%</i>
20 Year MBS and 7 Year Swap	2.32	6.1	0.2%	0.0%	-2.7%	-6.5%	-10.4%
<i>Difference vs. 15 Year MBS</i>	<i>-0.01</i>	<i>0.8</i>	<i>-2.9%</i>	<i>0.0%</i>	<i>1.8%</i>	<i>3.0%</i>	<i>3.8%</i>

Source: Yieldbook and ZM

- As can be seen above, the 20 year MBS paired with swap is neutral to the 15 year MBS on a static yield basis but has significantly less price volatility illustrated by an UP 300 price risk (% volatility) measure.
- However, we wanted to explore other measures that may more appropriately capture the dynamics of the declining MBS notional amount through time in contrast to the static swap notional amount.

# Relative Value Comparison: Agency MBS Base Scenario

- With the total rate of return (ROR) calculations below, we are capturing the immediate return metrics of the instruments but also the remaining risk profile of the longer 20 year MBS after the swap matures on the horizon.

20y MBS/Interest Rate Swap vs. 15y MBS								Total ROR				
	Base Case		1yr TRR					3yr TRR				
	Yield	WAL	-100	0	+100	+200	+300	-100	0	+100	+200	+300
20 Year MBS	2.62	6.1	3.81%	2.79%	-1.53%	-6.90%	-12.56%	2.09%	2.68%	1.86%	0.68%	-0.66%
15 Year MBS	2.33	5.3	4.43%	2.54%	-1.22%	-5.41%	-9.71%	2.36%	2.46%	1.83%	1.07%	0.23%
20 Year MBS and 4 Year Swap	2.27	6.1	0.82%	2.26%	0.38%	-2.60%	-5.89%	0.85%	2.26%	2.27%	1.91%	1.40%
<i>Difference vs. 15 Year MBS</i>	<i>-0.06</i>	<i>0.8</i>	<i>-3.61%</i>	<i>-0.27%</i>	<i>1.60%</i>	<i>2.82%</i>	<i>3.82%</i>	<i>-1.51%</i>	<i>-0.19%</i>	<i>0.44%</i>	<i>0.84%</i>	<i>1.17%</i>
20 Year MBS and 5 Year Swap	2.28	6.1	0.72%	2.27%	0.48%	-2.41%	-5.64%	0.80%	2.24%	2.28%	1.94%	1.46%
<i>Difference vs. 15 Year MBS</i>	<i>-0.05</i>	<i>0.8</i>	<i>-3.71%</i>	<i>-0.27%</i>	<i>1.70%</i>	<i>3.00%</i>	<i>4.07%</i>	<i>-1.56%</i>	<i>-0.21%</i>	<i>0.45%</i>	<i>0.88%</i>	<i>1.22%</i>
20 Year MBS and 6 Year Swap	2.30	6.1	0.72%	2.30%	0.52%	-2.37%	-5.60%	0.80%	2.25%	2.29%	1.96%	1.47%
<i>Difference vs. 15 Year MBS</i>	<i>-0.03</i>	<i>0.8</i>	<i>-3.71%</i>	<i>-0.24%</i>	<i>1.75%</i>	<i>3.04%</i>	<i>4.10%</i>	<i>-1.55%</i>	<i>-0.21%</i>	<i>0.46%</i>	<i>0.89%</i>	<i>1.24%</i>
20 Year MBS and 7 Year Swap	2.32	6.1	0.82%	2.34%	0.49%	-2.48%	-5.81%	0.84%	2.27%	2.29%	1.93%	1.42%
<i>Difference vs. 15 Year MBS</i>	<i>-0.01</i>	<i>0.8</i>	<i>-3.61%</i>	<i>-0.20%</i>	<i>1.72%</i>	<i>2.93%</i>	<i>3.90%</i>	<i>-1.51%</i>	<i>-0.19%</i>	<i>0.46%</i>	<i>0.86%</i>	<i>1.19%</i>

Source: Yieldbook and ZIM

- For example, the 20 year MBS paired with 7 year swap outperforms significantly in all rising rate scenarios for both 12 month and 36 month horizons.

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