



PRESENTS

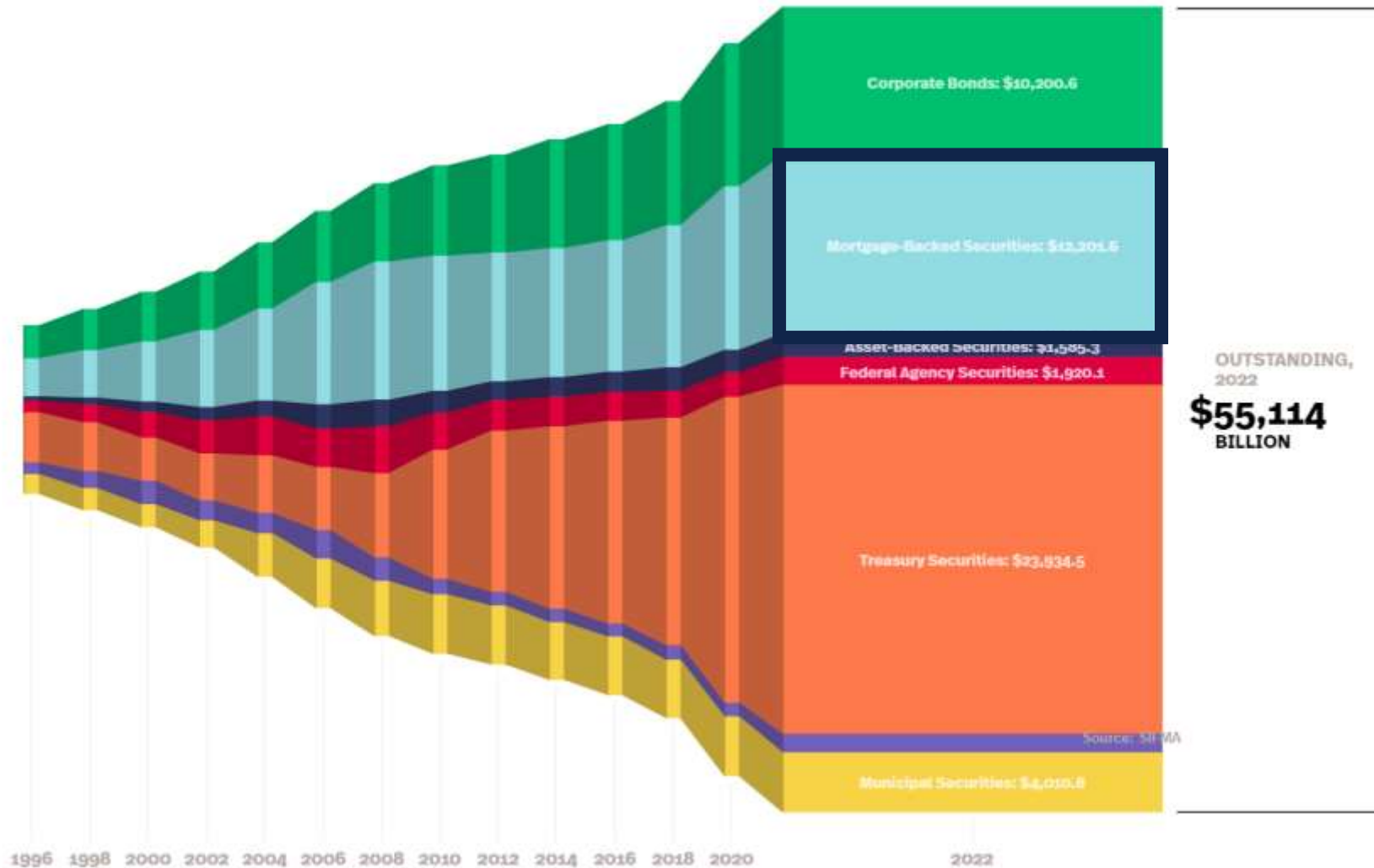
EXECUTIVE BALANCE SHEET FORUM 2023

Part 2 - Investment Analytics, Strategies & Case Study

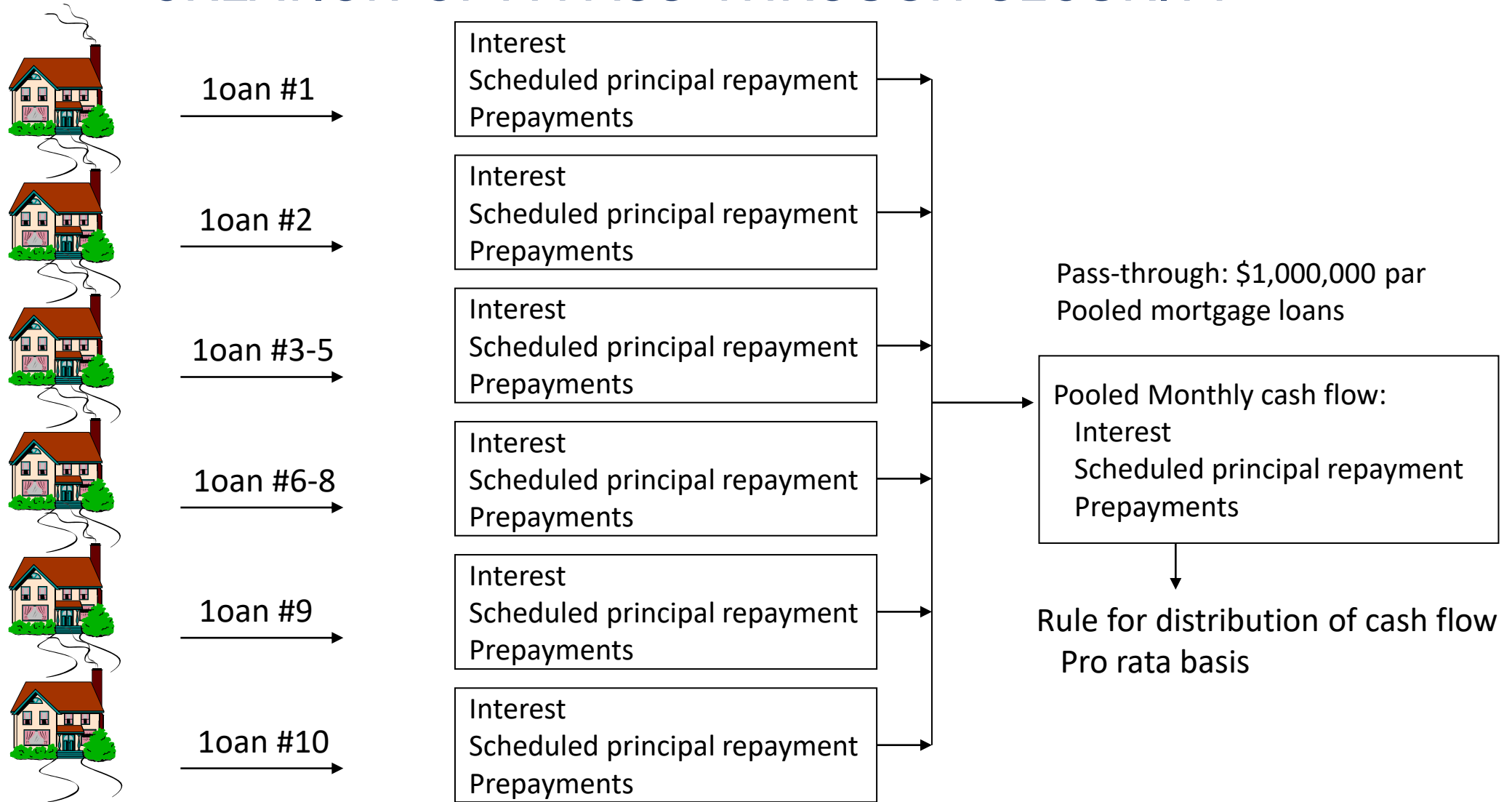
Sasha Antskaitis, CFA

Tom Evans, CFA

MORTGAGE-BACKED SECURITIES IS SECOND LARGEST SECTOR



CREATION OF A PASS-THROUGH SECURITY



Each loan is for \$100,000
Total loan pool: 1,000,000

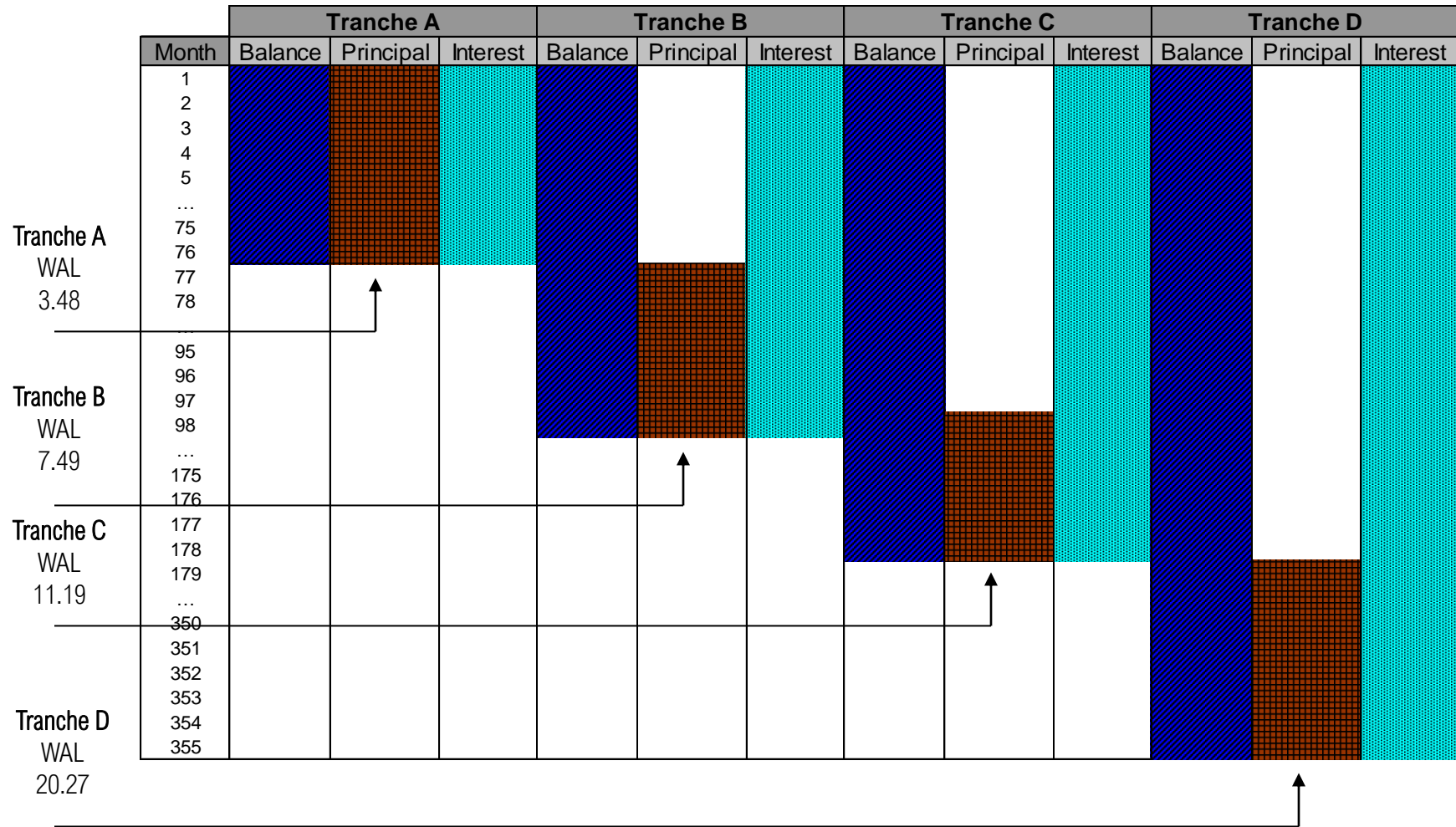
MORTGAGE TICKER/COLLATERAL DESCRIPTION

		Mortgage Ticker Lookup
Asset Class	Security Identifier Format	Examples
All	[CUSIP] <Mtge>	312945LM8 <Mtge>
CMO / ABS	[Issuer] [Year-Series] [Class] <Mtge>	FNR 2012-3 NP <Mtge>
Pool	[Pool Ticker] [Pool Number] <Mtge>	FG A96632 <Mtge>
Generic	[Ticker] [Coupon] [Age* OR Production Year] <Mtge>	FGLMC 3.5 2011 <Mtge>
TBA	[Ticker] [Coupon] [MM/YY] <Mtge>	FNCL 4 5/12 <Mtge>

*Age can be specified as Blank (Aggregate), S (Seasoned), N (Non-seasoned), M (Moderately Seasoned)

Pool Tickers	Generic/TBA Tickers		
GN GNMA 1	GNMA 1	FNMA	FHLMC Gold
G2 GNMA 2	GNSF 30-Year Fixed	FNCL 30-Year Fixed	FGLMC 30-Year Fixed
FH FHLMC	GNJO 15-Year Fixed	FNCI 15-Year Fixed	FGCI 15-Year Fixed
FG FHLMC Gold	GNMHB Mobile Home B	FNCX 30/7 Balloon	FGFB 30/5 Balloon
FN FNMA	GNMHD Mobile Home D	FNCT 20-Year Fixed	FGSB 30/7 Balloon
SBA Small Bus Ad	GNGP Grad Payment	FNCN 10-Year Fixed	FGTW 20-Year Fixed
CAN Canadian	GNMA 2	FNGL FHA/VA Guar	FGIOH0 10-Yr IO/20 Amort
	G2SF 30-Year Fixed	FNCOF COFI ARM	FGIOH1 15-Yr IO/15 Amort
	G2JO 15-Year Fixed	FNCZ 40-Year Fixed	FGIOH2 10-Yr IO/10 Amort
	G2AR ARM	FNIONP 7-10 Year IO	FHLMC 75-day
	G2GP Grad Payment	FNIONQ 10-15 Year IO	FHLMC 30-Year Fixed
	G2JM 30-Year Jumbo	FNIONR 15-20 Year IO	FHCI 15-Year Fixed
			FHTPM Tiered Payment

CREATION OF A COLLATERALIZED MORTGAGE OBLIGATION



Source: Fixed Income Analysis. Frank J. Fabozzi

CMO CLASS TYPES

Type	Definition
1) AD	Accretion Directed
2) AFC	Available Funds Class
3) ARB	Ascending Rate
4) ARS	Auction Rate
5) AS	Accelerated Security
6) CALL	Call Option
7) CAM	Controlled Amortization Matur
8) CMLX	Complex
9) CPT	Component
10) CSTR	Collateral Strip Rate
11) DCALL	Date Callable
12) DFRD	Deferring Interest
13) DGT	Digital
14) DLY	Non Zero Day Delay
15) DRB	Descending Rate
16) EXCH	Exchangeable
17) EXE	Excess
18) FLT	Floater
19) FTV	Fixed to Variable
20) HAZ	Hazard Bond
21) HB	Hard Bullet Maturity
22) HZ	Deferred Balance Accrual
23) IAN	Indexed Amortization Notes

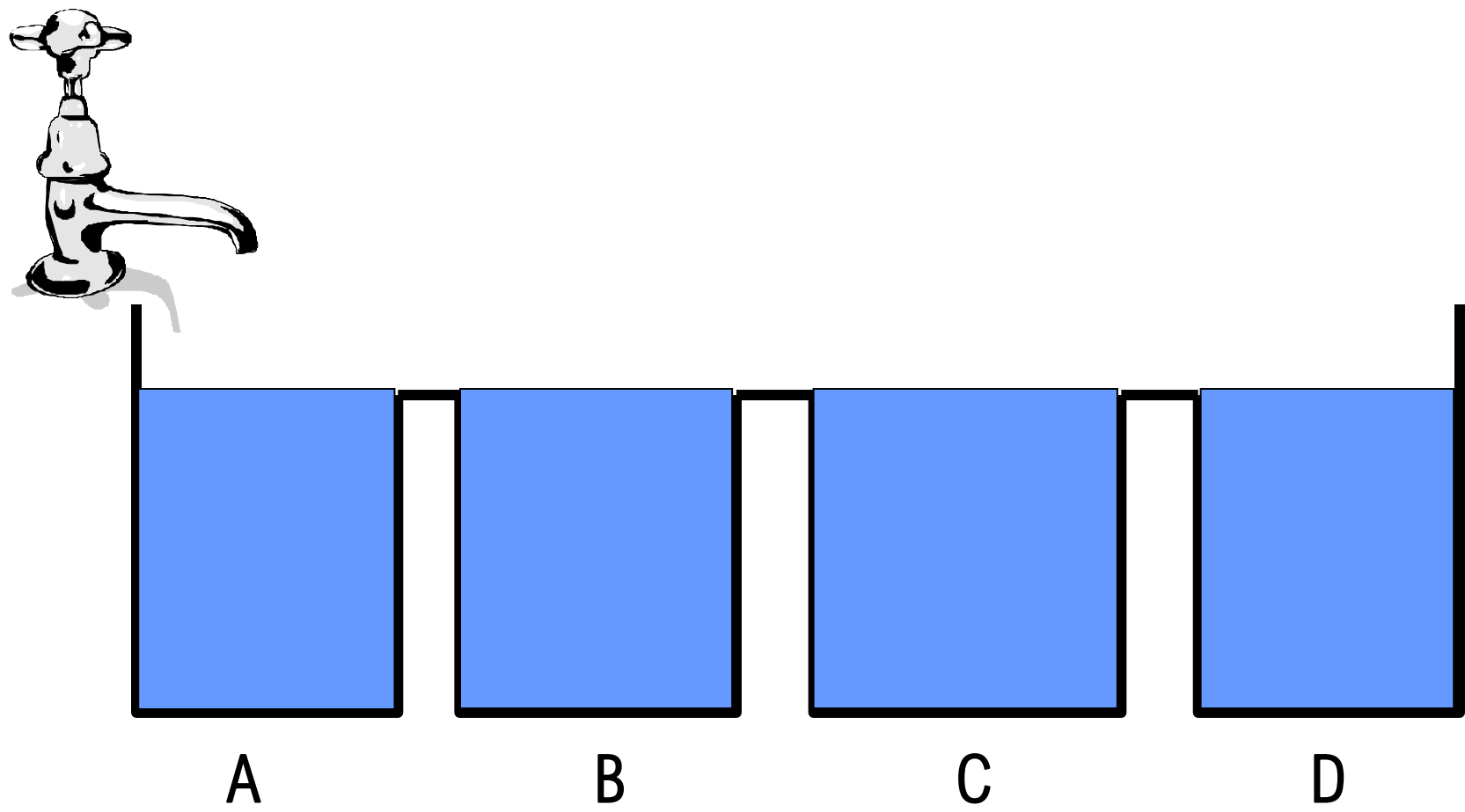
Type	Definition
24) INV	Inverse Floater
25) IO	Interest Only
26) IRC	Interest Rate Contract Enhanc
27) LIQ	Liquidity
28) MEZ	Mezzanine
29) MR	Mandatory Redemption
30) NAS	Non-Accelerated Security
31) NPR	Non-Paying Residual
32) NSJ	Non-Sticky Jump
33) NTL	Notional Principal
34) OC	Over Collateralization
35) PAC	Planned Amortization Class
36) PEC	Payment Exchange Certificate
37) PIP	Prepayment Interest Penalty
38) PO	Principal Only
39) PT	Pass Through
40) PUT	Put
41) PZ	Partial Accrual
42) R	Residual
43) RAKE	Rake Bond
44) REFI	Refinancing Security
45) RFID	Refinanced Security
46) RRI	Risk Retention Interest

Type	Definition
47) RRN	Reset Rate Note
48) RSET	Resetting Security
49) RSTD	Reset Security
50) RSTP	Ratio Strip
51) RTL	Retail
52) SB	Soft Bullet Maturity
53) SC	Structured Collateral
54) SCH	Scheduled
55) SEG	Segment
56) SEMI	Semiannual Pay
57) SEQ	Sequential Pay
58) SJ	Sticky Jump
59) SM	Scheduled Maturity
60) SNSTP	Senior Strip
61) SSNR	Super Senior
62) SSUP	Senior Support
63) STEP	Stepped Rate Bond
64) STP	Pro-Rata Principal Strip
65) SUB	Subordinated
66) SUP	Support Bond
67) SWAP	Swap
68) TAC	Target Amortization Class
69) TBD	To be determined

70) W	Weighted Average Coupon
71) XAC	Index Allocation Class
72) XRESE	Extended Reset
73) Z	Accrual

* Bloomberg Type

SEQUENTIAL-PAY CMO



SEQUENTIAL-PAY VS. PAC BOND

Sequential-Pay

Weighted-average life can extend and contract depending on prepayment speeds

Prepayment Speed (PSA)	Average life (in years) for				
	Collateral	Tranche A	Tranche B	Tranche C	Tranche D
50	15.11	7.48	15.98	21.02	27.24
100	11.66	4.90	10.86	15.78	24.58
165	8.76	3.48	7.49	11.19	20.27
200	7.68	3.05	6.42	9.60	18.11
300	5.63	2.32	4.64	6.81	13.36
400	4.44	1.94	3.70	5.31	10.34
500	3.68	1.69	3.12	4.38	8.35
600	3.16	1.51	2.74	3.75	6.96
700	2.78	1.38	2.47	3.30	5.95

Source: Fixed Income Analysis. Frank J. Fabozzi

PAC Bond

A planned amortization class (PAC) tranche has reduced weighted-average life variability, the better protection provided by the support tranches.



PAC bands

Prepayment Speed (PSA)	PAC Bond	Support Bond
0	15.97	27.26
50	9.44	24.00
90	7.26	20.06
100	7.26	18.56
150	7.26	12.57
165	7.26	11.16
200	7.26	8.38
250	7.26	5.37
300	7.26	3.13
350	6.56	2.51
400	5.92	2.17
450	5.38	1.94
500	4.93	1.77
700	3.70	1.37

Source: Fixed Income Analysis. Frank J. Fabozzi

FOUR MAJOR SOURCES OF PREPAYMENT RISK

➤ Refinancing

- **Ability to obtain a lower interest rate**
- Home price appreciation (cash-out refis)
- Age of the loan
- Mortgage type
 - 30-year refinance into 20 and 15 year
 - ARMs refi into new ARMs or Fixed

➤ Housing Turnover

- Home price appreciation / Number of years since purchase
- Desire to move or upgrade / Employment mobility
- Mortgage rates

➤ Default / Buyouts

- GSEs buy delinquent loans out of pools. Buy-outs are measured as the involuntary component of CPR speeds.

➤ Curtailment

- Borrower elects to pay more than contractual payment.

MORTGAGE ANALYTICS



BLOOMBERG YIELD TABLE

The Bloomberg™ Yield Table to the right has a wealth of information. In order to make more informed investment decisions, it is important to know what the information means (and what it doesn't mean).

➤ Topic

- Descriptive
- Historical
- Collateral
- Average Life
- Pricing Information
- Prepayments/Structure

Enter all values and hit <GO>

FHR 4710 GV Mtge												Actions		Export		Settings		Yield Table			
100% FGLMC 3.0 S						3.585(274)76 CUSIP 3137FA5B0						Pool Level		As of 03/2023							
3/2023	74P	4.4C	0.3B	Traits	SEQ	Coupon	3.0%	Maturity	10/15/40	CA	22%	2016	100%								
3Mo	73	4.4	0.3	08/31/2017	6,430,000	LTV/HLTV	74/46	Accrual	3/1-3/31	TX	5%	2015	0%								
6Mo	102	6.1	0.4	03/15/2023	6,430,000	MAXLS	1,000,000	Next Pay	4/15/23	IL	5%	2014	0%								
12Mo	162	9.7	0.7	Factor	1.0	WACLS	231,807	Collar	No Band	MA	4%										
Life	357	19.1	--	# Loans	16,632																
I) Price-to-Yield																					
Settle	03/10/23			CF	5.4 CPR	5.6 CPR	5.9 CPR	7.2 CPR	8.4 CPR	11.3 CPR											
Indices	C+0			C+300	C+200	C+100	C-100	C-200	C-300												
Vary	0			121 PSA	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM											
Price	92-26 ³ / ₈			5.01	4.63	4.65	4.69	4.87	5.05	5.40											
Avg Life				4.00	5.01	4.93	4.81	4.31	3.91	3.30											
Mod Duration				3.66	4.52	4.45	4.35	3.93	3.58	3.05											
Prin Win	Year			2.7-5.4	3.5-6.5	3.4-6.4	3.4-6.3	3.0-5.7	2.7-5.2	2.4-4.4											
I Spread				50	32	33	35	43	53	76											
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y	
74P	72	71	117	128	148	174	131	204	225	255	319	16:43	5.16	5.20	5.01	4.72	4.31	4.17	3.97	3.87	
4.4C	4.3	4.3	7.0	7.7	8.9	10.4	7.8	12.2	13.5	15.3	19.2	Disc	30/360	3Y	98-01 ³ / ₄	5Y	98-20				

NAME OF CMO



Enter all values and hit <GO>

100% FGLMC 3.0 S										3.585(274)76 CUSIP 3137FA5B0		Pool Level		As of 03/2023						
3/2023	74P	4.4C	0.3B	Traits	SEQ	Coupon	3.0%	Maturity	10/15/40	CA	22%	2016	100%							
3Mo	73	4.4	0.3	08/31/2017	6.430	LTV/HLTV	74/46	Accrual	3/1-3/31	TX	5%	2015	0%							
6		.1	0.4	03/15/2017	100	MAX		Next Pay	4/15/23	IL	5%	2014	0%							
1		.7	0.7	Factor	1.0	WAC		Collar	No Band	MA	4%									
Life	457	19.1	--	# Loans	16,632															
Price-to-Yield																				
Settle	03/10/23			CF	5.4 CPR	5.6 CPR	5.9 CPR	7.2 CPR	8.4 CPR	11.3 CPR										
Indices					C-200	C-200	C-100	C-100	C-200	C-200			C-300							
Vary													100% BAM							
Price	92-26 ³ / ₈			5.01	4.63	4.65	4.69	4.87	5.05	5.40										
Avg Life				4.00	5.01	4.93	4.81	4.31	3.91	3.30										
Mod Duration				3.66	4.52	4.45	4.35	3.93	3.58	3.05										
Prin Win	Year			2.7-5.4	3.5-6.5	3.4-6.4	3.4-6.3	3.0-5.7	2.7-5.2	2.4-4.4										
I Spread				50	32	33	35	43	53	76										
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y
74P	72	71	117	128	148	174	131	204	225	255	319	16:43	5.16	5.20	5.01	4.72	4.31	4.17	3.97	3.87
4.4C	4.3	4.3	7.0	7.7	8.9	10.4	7.8	12.2	13.5	15.3	19.2	Disc	30/360	3Y	98-01 ³ / ₄	5Y	98-20			

DESCRIPTIVE INFORMATION

Enter all values and hit <GO>

FHR 4710 GV Mtge	Actions	Export	Settings	Yield Table
100% FGLMC 3.0 S	3.585(274)76	CUSIP 3137FA5B0	Pool Level	As of 03/2023
3/2023	7	3.0%	08/31/2017	
3Mo	7	08/31/2017		
6Mo	102	6.1	0.4	03/15/2023
12Mo	162	9.7	0.7	Factor

CMO Tranche or Class Type See Page 5

CUSIP

Coupon for this Tranche

Legal Final Maturity

CUSIP

Coupon for this Tranche

Legal Final Maturity

3.585(274)76	CUSIP	3137FA5B0	Pool Level	As of	03/2023
Traits	SEQ	Coupon	3.0%	Maturity	10/15/40
08/31/2017	6,430,000	LTV/HLTV	74/46	Accrual	3/1-3/31
03/15/2023	6,430,000	MAXLS	1,000,000	Next Pay	4/15/23
Factor	1.0	WACLS	231,807	Collar	No Band
# Loans	16,632				

Avg Life	4.00	5.01	4.93	4.81	4.31	3.91	3.30
Mod Duration	3.66	4.52	4.45	4.35	3.93	3.58	3.05
Prin Win	Year	2.7-5.4	3.5-6.5	3.4-6.4	3.4-6.3	3.0-5.7	2.7-5.2
I Spread		50	32	33	35	43	53
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug
74P	72	71	117	128	148	174	131
4.4C	4.3	4.3	7.0	7.7	8.9	10.4	7.8

DESCRIPTIVE INFORMATION

Factor Information:
 Original Settlement Date - Original Principal Dollars
 Last Record Date - Principal Balance Remaining
 Factor = Principal Remaining / Original Principal

Payment Information
 Next Pay = Next Payment Date for Holder of Record
 Accrual = Accrual Period for Payment

Geographic Distribution:
 Current composition of entire deal - broken down by state

Factor Information:
 Original Settlement Date - Original Principal Dollars
 Last Record Date - Principal Balance Remaining
 Factor = Principal Remaining / Original Principal

Payment Information
 Next Pay = Next Payment Date for Holder of Record
 Accrual = Accrual Period for Payment

3.585(274)76 CUSIP 3137FA5B0		Pool Level		As of 03/2023					
Traits	SEQ	Coupon	3.0%	Maturity	10/15/40	CA	22%	2016	100%
08/31/2017	6,430,000	LTV/HLTV	74/46	Accrual	3/1-3/31	TX	5%	2015	0%
03/15/2023	6,430,000	MAXLS	1,000,000	Next Pay	4/15/23	IL	5%	2014	0%
Factor	1.0	WACLS	231,807	Collar	No Band	MA	4%		
# Loans	16,632								

Price	92-26 ³ / ₈	5.01	4.63	4.65	4.69	4.87	5.05	5.40													
Avg Life		4.00	5.01	4.93	4.81	4.31	3.91	3.30													
Mod Duration		3.66	4.52	4.45	4.35	3.93	3.58	3.05													
Prin Win	Year	2.7-5.4	3.5-6.5	3.4-6.4	3.4-6.3	3.0-5.7	2.7-5.2	2.4-4.4													
I Spread		50	32	33	35	43	53	76													
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y	
74P	72	71	117	128	148	174	131	204	225	255	319	16:43	5.16	5.20	5.01	4.72	4.31	4.17	3.97	3.87	
4.4C	4.3	4.3	7.0	7.7	8.9	10.4	7.8	12.2	13.5	15.3	19.2	Disc	30/360	3Y	98-01 ³ / ₄	5Y	98-20				

COLLATERAL INFORMATION

Collateral Description

FGLMC = Freddie Max 30 Yr Fixed Rate
 3 = Collateral Coupon
 Letter = degree of seasoning
 N=New (0 - 29 months)
 M=Moderately Seasoned (30-59 months)
S = Seasoned (60+ months)

WAC(WAM) CAGE

WAC(WAM) CAGE

WAC = Weighted Average Coupon = rate homeowners are paying = **3.58%**
 WAM = Weighted Average Maturity of the loans = 274 months
 CAGE = Collateral Age = Average age of loans = 76 months

3 = Collateral Coupon

Letter = degree of seasoning

N=New (0 - 29 months)

M=Moderately Seasoned (30-59 months)

S = Seasoned (60+ months)

FHR 4710 GV Mtge												Actions		Export		Settings				
100% FGLMC 3.0 S				3.585(274)76				CUSIP 3137FA5B0				Pool Level								
Vary	0		121 PSA	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM									
Price	92-26 ³ / ₈		5.01	4.63	4.65	4.69	4.87	5.05	5.40											
Avg Life			4.00	5.01	4.93	4.81	4.31	3.91	3.30											
Mod Duration			3.66	4.52	4.45	4.35	3.93	3.58	3.05											
Prin Win	Year		2.7-5.4	3.5-6.5	3.4-6.4	3.4-6.3	3.0-5.7	2.7-5.2	2.4-4.4											
I Spread			50	32	33	35	43	53	76											
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y
74P	72	71	117	128	148	174	131	204	225	255	319	16:43	5.16	5.20	5.01	4.72	4.31	4.17	3.97	3.87
4.4C	4.3	4.3	7.0	7.7	8.9	10.4	7.8	12.2	13.5	15.3	19.2	Disc	30/360	3Y	98-01 ³ / ₄	5Y	98-20			

HISTORICAL INFORMATION

Prepayment History

Recent Prepayment history for this CMO in average PSA and CPR.

Prepayment History

Recent Prepayment history for this CMO in average PSA and CPR.

Prepayment History

Most recent 12 months of history in PSA and CPR

Enter all values and				Yield Table																
FHR 4710 GV Mtae				As of 03/2023																
3/2023	74P	4.4C	0.3B	10/15/40	CA	22%	2016 100%													
3Mo	73	4.4	0.3	3/1-3/31	TX	5%	2015 0%													
6Mo	102	6.1	0.4	4/15/23	IL	5%	2014 0%													
12Mo	162	9.7	0.7	No Band	MA	4%														
Life	357	19.1	--																	
Settle	03/10/23	CF	5.4 CPR	5.6 CPR	5.9 CPR	7.2 CPR	8.4 CPR	11.3 CPR												
Indices	C+0	C+300	C+200	C+100	C-100	C-200	C-300													
Vary	0	121 PSA	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM												
	92-26 ³ _a	5.01	4.63	4.65	4.69	4.87	5.05	5.40												
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr									
74P	72	71	117	128	148	174	131	204	225	255	319									
4.4C	4.3	4.3	7.0	7.7	8.9	10.4	7.8	12.2	13.5	15.3	19.2									
Mod Duration			3.66	4.52	4.45	4.35	3.93	3.58	3.30											
Prin Win	Year		2.7-5.4	3.5-6.5	3.4-6.4	3.4-6.3	3.0-5.7	2.7-5.2	2.4-4.4											
I Spread			50	32	33	35	43	53	76											
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y
74P	72	71	117	128	148	174	131	204	225	255	319	16:43	5.16	5.20	5.01	4.72	4.31	4.17	3.97	3.87
4.4C	4.3	4.3	7.0	7.7	8.9	10.4	7.8	12.2	13.5	15.3	19.2	Disc	30/360	3Y	98-01 ³ _a	5Y	98-20			

PREPAYMENTS AND STRUCTURE

Prepayment Forecasts

Bloomberg Agency Model forecasts for prepayments given a change in rates. These are **predictions** only.

Example: If rates decline 200 bp, the model's forecast for this collateral is a speed of 8.4 CPR.

Enter all values and hit <GO>

FHR 4710 GV Mtge Actions Export Settings Yield Table
 100% FGLMC 3.0 S 3.585(274)76 CUSIP 3137FA5B0 Pool Level As of 03/2023
 3/2023 74P 4.4C 0.3B Traits SEQ Coupon 3.0% Maturity 10/15/40 CA 22% 2016 100%

1) Price-to-Yield

CF	5.4 CPR	5.6 CPR	5.9 CPR	7.2 CPR	8.4 CPR	11.3 CPR
C+0	C+300	C+200	C+100	C-100	C-200	C-300
121 PSA	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM

Price	92-26 ^{3/8}	5.01	4.63	4.65	4.69	4.87	5.05	5.40												
Avg Life		4.00	5.01	4.93	4.81	4.31	3.91	3.30												
Mod Duration		3.66	4.52	4.45	4.35	3.93	3.58	3.05												
Prin Win	Year	2.7-5.4	3.5-6.5	3.4-6.4	3.4-6.3	3.0-5.7	2.7-5.2	2.4-4.4												
I Spread		50	32	33	35	43	53	76												
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y
74P	72	71	117	128	148	174	131	204	225	255	319	16:43	5.16	5.20	5.01	4.72	4.31	4.17	3.97	3.87
4.4C	4.3	4.3	7.0	7.7	8.9	10.4	7.8	12.2	13.5	15.3	19.2	Disc	30/360	3Y	98-01 ^{3/4}	5Y	98-20			

Weighted Average Life (WAL):
 AvgLife = The weighted average time to the return of the principal.

The yield of the CMO is compared to a treasury with a maturity close to the WAL

Weighted Average Life (WAL):
 AvgLife = The weighted average time to the return of the principal.

Yield Table

As of 03/2023

Maturity	10/15/40	CA	22%	2016	100%
Accrual	3/1-3/31	TX	5%	2015	0%
Next Pay	4/15/23	IL	5%	2014	0%
Collar	No Band	MA	4%		

Factor 1.0 WACLS 231,807

Loans 16,632

Price-to-Yield

Settle	03/10/23	CF	5.4 CPR	5.6 CPR	5.9 CPR	7.2 CPR	8.4 CPR	11.3 CPR
Indices		C+0	C+300	C+200	C+100	C-100	C-200	C-300

Avg Life	4.00	5.01	4.93	4.81	4.31	3.91	3.30
Mod Duration	3.66	4.52	4.45	4.35	3.93	3.58	3.05
Prin Win Year	2.7-5.4	3.5-6.5	3.4-6.4	3.4-6.3	3.0-5.7	2.7-5.2	2.4-4.4
I Spread	50	32	33	35	43	53	76

The yield of the CMO will likely be compared to a treasury with a maturity close to the WAL.

Avg Life	4.00	5.01	4.93	4.81	4.31	3.91	3.30
Mod Duration	3.66	4.52	4.45	4.35	3.93	3.58	3.05
Prin Win Year	2.7-5.4	3.5-6.5	3.4-6.4	3.4-6.3	3.0-5.7	2.7-5.2	2.4-4.4
I Spread	50	32	33	35	43	53	76

Date Window:

1st number: Number of years in which you can expect to receive your next principal payment
 2nd number: Number of years in which you can expect to receive your final principal payment
 (Based on Prepayment Assumptions)

Date Window:

1st number: Number of years you can expect to receive your next principal payment
 2nd number: Number of years you can expect to receive your final principal payment
 (Based on Prepayment Assumptions)

Yields:

The quoted yield of the CMO based on the dollar price to the left, and based on the prepayment speed above it.

Spreads:

The quoted spread to the Treasury with maturity close to the weighted average life of the CMO.

Example: 4 Year Tsy yield = 4.51
 $4.51 + .50 = 5.01$

		D) Price-to-Yield													
Settle	03/10/23	CF	5.4 CPR	5.6 CPR	5.9 CPR										
Indices		C+0	C+300	C+200	C+100	C-100									
Vary	0	121 PSA	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM						
Price	92-26 ³ / ₈	5.01	4.63	4.65	4.69	4.87	5.05	5.40							
		4.00	5.01	4.93	4.81	4.31	3.91	3.30							
Mod Duration		3.66	4.52	4.45	4.35	3.93	3.58	3.05							
Prin Win	Year	2.7-5.4	3.5-6.5	3.4-6.4	3.4-6.3	3.0-5.7	2.7-5.2	2.4-4.4							
	I Spread	50	32	33	35	43	53	76							
Mar23	74P	72	71	117	128										
	4.4C	4.3	4.3	7.0	7.7										
						Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y
						19	16:43	5.16	5.20	5.01	4.72	4.31	4.17	3.97	3.87
						9.2	Disc	30/360		3Y	98-01 ³ / ₄	5Y	98-20		

Dollar Price

Spread Type:

I = Interpolated Treasury Curve
 A = Actual Treasury

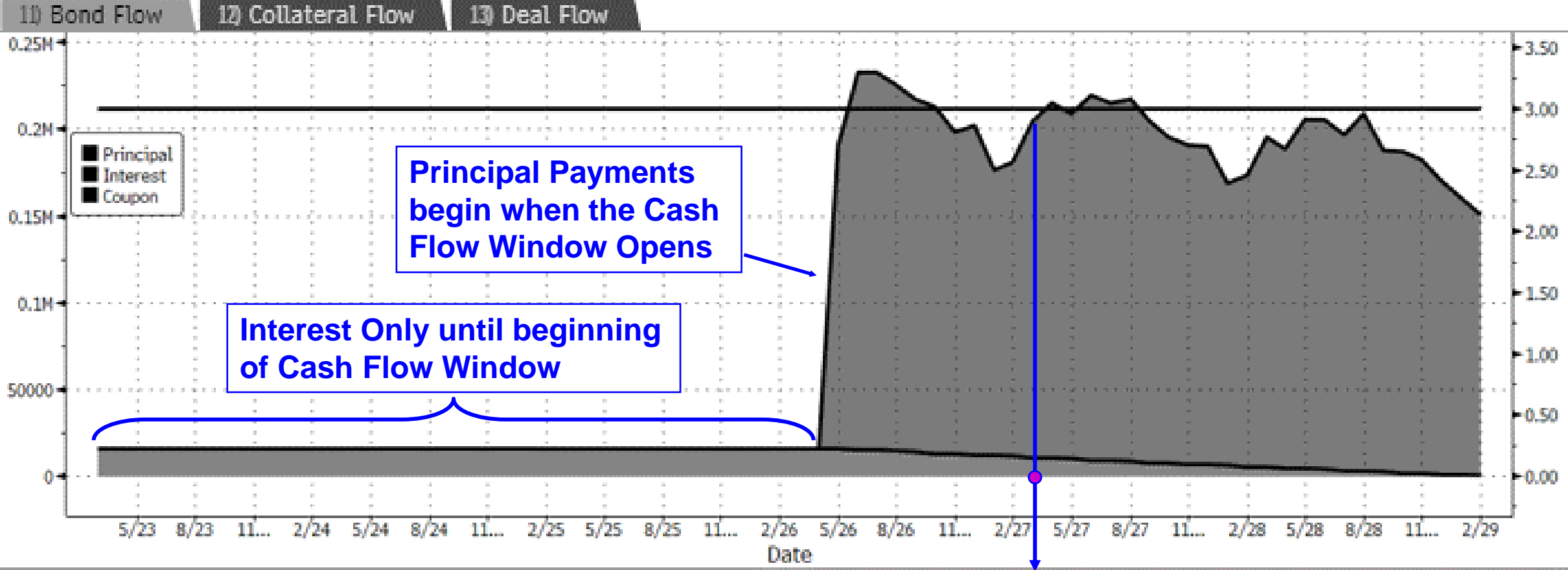
Treasury Curve

Treasury Curve at the time the table was printed

CASH FLOW GRAPH

Enter all values and hit <GO>

FHR 4710 GV Mtge Actions Export Settings Yield Table
 100% FGLMC 3.0 S 3.585(274)76 CUSIP 3137FA5B0 Pool Level As of 03/2023



Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330
 Japan 81 3 4565 8900 Singapore 65 6212 1000 U.S. 1 212

**Weighted Average Life
 WAL of 4.0 years**

**Weighted Average Life
 WAL of 4.0 years**

2023 16:46:12

PAC CMOs ARE **NOT** CREATED EQUAL
VECTOR ANALYSIS



STRUCTURE AT VARIOUS PSA SPEEDS

Enter all values and hit <GO>

FNR 23-4 PH Mtge		Actions	Export	Settings	Yield Table																																																																																																						
100% FNCL 6.5 N		7.477(357)3	CUSIP 3136BPV7	Pool Level	As of 03/2023																																																																																																						
3/2023	682P 4.1C 0.0B	Traits	AD,PAC	Coupon	5.0%	Maturity	6/25/52	NC	14%	2023	0%																																																																																																
3Mo	-- -- --	02/28/2023	20,996,000	LTV/HLTV	84/84	Accrual	3/1-3/31	CA	10%	2022	100%																																																																																																
6Mo	-- -- --	03/25/2023	20,932,427	MAXLS	970,000	Next Pay	4/25/23	FL	9%																																																																																																		
12Mo	-- -- --	Factor	0.99697213	WACLS	405,476	Collar	154-296	WA	9%																																																																																																		
Life	682 4.1 --	# Loans	277																																																																																																								
<table border="1"> <thead> <tr> <th colspan="12">Price-to-Yield</th> </tr> <tr> <th>Settle</th> <th>03/27/23</th> <th>0 MED</th> <th>+300 MED</th> <th>+200 MED</th> <th>+100 MED</th> <th>-100 MED</th> <th>-200 MED</th> <th>-300 MED</th> <th colspan="3"></th> </tr> <tr> <th>Vary</th> <th>0</th> <th>375 PSA</th> <th>119 PSA</th> <th>141 PSA</th> <th>216 PSA</th> <th>734 PSA</th> <th>1057 PSA</th> <th>1219 PSA</th> <th colspan="3"></th> </tr> <tr> <th>Price</th> <th>100-20⁵₈</th> <th>4.80</th> <th>4.85</th> <th>4.83</th> <th>4.83</th> <th>4.65</th> <th>4.53</th> <th>4.48</th> <th colspan="3"></th> </tr> <tr> <th>Avg Life</th> <td></td> <td>4.51</td> <td>5.78</td> <td>5.43</td> <td>5.32</td> <td>2.67</td> <td>2.03</td> <td>1.82</td> <td colspan="3"></td> </tr> <tr> <th>Mod Duration</th> <td></td> <td>3.84</td> <td>4.73</td> <td>4.47</td> <td>4.39</td> <td>2.42</td> <td>1.88</td> <td>1.70</td> <td colspan="3"></td> </tr> <tr> <th>Prin Win</th> <th>Year</th> <td>0.1-11.4</td> <td>0.1-14.0</td> <td>0.1-14.0</td> <td>0.1-14.0</td> <td>0.1-5.9</td> <td>0.1-4.0</td> <td>0.1-3.4</td> <td colspan="3"></td> </tr> <tr> <th>I Spread</th> <td></td> <td>112</td> <td>123</td> <td>121</td> <td>121</td> <td>75</td> <td>51</td> <td>38</td> <td colspan="3"></td> </tr> </thead> </table>												Price-to-Yield												Settle	03/27/23	0 MED	+300 MED	+200 MED	+100 MED	-100 MED	-200 MED	-300 MED				Vary	0	375 PSA	119 PSA	141 PSA	216 PSA	734 PSA	1057 PSA	1219 PSA				Price	100-20 ⁵ ₈	4.80	4.85	4.83	4.83	4.65	4.53	4.48				Avg Life		4.51	5.78	5.43	5.32	2.67	2.03	1.82				Mod Duration		3.84	4.73	4.47	4.39	2.42	1.88	1.70				Prin Win	Year	0.1-11.4	0.1-14.0	0.1-14.0	0.1-14.0	0.1-5.9	0.1-4.0	0.1-3.4				I Spread		112	123	121	121	75	51	38			
Price-to-Yield																																																																																																											
Settle	03/27/23	0 MED	+300 MED	+200 MED	+100 MED	-100 MED	-200 MED	-300 MED																																																																																																			
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I Spread		112	123	121	121	75	51	38																																																																																																			
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y																																																																																							
682P	--	--	--	--	--	--	--	--	--	--	--	14:26	4.84	4.50	4.04	3.84	3.63	3.59	3.52	3.69																																																																																							
4.1C	--	--	--	--	--	--	--	--	--	--	--	Disc	30/360	3Y	102-06	5Y	101-20																																																																																										

STRUCTURE AT *STATIC* CPR SPEEDS

Enter all values and hit <GO>

FNR 23-4 PH Mtge													Actions		Export		Settings		Yield Table			
100% FNCL 6.5 N				7.477(357)3 CUSIP 3136BPYV7				Pool Level		As of 03/2023												
3/2023	682P	4.1C	0.0B	Traits	AD,PAC	Coupon	5.0%	Maturity	6/25/52	NC	14%	2023	0%									
3Mo	--	--	--	02/28/2023	20,996,000	LTV/HLTV	84/84	Accrual	3/1-3/31	CA	10%	2022	100%									
6Mo	--	--	--	03/25/2023	20,932,427	MAXLS	970,000	Next Pay	4/25/23	FL	9%											
12Mo	--	--	--	Factor	0.99697213	WACLS	405,476	Collar	154-296	WA	9%											
Life	682	4.1	--	# Loans	277																	
1) Price-to-Yield																						
Settle	03/27/23			CF	CF	CF	CF	CF	CF	CF	CF	CF	CF									
Vary	0			10 CPR	6 CPR	12 CPR	16 CPR	20 CPR	25 CPR	30 CPR												
Price	100-20 ⁵ _a			4.84	4.86	4.84	4.82	4.78	4.71	4.64												
Avg Life				5.61	6.32	5.51	5.18	4.15	3.27	2.67												
Mod Duration				4.60	5.06	4.52	4.27	3.53	2.87	2.39												
Prin Win				0.1-14.0	0.1-14.0	0.1-14.0	0.1-14.7	0.1-11.8	0.1-9.4	0.1-7.7												
I Spread				122	126	122	120	106	90	74												
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y		
682P	--	--	--	--	--	--	--	--	--	--	--	14:26	4.84	4.50	4.04	3.84	3.63	3.59	3.52	3.69		
4.1C	--	--	--	--	--	--	--	--	--	--	--	Disc	30/360	5Y	101-20	7Y	102-16					

CMO DEAL STRUCTURE

FNR 2023-4 PH Mtge							Deal Summary				
100% FNCL 6.5 N							7.477(357)3 CUSIP 3136BPYV7 <input type="text" value="Pool Level"/>				
Orig Amt	107,353,159	Orig Speed	225 PSA				Group 2: 30YR/6.5/FNMA/G2				
Priced	02/23/2023	1 mo Hist	682.46 PSA	03/01/2023							
Dated	MIXED	Default	375 PSA	0 BAM							
Settled	02/28/2023							Orig	03/01/2023		
First Pay	03/25/2023	Orig	PAC %	SUP/PAC %	SUP %	Other %	WAC	7.4776	7.4771		
03/23 Amt	106,897,277	Curr	84.1		15.9		WAM	29y 10m	29y 09m		
							Age	00y 02m	00y 03m		
CF	Class	Tranche Description	Cpn	Orig Mty	Curr(000)	Original(000)	Factor	0WAL	Curr Band	As Of	
1)	Y PF	FLT, AD, PAC	5.150	03/25/53	67,538	67,729	0.9972	6.30	153-293	03/23	
2)	Y PH	AD, PAC	5.000	06/25/52	20,932	20,996	0.9970	5.40	154-296	03/23	
3)	Y PJ	AD, PAC	5.000	03/25/53	1,580	1,580	1.0000	18.00	69-294	03/23	
4)	Y PK	EXCH, AD, PAC	5.000	03/25/53	22,513	22,576	0.9972	6.30	153-295	03/23	
5)	Y PS	IO, INV, NTL, AD, PAC	1.850	03/25/53	67,538	67,729	0.9972	6.30	153-293	03/23	
6)	Y PZ	Z, SUP	6.500	03/25/53	16,847	17,048	0.9882	11.10	--	--	

16% of the deals supports cash flow stability of the remaining 84%

PREPAYMENT VECTOR...

- Is a customized path of prepayment assumptions
 - Dimensions: Prepayment speed and Length of time
- Enables to analyze different prepayment scenarios
- Uses more than one prepayment constant
- Stress-tests the CMO deal structure
- Helps uncover “hidden” risks of a mortgage security

FAST/SLOW PREPAYMENT VECTOR

Prepay Vectors

Name Type

Text Input

Formatted Input Scaler
Start

Rate	Months	S/R
35.00	6	Ramp
20.00	3	Ramp
15.00	3	Ramp
10.00	3	Ramp
6.00		

Let's model a Fast/Slow vector.

CMO WITH THE PREPAYMENT VECTOR

Enter all values and hit <GO>

FNR 23-4 PH Mtge												Actions		Export		Settings		Yield Table			
100% FNCL 6.5 N				7.477(357)3				CUSIP 3136BPV7				Pool Level		As of 03/2023							
3/2023	682P	4.1C	0.0B	Traits	AD,PAC	Coupon	5.0%	Maturity	6/25/52	NC	14%	2023	0%								
3Mo	--	--	--	02/28/2023	20,996,000	LTV/HLTV	84/84	Accrual	3/1-3/31	CA	10%	2022	100%								
6Mo	--	--	--	03/25/2023	20,932,427	MAXLS	970,000	Next Pay	4/25/23	FL	9%										
12Mo	--	--	--	Factor	0.99697213	WACLS	405,476	Collar	154-296	WA	9%										
Life	682	4.1	--	# Loans	277																
Price-to-Yield																					
Settle	03/27/23			CF	CF	CF	CF	CF	CF	CF	CF	CF	CF								
Vary	100 FAST-SLI			6 CPR	12 CPR	16 CPR	20 CPR	25 CPR	30 CPR												
Price	100-20 ⁵ / ₈			4.90	4.86	4.84	4.82	4.78	4.71	4.64											
Avg Life				9.32	6.32	5.51	5.18	4.15	3.27	2.67											
Mod Duration				6.63	5.08	4.52	4.27	3.53	2.87	2.39											
Prin Win				0.1-24.9	0.1-14.0	0.1-14.0	0.1-14.7	0.1-11.8	0.1-9.4	0.1-7.7											
I Spread				137	126	122	120	106	90	74											
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y	
682P	--	--	--	--	--	--	--	--	--	--	--	14:26	4.84	4.50	4.04	3.84	3.63	3.59	3.52	3.69	
4.1C	--	--	--	--	--	--	--	--	--	--	--	Disc	30/360	7Y	102-16	10Y	99-26+				

Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
 Japan 81 3 4565 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2023 Bloomberg Finance L.P.
 SN 480842 EDT GMT-4:00 H606-42-161 22-Mar-2023 14:29:16

Average life extends an additional 3 years vs. static 6 CPR scenario

LOAN COLLATERAL SELECTION



DRIVERS OF PREPAYMENT SPEEDS

➤ Primary Factors

- Coupon or GWAC
- Type (Term)
- Seasoning

➤ Secondary Factors

- GEO
- Loan Size
- Owner/Investor Allocation
- Servicer
- LTV/FICO

SPECIFIED COLLATERAL EXAMPLES

FNCL 5.0	New WALA	FN MA4806	5.00	5.66	1	360	+ 1/32 vs. FN 5s	145	96.617	5.51	9.88	2.9	6.7
FNCL 5.0	85k Max	FN FS3051	5.00	5.81	4	352	+2 8/32 vs. FN 5s	110	98.828	5.19	8.62	5.4	8.3
FNCL 5.0	110k Max	FR SD1786	5.00	5.75	3	355	+1 27/32 vs. FN 5s	117	98.422	5.25	8.91	4.8	7.9
FNCL 5.0	150k Max	FN BW6304	5.00	5.93	3	356	+1 vs. FN 5s	131	97.578	5.40	8.72	5.8	8.3
FNCL 5.0	175 Max	FN BW9851	5.00	5.89	3	357	+ 18/32 vs. FN 5s	138	97.141	5.46	9.09	4.4	7.8
FNCL 5.0	100% NY	FN BW9911	5.00	5.74	1	360	+ 7/32 vs. FN 5s	137	96.797	5.45	10.75	2.3	5.8
FNCL 5.0	100% Investor	FR SD1623	5.00	5.94	3	357	+ 8/32 vs. FN 5s	142	96.813	5.48	9.73	3.8	6.9
FNCL 5.0	95 HLTV	FN CB4573	5.00	5.92	3	356	+ 7/32 vs. FN 5s	143	96.797	5.49	9.69	2.7	7.0
FNCL 4.5	New WALA	FN MA4805	4.50	5.23	1	360	+ 1/32 vs. FN 4.5s	127	94.006	5.34	10.52	2.0	5.9
FNCL 4.5	85k Max	FN FS2897	4.50	5.29	4	349	+1 24/32 vs. FN 4.5s	110	95.719	5.18	8.77	5.1	7.9
FNCL 4.5	125k Max	FN CB4337	4.50	5.34	4	356	+1 7/32 vs. FN 4.5s	117	95.172	5.24	9.28	4.2	7.3
FNCL 4.5	150k Max	FN BW6292	4.50	5.46	3	357	+ 28/32 vs. FN 4.5s	123	94.844	5.30	9.19	4.9	7.5
FNCL 4.5	175 Max	FN BW6294	4.50	5.47	3	356	+ 22/32 vs. FN 4.5s	125	94.656	5.32	9.35	4.8	7.3
FNCL 4.5	200 Max	FR SD1804	4.50	5.42	2	359	+ 14/32 vs. FN 4.5s	127	94.391	5.33	9.76	2.7	6.8
FNCL 4.5	100% NY	FN FS3102	4.50	5.38	2	359	+ 12/32 vs. FN 4.5s	114	94.344	5.24	11.38	1.4	5.0
FNCL 4.5	100% Investor	FN CB3918	4.50	5.45	6	354	+ 6/32 vs. FN 4.5s	131	94.141	5.37	9.81	3.5	6.6
FNCL 4.5	95 HLTV	FR RA7642	4.50	5.42	4	355	+ 4/32 vs. FN 4.5s	130	94.078	5.35	10.12	2.4	6.3
FNCL 4.0	New WALA	FN MA4700	4.00	4.90	4	355	+ 1/32 vs. FN 4s	109	91.164	5.18	10.92	1.9	5.3
FNCL 4.0	85k Max	FN FS2445	4.00	4.57	6	351	+1 15/32 vs. FN 4s	110	92.594	5.19	8.75	5.3	7.8
FNCL 4.5	125k Max	FN FS2123	4.00	4.66	6	353	+1 2/32 vs. FN 4s	116	92.172	5.24	8.91	4.8	7.6
FNCL 4.0	150k Max	FN FS3097	4.00	4.79	7	351	+ 30/32 vs. FN 4s	118	92.063	5.26	8.89	5.0	7.6
FNCL 4.0	175k Max	FN FS3124	4.00	4.88	4	353	+ 21/32 vs. FN 4s	114	91.766	5.19	9.91	3.0	6.3
FNCL 4.0	200k Max	FR RA7915	4.00	4.96	3	357	+ 15/32 vs. FN 4s	111	91.594	5.17	10.34	2.4	5.9
FNCL 4.0	100% NY	FR SD1720	4.00	4.92	3	358	+ 4/32 vs. FN 4s	92	91.250	5.06	12.21	1.1	4.1
FNCL 4.0	100% Investor	FR SD1426	4.00	4.82	6	355	+ 5/32 vs. FN 4s	115	91.281	5.21	10.38	2.7	5.8
FNCL 4.0	100% High LTV	FR RA7549	4.00	4.92	5	354	+ 4/32 vs. FN 4s	118	91.250	5.24	10.20	2.2	6.0
FNCL 3.5	New WALA	FR SD8264	3.50	4.39	2	359	+ 3/32 vs. FN 3.5s	89	88.188	5.00	11.43	1.3	4.7
FNCL 3.5	85k Max	FN FS1184	3.50	4.08	9	348	+1 14/32 vs. FN 3.5s	113	89.547	5.23	8.41	5.7	8.1
FNCL 3.5	150k Max	FR SD1585	3.50	4.23	7	352	+ 28/32 vs. FN 3.5s	113	88.984	5.21	9.09	4.5	7.2
FNCL 3.5	200k Max	FN CB3127	3.50	4.33	9	351	+ 18/32 vs. FN 3.5s	118	88.672	5.26	9.13	4.5	7.1
FNCL 3.5	225k Max	FN FS1206	3.50	4.25	8	351	+ 11/32 vs. FN 3.5s	119	88.453	5.27	9.26	3.6	6.9
FNCL 3.5	100% NY	FN CB2913	3.50	3.92	10	349	+ 3/32 vs. FN 3.5s	92	88.203	5.02	11.21	2.1	4.5
FNCL 3.5	100% FL	FN FS1173	3.50	4.26	12	347	+ 18/32 vs. FN 3.5s	117	88.656	5.25	9.18	4.6	7.0
FNCL 3.5	100% InvProp	FN CB3417	3.50	4.24	7	353	+ 10/32 vs. FN 3.5s	93	88.416	5.02	10.97	2.3	5.0
FNCL 3.5	100% High LTV	FN CB3770	3.50	4.16	6	353	+ 5/32 vs. FN 3.5s	102	88.266	5.09	10.60	1.7	5.3

DRIVERS OF PREPAYMENT SPEEDS

30 Year MBS			
Collateral Info	Option 1	Option 2	Option 3
Servicer	100% Quicken	20% Wells Fargo	15% PNC
MAX Loan Size	\$1,100,000	\$600,000	\$110k MAX
Number of Loans	30	300	500
GEO %	100% California	30% California	100% New York
Owner Occupied %	100%	95%	90%
Seasoning	Brand New	<1 Yr Seasoned	3 Yrs Seasoned



Prepayment Risk

Highest

Moderate

Lowest

GENERIC 30 YEAR MBS

FR SD8310 Mtge												Actions		Export		Settings		Yield Table						
100% FNCL 6.5 N				7.439(356)2				CUSIP 3132DWGT4				Pool Level		As of 03/2023										
3/2023	3123P	12.5C	0.0B	Traits	CL, Super, 30/360			Coupon	6.5%		Maturity	3/1/53		CA	14%	2023	44%							
3Mo	--	--	--	02/01/2023	190,669,423			LTV/HLTV	80/80		Accrual	4/1-4/30		AZ	6%	2022	56%							
6Mo	--	--	--	03/25/2023	188,418,048			MAXLS	1,089,000		Next Pay	5/25/23		GA	5%	2021	0%							
12Mo	--	--	--	Factor	0.98819226			WAOLS	463,339															
Life	3123	12.5	--	# Loans	479																			
1) Price-to-Yield																								
Settle	04/13/23			24.4 CPR			6.9 CPR			8.5 CPR			13.9 CPR			31.1 CPR			44.8 CPR			60.6 CPR		
Indices				C+0			C+300			C+200			C+100			C-100			C-200			C-300		
Vary	0			100% BAM			100% BAM			100% BAM			100% BAM			100% BAM			100% BAM			100% BAM		
Price	103-01			5.35			6.06			6.01			5.83			4.99			4.23			3.09		
Avg Life				3.43			10.05			8.78			6.00			2.61			1.66			1.06		
Mod Duration				2.81			6.60			6.00			4.54			2.20			1.50			1.02		
Prin Win	Year			0.1-29.6			0.1-29.6			0.1-29.6			0.1-29.6			0.1-29.6			0.1-29.6			0.1-29.6		
I Spread				151			249			242			217			103			1			-136		
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y				
3123P	--	--	--	--	--	--	--	--	--	--	--	13:20	4.82	4.49	4.08	3.88	3.68	3.64	3.57	3.78				
12.5C	--	--	--	--	--	--	--	--	--	--	--	Disc	30/360	3Y	102-01	5Y	99-24 ³ / ₄							

20 YEAR MBS

FN MA4969 Mtge												Actions		Export		Settings		Yield Table					
100% FNCT 6 N				6.943(237)1 CUSIP 31418EQX1				Pool Level		As of 03/2023													
3/2023	171P	0.3C	0.0B	Traits	CT, 30/360	Coupon	6.0%	Maturity	2/1/43	CA	23%	2023	85%										
3Mo	--	--	--	02/01/2023	7,363,475	LTV/HLTV	63/63	Accrual	4/1-4/30	TX	23%	2022	15%										
6Mo	--	--	--	03/25/2023	7,346,918	MAXLS	525,000	Next Pay	5/25/23	FL	9%												
12Mo	--	--	--	Factor	0.9977515	WAOLS	303,113			NJ	6%												
Life	171	0.3	--	# Loans	31																		
1) Price-to-Yield																							
Settle	04/13/23			13.6 CPR	6.0 CPR	8.1 CPR	10.2 CPR	18.2 CPR	20.3 CPR	21.9 CPR													
Indices				C+0	C+300	C+200	C+100	C-100	C-200	C-300													
Vary	0			100% BAM	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM	100% BAM													
Price	102-21 ¹ / ₈			5.33	5.56	5.51	5.44	5.16	5.08	5.02													
Avg Life				5.21	8.04	7.10	6.25	4.16	3.78	3.53													
Mod Duration				4.11	5.90	5.36	4.83	3.37	3.10	2.92													
Prin Win	Year			0.1-19.7	0.1-19.7	0.1-19.7	0.1-19.7	0.1-19.7	0.1-19.7	0.1-19.7													
	I Spread			166	194	187	179	140	128	119													
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y			
171P	--	--	--	--	--	--	--	--	--	--	--	13:25	4.82	4.48	4.09	3.89	3.68	3.64	3.57	3.78			
0.3C	--	--	--	--	--	--	--	--	--	--	--	Disc	30/360	5Y	99-24+	7Y	102-05						

AGENCY CMBS – SEARCH FOR CALL PROTECTION



INTRODUCTION TO AGENCY CMBS

- Agency CMBS is a catch-all term referring to any Agency securitization (FNMA, FHLMC, GNMA) backed by commercial loans (e.g., income producing multifamily properties)

- Each agency has its own variations of Agency CMBS products:
 - FNMA: DUS and ACES
 - FHLMC: K-Certificates, PCs, and FRESBs
 - GNMA: Project Loan CMBS

- Each product comes with its own stipulations on collateral types, structure, and most importantly **call protection**

- Fannie & Freddie loans typically feature a balloon maturity, Ginnie loans are typically fully am
 - Fannie & Freddie ACMBS typically have back-loaded cash flow
 - Ginnie ACMBS are typically structured into CMOs with various WALs

PREPAYMENT RESTRICTION FEATURES

- Multifamily loans securitized into Agency CMBS typically have prepayment restrictions that prohibit or disincentivize voluntary prepayment.
- Prepayment Restrictions take the form of:
 - **Lock-out (LO)** – voluntary prepayment is strictly prohibited
 - **Defeasance (D)** – in lieu of paying off the loan, the borrower buys & pledges Treasury securities to replicate the remaining P&I cashflows and maturity
 - **Yield Maintenance (YM)** – a formula-based prepayment penalty designed to compensate the lender/investor for adverse prepayment & reinvestment risk
 - **Prepayment Penalty (PP)** – penalty points charged to the prepaid amount of the loan; penalty points usually step-down according to a specific schedule
- Prepayment Penalty cashflows are allocated to ACMBS deals in different ways. In some bonds, the investor receives a proportionate share of YM or penalty cashflows. In other bonds, the YM or penalty cashflows are directed towards other tranches.

DUS MBS Examples

FN BS7995 Mtge												Actions		Export		Settings		Yield Table			
US POOL												5.840(60)0		CUSIP 3140LJ3D6		Pool Level		As of 03/2023			
3/2023	P	--C	B	Traits	HX, Partial IO, B...			Coupon	4.71%	Maturity	3/1/28	NC	100%	2023	100%						
3Mo	--	--	--	03/01/2023	20,825,000			LTV	59	Accrual	4/1-4/30										
6Mo	--	--	--	03/25/2023	20,825,000			MAXLS	--	Next Pay	5/25/23										
12Mo	--	--	--	Factor	1.0			DSCR (Curr)	1.250												
Life	--	--	--	# Loans	1																
												1) Price-to-Yield									
Settle	04/03/23			CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF						
Vary	0			0 CPY	100 CPY	60 CPY	40 CPY	20 CPY	0 CPY	0 CPY											
Price	101-27			4.33	4.29	4.32	4.33	4.33	4.33	4.33	4.33	4.33	4.33	4.33	4.33						
Avg Life				4.96	4.47	4.84	4.89	4.92	4.96	4.96	4.96	4.96	4.96	4.96	4.96						
Mod Duration				4.35	3.96	4.26	4.29	4.32	4.35	4.35	4.35	4.35	4.35	4.35	4.35						
Prin Win	Year			3.1-5.0	3.1-4.5	3.1-5.0	3.1-5.0	3.1-5.0	3.1-5.0	3.1-5.0	3.1-5.0	3.1-5.0	3.1-5.0	3.1-5.0	3.1-5.0						
I Spread				66	57	64	65	66	66	66	66	66	66	66	66						
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y	
--P	--	--	--	--	--	--	--	--	--	--	--	12:55	4.83	4.48	4.07	3.87	3.66	3.63	3.56	3.78	
--C	--	--	--	--	--	--	--	--	--	--	--	Disc	30/360	3Y	102-02	5Y	99-26+				

FREDDIE K CMBS

FHMS K086 A2		Export		Sheets		Settings		Yield Table														
US CMBS : FREDDIE				4.427(68)53 CUSIP 3137FKSH0				95 Buy	96 Sell													
03/23	1mo	0.00	WAOLS	40MMMob...	1.60%	AK	0.41%	Coupon	3.86% Delay	24	Maturity	11/25/2028										
30D	0.00	3mo	0.00	LTV	57.17	Mfam	92.56%	AZ	12.01%	Descr	SC,AFCC	Face	833MM	Created	03/28/2023							
60D	0.00	6mo	0.00	DSCR	1.90		CA	8.89%		O	Face	833MM	1st Proj	04/25/2023								
90+D	0.00	12mo	0.00	CL Pls	--		CO	2.54%	# Loans	54	Factor	1.0000	Next Pay	05/25/2023								
							CT	2.95%						Mthly								
Price-to-Yield																						
Settle	04/03/23		CF		CF		CF		CF		CF		CF									
Calls			N		N		N		N		N		N									
Vary	0		0 CPY		100 CPY		80 CPY		60 CPY		40 CPY		20 CPY		0 CPY							
Price	98-00		4.247		4.272		4.259		4.256		4.253		4.250		4.247							
Avg Life			5.59		5.19		5.39		5.44		5.49		5.54		5.59							
Modmed Duration			4.94		4.61		4.77		4.82		4.86		4.90		4.94							
Prin Win	Year		4.7-5.7		2.6-5.4		2.8-5.7		2.9-5.7		3.1-5.7		3.6-5.7		4.7-5.7							
Spread	I		59.7		61.6		60.6		60.3		60.1		59.9		59.7							
GOVT(I)	12:57	6M	4.83	1Y	4.48	2Y	4.06	3Y	3.87	5Y	3.66	7Y	3.63	10Y	3.56	30Y	3.78	5Y	99.846	7Y	102.25	30/360

Typical Bank Portfolio Mortgage Products Menu

- Generic Agency MBS
- Specified Agency MBS
- Agency Sequential CMO
- Agency PAC CMO
- Agency CMBS Fixed Rate
- Agency CMBS Variable Rate
- SBA pool Fixed Rate
- **SBA pool Variable Rate**

VARIABLE RATE SBA POOL – STATIC RATES

SBA 530307 Mtge												Actions		Export		Settings		Yield Table					
US POOL				5.500(301)2 CUSIP 8316A0KV1				Pool Level		As of 03/2023													
3/2023	OP	0.0C	B	Traits	STANDARD, Quart..	Coupon	5.5%	Maturity	5/25/48														
3Mo	--	--	--	01/01/2023	113,076,271	LTV/HLTV	--/--	Accrual	4/1-4/30														
6Mo	--	--	--	04/25/2023	112,729,637	MAXLS	--	Next Pay	6/25/23														
12Mo	--	--	--	Factor	0.99693451	WACLS	--																
Life	0	0.0	--	# Loans	68	PRIME	+-2.00..	Cap Flr				Mths to Reset 1											
				1) Price-to-Yield						Current PRIME 8.00000													
Settle	04/18/23			CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF									
Indices				C	C	C	C	C	C	C	C	C	C	C									
Vary	0			10 CPR	6 CPR	12 CPR	18 CPR	24 CPR	30 CPR	36 CPR													
Price	101-16			5.62	5.70	5.57	5.42	5.25	5.08	4.89													
Avg Life				7.19	9.50	6.34	4.58	3.50	2.79	2.29													
Spread Duration				5.23	6.48	4.74	3.66	2.93	2.42	2.04													
Prin Win	Year			0.2-25.1	0.2-25.1	0.2-25.1	0.2-25.1	0.2-25.1	0.2-25.1	0.2-25.1													
	I Spread			199	214	193	171	144	117	88													
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y			
OP	0	--	--	--	--	--	--	--	--	--	--	12:59	4.82	4.48	4.06	3.87	3.66	3.63	3.56	3.78			
0.0C	0.0	--	--	--	--	--	--	--	--	--	--	Disc	30/360	7Y	102-08	10Y	99-16						

VARIABLE RATE SBA POOL – RATE SHOCKS

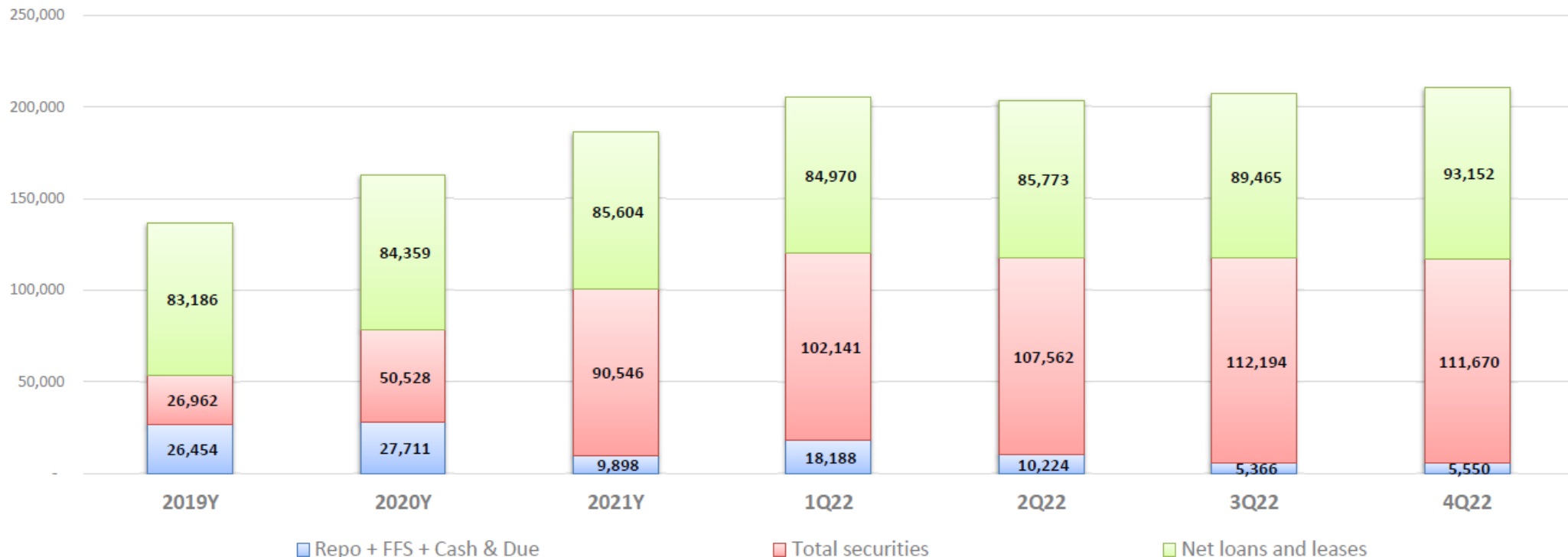
SBA 530307 Mtge													Actions		Export		Settings		Yield Table									
US POOL													5.500(301)2 CUSIP 8316A0KV1		Pool Level		As of 03/2023											
3/2023	OP	0.0C	B	Traits	STANDARD, Quart..	Coupon	5.5%	Maturity	5/25/48																			
3Mo	--	--	--	01/01/2023	113,076,271	LTV/HLTV	--/--	Accrual	4/1-4/30																			
6Mo	--	--	--	04/25/2023	112,729,637	MAXLS	--	Next Pay	6/25/23																			
12Mo	--	--	--	Factor	0.99693451	WACLS	--																					
Life	0	0.0	--	# Loans	68	PRIME	+/-2.00...	Cap Flr	Mths to Reset	1																		
													1) Price-to-Yield					Current PRIME 8.0000%										
Settle	04/18/23			CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF							
Indices				C	C+150	C+100	C+50	C-50	C-100	C-150																		
Vary	0			10 CPR	10 CPR	10 CPR	10 CPR	10 CPR	10 CPR	10 CPR																		
Price	101-16			5.62	7.09	6.60	6.11	5.13	4.64	4.15																		
Avg Life				7.19	7.37	7.31	7.25	7.12	7.05	6.99																		
Spread Duration				5.23	4.96	5.05	5.14	5.32	5.41	5.51																		
Prin Win				0.2-25.1	0.2-25.1	0.2-25.1	0.2-25.1	0.2-25.1	0.2-25.1	0.2-25.1																		
I Spread				199	347	298	248	150	101	52																		
Mar23	Feb	Jan	Dec	Nov	Oct	Sep	Aug	Jul	Jun	May	Apr	GOVT(I)	6M	1Y	2Y	3Y	5Y	7Y	10Y	30Y								
OP	0	--	--	--	--	--	--	--	--	--	--	12:59	4.82	4.48	4.06	3.87	3.66	3.63	3.56	3.78								
0.0C	0.0	--	--	--	--	--	--	--	--	--	--	Disc	30/360	7Y	102-08	10Y	99-16											

BANK CASE STUDY – Loss Trade



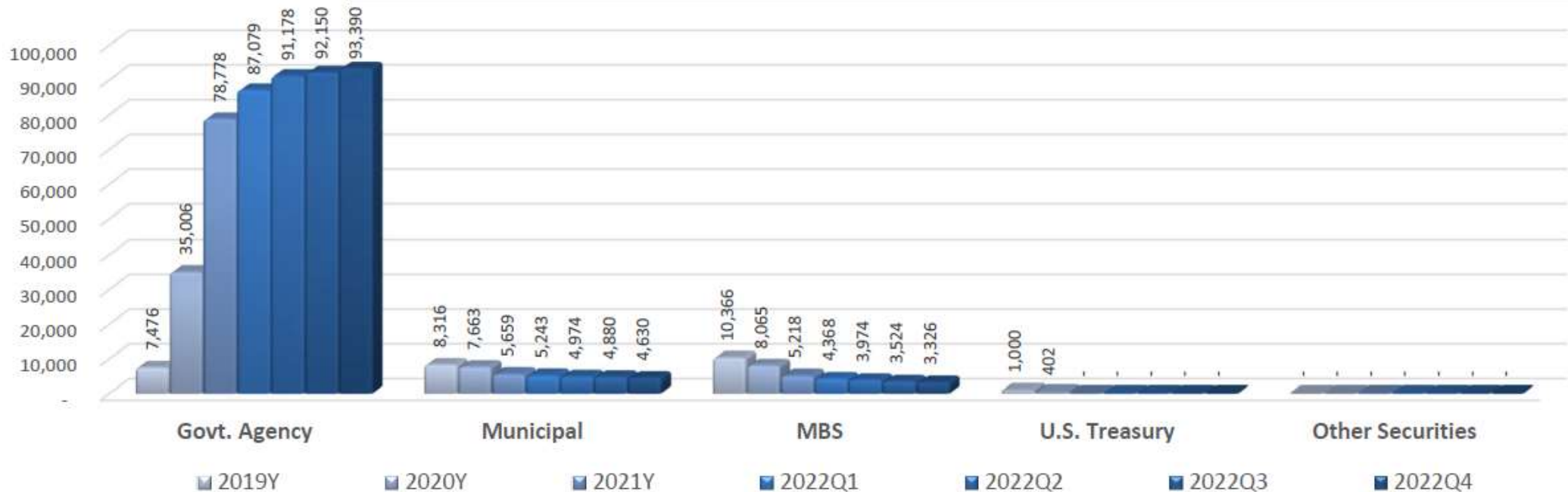
BALANCE SHEET MIX ANALYSIS

	2019Y	2020Y	2021Y	2022Q1	2022Q2	2022Q3	2022Q4
Cash & due from depository institutions	26,454	15,939	6,903	9,746	8,912	5,366	5,108
Federal funds sold and Repos	-	11,772	2,995	8,442	1,312	-	442
Total securities	26,962	50,528	90,546	102,141	107,562	112,194	111,670
Net loans and leases	83,186	84,359	85,604	84,970	85,773	89,465	93,152
Bank premises and fixed assets	1,621	1,683	1,535	1,487	1,442	1,426	1,381
Intangibles	-	-	-	-	-	-	-
All other assets	12,056	12,088	12,198	12,379	12,535	12,296	12,682
Total assets	150,279	176,369	199,781	219,165	217,536	220,747	224,435



CURRENT INVESTMENT PORTFOLIO

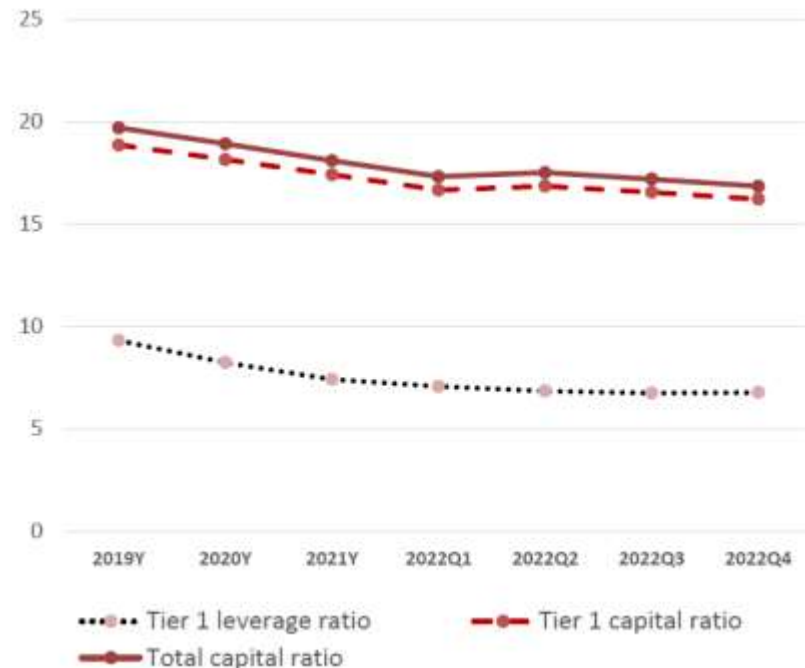
	2019Y	2020Y	2021Y	2022Q1	2022Q2	2022Q3	2022Q4
Govt. Agency	7,476	35,006	78,778	87,079	91,178	92,150	93,390
Municipal	8,316	7,663	5,659	5,243	4,974	4,880	4,630
MBS	10,366	8,065	5,218	4,368	3,974	3,524	3,326
U.S. Treasury	1,000	402	-	-	-	-	-
Other Securities	-	-	-	-	-	-	-
CMO	-	-	-	-	-	-	-
CMBS	-	-	-	-	-	-	-
Equity	-	-	-	-	-	-	-
Total Securities (Fair Value)	27,158	51,136	89,655	96,690	100,126	100,554	101,346
Life Insurance Assets	9,325	9,567	9,567	9,624	9,679	9,737	9,794



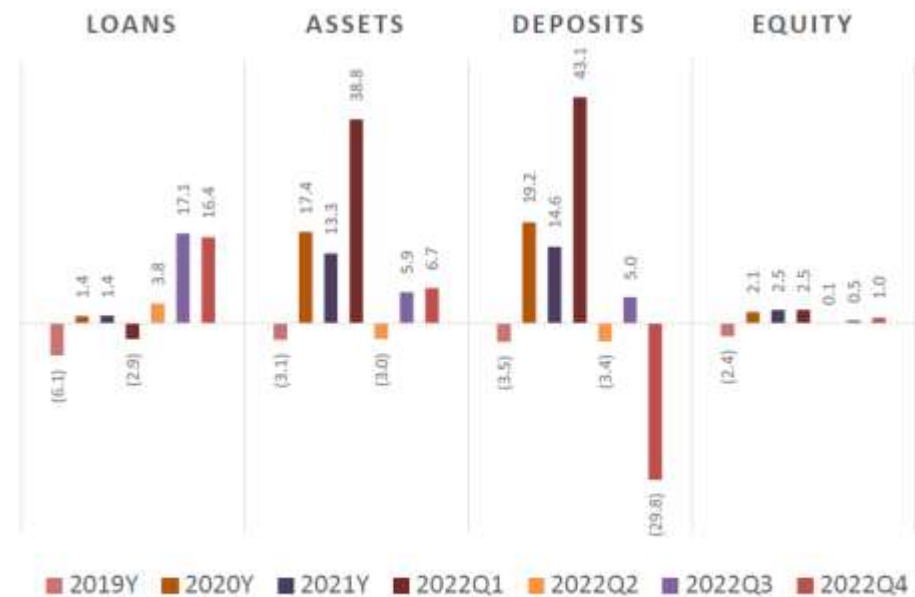
BANK'S ASSET GROWTH HAS OUTPACED CAPITAL RETENTION

	2019Y	2020Y	2021Y	2022Q1	2022Q2	2022Q3	2022Q4
Equity capital ratio	9.29	8.64	7.66	7.09	6.87	6.77	6.80
Tier 1 leverage ratio	9.34	8.26	7.44	7.09	6.87	6.77	6.80
CET1 capital ratio	18.88	18.17	17.43	16.68	16.87	16.57	16.23
Tier 1 capital ratio	18.88	18.17	17.43	16.68	16.87	16.57	16.23
Total capital ratio	19.71	18.93	18.11	17.33	17.53	17.21	16.86
<hr/>							
Growth Rate of Loans	(6.1)	1.4	1.4	(2.9)	3.8	17.1	16.4
Growth Rate of Assets	(3.1)	17.4	13.3	38.8	(3.0)	5.9	6.7
Growth Rate of Deposits	(3.5)	19.2	14.6	43.1	(3.4)	5.0	(29.8)
Growth Rate of Tier 1 Capital	(2.4)	2.1	2.5	2.5	0.1	0.5	1.0

REGULATORY CAPITAL RATIO TRENDS



BALANCE SHEET GROWTH RATES



BROKER STRATEGY RECOMMENDATION

Summary of Strategies

Impact on Earnings					
Net Interest Income	5,229	6,134	905	5,562	333
Net Interest Margin	2.56%	3.42%	0.85%	3.07%	0.51%
Net Income	1,154	1,869	715	1,417	263
ROAA	0.53%	0.97%	0.44%	0.73%	0.20%
ROAE	7.70%	12.47%	4.77%	9.46%	1.76%
Pretax Gain / (Loss)		(2,505)		(1,029)	
After-tax Gain / (Loss)		(1,979)		(813)	
Earnback Period (Years)		2.77		3.09	
Impact on Capital					
Tier 1 Leverage	6.80%	6.64%	(0.16%)	7.18%	0.38%
CET1 Risk Based	16.23%	14.89%	(1.34%)	16.22%	(0.01%)
Tier 1 Risk Based	16.23%	14.89%	(1.34%)	16.22%	(0.01%)
Total Risk Based	16.86%	15.55%	(1.31%)	16.88%	0.02%
Tangible Equity Ratio	6.72%	7.47%	0.75%	7.46%	0.74%
TCE / TA	6.72%	7.47%	0.75%	7.46%	0.74%
Impact on -100 EVE		(549)		(594)	
Impact on +300 EVE		1,585		1,961	

evaluate impact

STEP 2: evaluate impact to Tier 1 Leverage

STEP 3: consider the Earnback Period

Strategy 1: Transaction Detail

Earnback period is **longer** than the average life of the securities

Portfolio Summary	Current Face	Book Price	Market Price	Gain / Loss	Book Yield	Avg. Life	Eff. Dur.
Current Portfolio	113,875	100.03	90.69	(10,639)	1.51	3.5	2.9
Security Sales	24,500	100.00	89.78	(2,505)	0.54	2.6	2.5
Pro Forma Portfolio	89,375	100.04	90.94	(8,134)	1.78	3.7	3.0

Liability Summary	Par Amount	Market Price	Gain / Loss	Rate	Rem. Mat.	Eff. Dur.
Liabilities Paid Off	22,521	100.00	-	4.60	0.0	0.0

Net Interest Margin Impact ↑ 0.85%

Income Change
(131)
1,036
905
(190)
715

Effect on Income (Book Values)			
	Yield	Amount	Income Change
Interest Income Given Up	0.54	24,500	(131)
Reduction in Interest Expense	4.60	22,521	1,036
Cumulative Effect on Pretax Nil			905
Provision for Taxes (Assumes 21% Tax Rate)			(190)
Cumulative Effect on Net Income			715


Eff	Cvx.	Gain / Loss
	0.1	(412,760)
	0.0	(2,092,145)
	-	-
	-	-
	-	-
	0.0	(2,504,905)

Strategy 2: Transaction Detail

Strategy 2 solve

Portfolio Summary	Current Face	Book Price	Market Price	Gain / Loss	Book Yield	Avg. Life	Eff. Dur.
Current Portfolio	113,875	100.03	90.69	(10,639)	1.51	3.5	2.9
Security Sales	23,025	100.25	95.78	(1,029)	2.99	3.8	2.8
Pro Forma Portfolio	90,850	99.97	89.40	(9,610)	1.14	3.4	3.0

Liability Summary	Par Amount	Market Price	Gain / Loss	Rate	Rem. Mat.	Eff. Dur.
Liabilities Paid Off	22,270	100.00	-	4.60	0.0	0.0

Net Interest Margin Impact  0.51%

Effect on Income (Book Values)			
	Yield	Amount	Income Change
Interest Income Given Up	2.99	23,083	(691)
Reduction in Interest Expense	4.60	22,270	1,024
Cumulative Effect on Pretax Nil			333
Provision for Taxes (Assumes 21% Tax Rate)			(70)
Cumulative Effect on Net Income			263

Category	Current P	Asset
Agency Bullet	4,00	
Callable Agency	91,00	
Agency Step	8,50	
MBS Fixed	3,45	
Municipal	5,66	
CD	1,25	
Total	113,87	

Earnback period is slightly **shorter** than the average life of the securities but still exceeds 3 years

If FHLB rate averages below 4.60% over the next 3 years (expected to), the bank may never earn back the loss

but still exceeds 3 years

FED FUNDS RATE PROBABILITY

Set Default | Export | World Interest Rate Probability

Show Models >>

Enable Overrides

Region: United States >>

Instrument: Fed Funds Futures >>

Target Rate 4.75

Pricing Date

02/13/2023

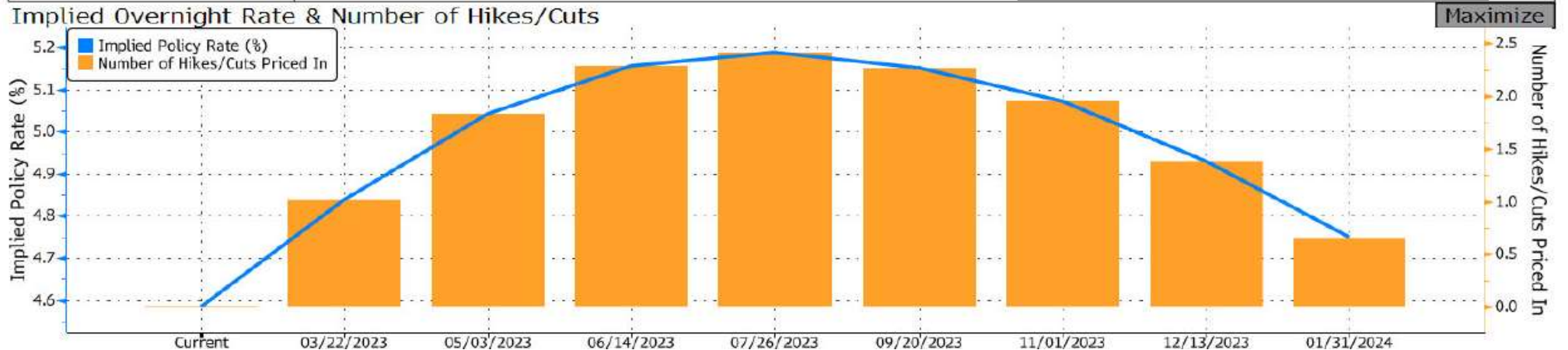
Effective Rate 4.57

Cur. Imp. 0/N Rate

4.584

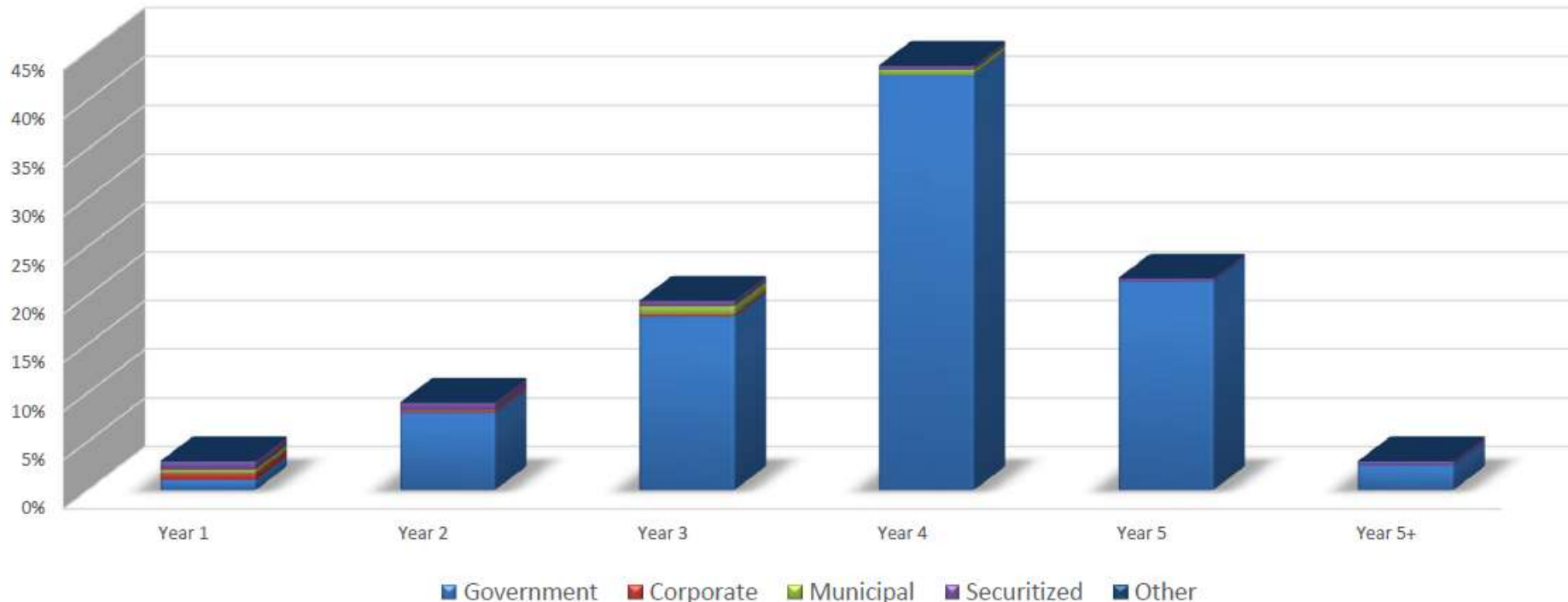
Meeting	#Hikes/Cuts	%Hike/Cut	Imp. Rate Δ	Implied Rate	A.R.M.
03/22/2023	+1.015	+101.5%	+0.254	4.838	0.250
05/03/2023	+1.834	+81.9%	+0.458	5.042	0.250
06/14/2023	+2.290	+45.6%	+0.573	5.156	0.250
07/26/2023	+2.415	+12.4%	+0.604	5.188	0.250
09/20/2023	+2.270	-14.5%	+0.567	5.151	0.250
11/01/2023	+1.954	-31.6%	+0.488	5.072	0.250
12/13/2023	+1.381	-57.3%	+0.345	4.929	0.250
01/31/2024	+0.655	-72.6%	+0.164	4.748	0.250

#Hikes/Cuts – cumulative number of 25 bps rate hikes/cuts
%Hike/Cut – probability of a 25 bps rate hike/cut
Imp. Rate – cumulative implied rate change in bps
Implied Rate – implied effective rate after hikes/cuts
A.R.M. - expected size of the rate hike/cut



TAYLOR ADVISORS PORTFOLIO ANALYTICS – CUMULATIVE CASH FLOWS

Scenario	Government	Corporate	Municipal	Securitized	Other	Total	Cumulative
Year 1	1,328	782	464	951	-	3,525	3%
Year 2	9,353	259	54	825	-	10,491	12%
Year 3	20,797	258	946	622	-	22,623	32%
Year 4	49,540	-	539	471	-	50,550	75%
Year 5	24,976	-	-	326	-	25,302	97%
Year 5+	3,040	-	-	478	-	3,518	100%
Total	109,034	1,299	2,003	3,673	-	116,009	
% of Total	94%	1%	2%	3%	0%		



LOSS TRADE SUMMARY COMMENTS/RECOMMENDATIONS

➤ Balance Sheet Considerations

- The bank's asset growth has outpaced capital generation, which pressured Leverage Ratio
- Most, if not all, of the bank's investment portfolio is designated as Held-To-Maturity
 - Selling HTM bonds would likely “taint” the portfolio

➤ Loss Trade Comments

- Scenario 1 results in decrease of Leverage Ratio
- Loss earnback period is not favorable – it is too long for both Scenarios
 - For Scenario 1 it is longer than remaining life of the bonds
- Earnback assumes FHLB rate of 4.60% - if this rate average lower over, the earnback period would extend

➤ Additional Considerations

- The bank can benefit from investment strategy adjustment to include better risk/reward sectors to lead to higher performance over longer horizons
- More work may need to be done on liquidity assessment and management and how to retain and grow deposits, in addition to capital stress testing