Bank of America

An Introduction to Agency MBS Derivatives

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- A mortgage derivative can be defined as a CMO class with leveraged exposure to prepayments on the underlying collateral. The coupon on the class can either be fixed (IO, PO) or floating (floater, inverse floater). In this primer, we provide an introduction to mortgage derivatives whose coupon payments are indexed to LIBOR. Specifically, this primer covers Floaters, Inverse floaters, Inverse IOs, TTIBs, Digital IOs, and Toggle floaters.
- Mortgage derivatives offer a wide range of duration, curve shape, and convexity exposures and several types of institutional investors actively participate in this market. We present a detailed discussion on the investment rationale and risk characteristics for different MBS derivative products.
- A **floater** is a CMO class whose coupon periodically resets at a specified spread over a specified index, subject to a cap and a floor. In contrast, an **inverse floater** has a coupon with an inverse linear relationship to its index.
- An **Inverse IO (IIO)** is an interest-only security with a coupon formula similar to that of an inverse floater. It differs from an inverse floater in that inverse IOs don't receive any principal payments. Inverse IOs usually offer very high current yields and are excellent investment vehicles for investors who believe that interest rates will remain range-bound and/or believe that the yield curve is likely to steepen.
- **TTIBs** are securities that typically offer high current yields and are a good investment vehicle for investors who either have a bullish view on interest rates or believe that rates will not back-up significantly. On the other hand, **Digital IOs** and **Super floaters** offer low base case yields but have the potential to offer very high yields if rates were to back up significantly.
- **Toggle floaters** are an attractive option for investors willing to take on some LIBOR risk for earning higher spreads. For instance, investors can earn a spread of 125-250 bps over 1-mo LIBOR by investing in toggle floaters versus the 30-50 bps of margin typically offered by most other CMO floaters.

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I. INTRODUCTION

In our previous primer on the Agency CMO market,[1] we discussed how different CMO structures can be created by redistributing the principal (both scheduled and prepaid) and interest cash-flows of the underlying mortgage pools. For instance, one can create sequentials or PAC bonds by sequential allocation of principal, or allocation of principal depending on prepayment speeds. Likewise, allocation of interest to pay principal for some other tranches allows one to create Z-bonds and VADMs. In this primer, we cover a class of CMO structures where the coupon payment on the security is indexed to a short term rate, usually the 1-month LIBOR rate. This results in securities that are sensitive to both short-term rates (index changes) and long-term rates (through prepayment rates). We call this class of securities mortgage derivatives. In this primer, we provide an introduction to a few of the more important mortgage derivatives like floaters, inverse floaters, inverse IOs, TTIBs, digital IOs and toggle floaters.

Mortgage derivatives offer a wide range of duration and convexity exposures. For instance, inverse floaters have very large positive duration and large negative convexity. On the other hand, a digital IO has a very large negative duration and very large positive convexity. Furthermore, mortgage derivatives offer very diverse exposures to different parts of the yield curve. For example, inverse IOs have positive short-rate partials but negative long-rate partials. Due to this diversity in duration, convexity, and curve exposure, investors can better customize their MBS portfolios using mortgage derivatives. As we will see later in this primer, many of these instruments allow investors to earn high current yields if future interest rates evolve in a certain way. Also, because of the uniqueness of each bond, there are more frequent opportunities for mis-pricing in the mortgage derivative market which creates opportunities for investors to buy cheap cash flows. In this primer, we present a detailed discussion on the risk characteristics and investment rationale for different MBS derivative products.

This primer is organized as follows: We begin the primer with a detailed analysis of the risk characteristics of floaters and inverse floaters. A floater is a CMO bond whose coupon resets periodically at a specified spread over a specified index (typically one-month LIBOR) subject to certain caps and floors. In contrast, an inverse floater has a coupon that has an inverse linear relationship to its index, also subject to caps and floors. Floaters and inverse floaters appeal to different groups of investors and offer widely different yields/spreads to compensate investors for the different risks associated with these securities.

In Section III, we provide a detailed discussion of Inverse IOs. An Inverse IO (IIO) is an interest-only security with a coupon formula similar to that of an inverse floater i.e., the coupon has an inverse linear relationship to its index and is subject to caps and floors. It differs from an inverse floater in that inverse IOs don't receive any principal payments. Inverse IOs usually offer very high current yields and are excellent investment vehicles for investors who believe that interest rates will remain range-bound and/or the yield curve is likely to steepen.

In Section IV, we present a brief introduction to the coupon payoff structure of TTIBs, digital IOs and super floaters. Two-Tiered Index Bonds (TTIBs)[2] are securities that usually offer high current yields and are a good investment vehicle for investors that either have a bullish view on interest rates or think that rates will not back-up significantly. On the other hand, digital IOs and super floaters may offer low base case yields, but have the potential to offer very high

[1] Please see our primer "*Introduction to Agency CMO Structures*" published on October 16, 2006.
[2] Also known as two-tiered inverse bonds.

yields if rates were to back up substantially. Thus, they usually offer a cheap alternative to investors for hedging their portfolios against a sell-off in rates. We present a brief introduction to the coupon payoff structure of TTIBs, digital IOs and super floaters followed by a discussion on different structuring aspects of and the risks and rewards associated with these bonds.

In the last section, we present a brief introduction to a relatively new class of floaters called toggle floaters. Toggle floaters are an attractive option for investors willing to take on some LIBOR risk for earning higher spreads. For instance, investors can earn a spread of 125-250 bps over 1-mo LIBOR by investing in toggle floaters versus the 30-50 bps of margin typically offered by most other CMO floaters.

II. FLOATERS AND INVERSE FLOATERS

A fixed rate bond can be split into a pair of simultaneously amortizing floating rate bonds – a floater and an inverse floater. A floater is a CMO class whose coupon resets periodically at a specified spread over a specified index (typically one-month LIBOR), subject to certain caps and floors. In contrast, an inverse floater has a coupon that has an inverse linear relationship to its index, also subject to caps and floors.

Structuring Floater/Inverse Floater Combinations

Figure 1 shows an example of creating a floater and an inverse floater from a fixed-rate bond.[3] Starting with a 6% coupon passthrough, we structure a floater and an inverse floater with the following coupon formulas:

Floater Coupon = 1-mo LIBOR + 50 bps, Cap of 7.5%, Floor of 0.5%

Inverse Floater Coupon = 28% - 4 * 1-mo LIBOR, Cap of 28%, Floor of 0%

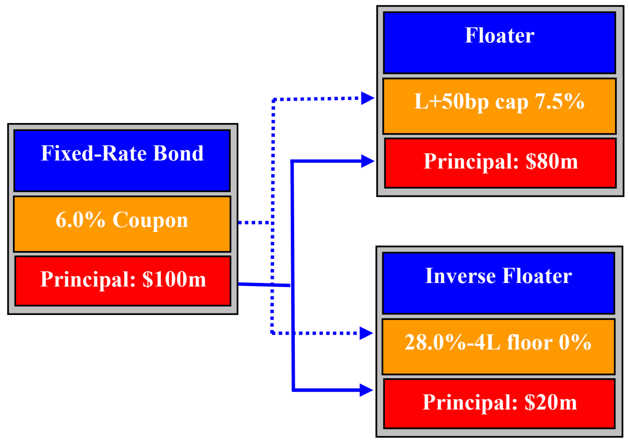
Usually, the most important determinant of a floater/inverse floater structure is the cap on the floater coupon. In the example shown in Figure 1, let’s assume that an investor prefers a floater with a cap of 7.5%. The cap on the floater, along with the coupon of the pass-through used to structure the floater, determines the principal amount of floater that a dealer can create from a given passthrough. For instance, starting with $100mm face value of a 6% pass-through, a dealer can create $80mm ($100mm x 6%/7.5%) of floater and $20mm of inverse floater.

Usually, newly issued floaters are priced at par and the market conditions determine the index margin on the floater such that the floater is priced at par. In our example, we assume that an index margin of 50 bps makes the floater trade at par. Note that the structuring parameters i.e., face values, coupons and caps and floors of the floater and inverse floater are jointly determined such that the weighted average coupon of the floater/inverse floater pair matches the coupon on the underlying bond for all values of the index. In the above example, the ratio of face amounts of the floater and the inverse floater is 4:1. Consequently, the inverse floater has a multiplier of negative 4 in its coupon reset equation to ensure that the weighted average coupon of the bonds is equal to the coupon on the fixed-rate bond for all levels of LIBOR. The relative size of the floater with respect to the inverse floater, also known as **leverage** of the inverse floater, determines the risk of the inverse floater.

Furthermore, the floor on the inverse floater comes from the cap on the floater and vice versa. For example, a 1-mo LIBOR value of 7.0%, which corresponds to the cap of 7.5% on the floater, is used to determine the cap of 28.0% on the inverse floater by multiplying it with the leverage of the inverse floater. This ensures that when the floater hits its cap, the inverse floater hits its floor and vice versa. The weighted average coupon of the two bonds remains 6.0% in all scenarios.

[3] A floater can also be created from a synthetic premium pass-through as shown in the section on Inverse IOs. Using synthetic premium pass-throughs allows for creating floaters with higher caps.

Figure 1: Creating a Floater and an Inverse Floater from a Fixed-Rate Bond



Step 1: Decide on floater cap (7.5% in this example).

Step 2: Market conditions determine the spread over LIBOR that a floater offers (50 bps).

Step 3: Floater Principal = Fixed Rate Bond Principal x Fixed Rate Bond Coupon/Floater Cap

= $100mm x 6%/7.5% = $ 80mm

Step 4: Inverse Floater Principal = Fixed Rate Bond Principal – Floater Principal

= $100mm - $80mm = $20mm

Step 5: Leverage, L = Floater Principal/Inverse Floater Principal

= $80mm/$20mm = 4

Step 6: Inverse Floater Cap = Leverage x (Floater Cap – Floater Floor)

= 4 x (7.5% - 0.5%) = 28%

Step 7: Inverse Floater Coupon = Inverse Floater Cap – Leverage x Libor

= 28% - 4L

Source: Banc of America Securities

By construction, an inverse floater is equivalent to a long position in the underlying fixed rate bond, *partially* financed through a capped floater position (paying 1-mo LIBOR + spread). If the leverage of an inverse floater is L, then the inverse floater amounts to $(1 + L)$ position in a fixed rate bond where only L positions are financed (i.e., it is only partially financed) at a floating rate of 1-mo LIBOR plus a fixed spread with a cap on the financing costs. Note that relative to a straight Libor financing, an inverse floater offers a cap on the financing cost. This cap corresponds to the 1-mo LIBOR rate where the floor on the inverse floater's coupon is hit.

Equivalently, an inverse floater can be viewed as a combination of a long position in the fixed rate bond plus a capped swap (receive fixed / pay floating). This implies that an inverse floater will be much more sensitive to interest rate changes as compared to the fixed rate bond due to its exposure to the additional interest rate risk from the swap. To illustrate, let us consider the above example again:

$100mm Fixed Rate Bond = $80mm Capped Floater + $20mm Inverse Floater

- $20mm Inverse Floater = $100mm Fixed Rate Bond - $80mm Capped Floater
- $20mm Inverse Floater = $20mm Fixed Rate Bond + $80mm Capped Swap (Receive Fixed / Pay Floating)

The equation implies that a $20mm position in an inverse floater is equivalent to a $20mm position in the fixed rate bond plus a capped swap with a four times bigger notional balance. The increased sensitivity of the inverse floater is proportional to the size of the swap, which in turn comes from the leverage of the inverse floater. However, it should be noted that swaps described above are different from conventional fixed for floating swaps due to the inverse relationship between prepayment speeds and the level of interest rates.

Risk Characteristics of Floaters and Inverse Floaters

Figure 2 shows some risk and valuation metrics for a floater and an inverse floater created from a 6% 30-year fixed-rate passthrough. Usually, floaters have low durations, low negative convexity, and reduced exposure to prepayment risks relative to the underlying collateral. In addition, they typically also have negative duration exposure to the short-end of the yield curve because of the floater cap. When short-term rates increase, the value of the floater cap decreases and vice-versa. Consequently, floaters usually benefit when the yield curve flattens and get hurt when the curve steepens.

On the other hand, inverse floaters generally have longer durations, higher negative convexity, and higher exposure to prepayment risks relative to the underlying collateral. As discussed above, an inverse floater is created as the difference between a fixed rate bond and a floater. Since a floater has very low duration, its price should be relatively stable over time. Note that this also implies that the fluctuations in the prices of the underlying fixed-rate bond are amplified in the inverse floater's price fluctuations. The price leverage embedded in an inverse floater is directly related to the index multiple in the coupon formula. Thus, an inverse floater reacts like a leveraged fixed-rate bond position. For instance, duration and convexities of the inverse floater shown in Figure 2 are several times higher than that of the 6% passthrough used to structure it. Finally, inverse floaters usually benefit relative to the underlying collateral when the yield curve steepens and get hurt when the curve flattens.

Figure 2: Risk and Valuation Metrics For a Floater and an Inverse Floater

Security	Coupon	Price	LOAS (bps)	Effective Duration	Effective Convexity	Partial Duration				Volatility Duration	Prepayment Duration
						2yr	5yr	10yr	30yr		
Floater	L + 50, 7.5% cap	100-26	-9.0	0.4	-1.0	-0.06	-0.35	0.69	0.09	0.03	0.00
Inverse Floater	28% - 4 x L	100-12+	-9.0	13.3	-8.9	5.00	5.74	2.37	0.30	0.10	0.01
Collateral	6.0%	100-14+	-9.0	3.0	-2.6	0.97	0.86	1.03	0.18	0.05	0.00

Source: Banc of America Securities. Prices as of 10/06/06 close.

CMO desks can create a wide range of floater/inverse floater combinations to suit investor preferences by changing the relative sizes of floaters and inverse floaters (which in turn change the cap of the floater and the leverage of the inverse floater). For instance, using $100mm face value of 6% collateral, we have created floaters/inverse floater structures with different caps/leverage and listed their risk characteristics in Figure 3. Cases 1 through 4 have different caps/leverage for floaters/inverse floaters. While cases 4 and 5 have the same leverage but have different margins on the floater, which leads to having different caps on the inverse floater.

We can see that the leverage and the margin jointly shape the risk profile of floaters and inverse floaters. In the base case (Case#1), floaters show a modest positive duration and negative convexity because of the combined effect of the cap on the floater and the impact of prepayments on the value of the 50 bps margin offered by the floater. Both the duration and negative convexity of floaters decrease when the embedded leverage in the structure is decreased since this amounts to increasing the cap on the floater. Finally, floaters have negative durations in Cases 4 and 5. This happens because the strike rate for the cap is so far away from the current level of 1-mo LIBOR that the positive duration of the cap is overwhelmed by the negative duration of the 50 bp spread/margin (The duration of the “margin” component of the floater alone is usually negative because it is similar to a strip IO created from mortgage collateral).

As discussed earlier, inverse floaters have higher interest rate and prepayment sensitivity than the underlying collateral and this is further accentuated with an increase in the leverage or the floater margin. Note that increasing the margin on the floater results in extended duration for the inverse floater due to lowering of the inverse floater cap. It also reduces its premium, which results in improved convexity and lower option cost.

Figure 3: Effect of Leverage and Margin on Risk Characteristics of Floater/Inverse Floater Structures

Case	Floater/Inverse Floater	Coupon Formula	Effective Duration	Effective Convexity	Option Cost	Volatility Duration	Prepayment Duration
#1	$80 MM Floater	L + 50, 7.5% cap	0.7	-0.8	40	0.028	-0.002
	$20 MM Inverse Floater	28% - 4xL	8.3	-8.6	406	0.090	0.042
#2	$75 MM Floater	L + 50, 8.0% cap	0.3	-0.8	33	0.024	0.000
	$25 MM Inverse Floater	22.5% - 3xL	7.7	-7.7	291	0.091	0.032
#3	$67 MM Floater	L + 50, 9.0% cap	-0.2	-0.6	22	0.018	0.005
	$33 MM Inverse Floater	17% - 2xL	6.9	-6.5	247	0.088	0.017
#4	$50 MM Floater	L + 50, 12.0% cap	-0.7	-0.3	11	0.006	0.010
	$50 MM Inverse Floater	11.5% - L	5.2	-4.8	182	0.078	0.008
#5	$50 MM Floater	L + 150, 12.0% cap	-2.6	-1.0	31	0.014	0.033
	$50 MM Inverse Floater	10.5% - L	7.3	-4.3	166	0.072	-0.016
Collateral	$100 MM Passthrough	6%	2.3	-2.6	94	0.042	0.009

Source: Banc of America Securities

Understanding Floater Discount Margins (DM)

Market participants often think of floaters in terms of their discount margin (DM). For a floater that pays a monthly coupon of 1-mo LIBOR plus a fixed spread *s*, its DM is the spread over the 1-mo LIBOR forward rates, which when used to discount the floater cash flows gives a price equal to the current market price of the floater. This is shown in the equation given below, where ${}_{n-1}f_n$ represents the 1-mo LIBOR forward rate at the beginning of time period *n-1*.

$$P = \sum_{n=1}^{n} \frac{CF_n}{(1+({}_0f_1 + DM)x30/360) * (1+({}_1f_2 + DM)x30/360) * \cdots\cdots * (1+({}_{n-1}f_n + DM)x30/360)}$$

Note that the interest paid at time *n* is based on the 1-mo LIBOR at period *n-1*. While quoting DM, it is a common market convention to assume that the future 1-mo LIBOR rates are same as the current 1-mo LIBOR rate. For a floater security selling at par, this means that its DM is equal to its spread *s*[4]. Likewise, if the floater is trading above par, it implies that its DM is less than the offered spread *s* and vice versa for discount floaters.

We next discuss factors that determine the DM offered by an MBS floater. The price of an MBS floater can be broken down into two components as shown below:

Price of a capped floater = Price of an uncapped floater – Price of the cap option

An investor who holds an MBS floater is essentially short an interest rate cap option with strike rate equal to the floater's strike rate. For instance, for a floater that pays a coupon of 1-mo LIBOR + 50 bps with a hard cap of 7.5%, the floater strike rate is 7.0% and the investor in this floater is short an interest rate cap with a strike of 7.0%. However note that unlike traditional cap options that have a fixed notional principal balance, the principal balance of the cap option that the investor has sold amortizes as per the amortization of the underlying collateral.

The market price for MBS floaters should essentially reflect the price of the cap option that the investors have sold short. A few factors that would determine the price of a cap option are the cap's strike rate, weighted average life of the floater, and the structure and convexity of the underlying fixed-rate bond. Floaters with higher caps will usually have lower option costs and lower DMs. Likewise, shorter average life floaters will also have lower option costs and lower DMs. The convexity of the underlying fixed-rate bond resulting from its coupon and its structure is also important. Floaters created off of higher negative convexity fixed-rate bonds will have higher option costs and higher DMs.

Figure 4 shows some relative value indicators for 3 floater securities with different structures. All the floaters shown have a hard cap of 7% and are structured from 6% 30-year collateral. For comparison purposes, we have also listed properties of the 6% 30-yr passthrough. A floater with no structure and which makes principal payments based on the amortization of the underlying passthrough is known as a strip floater. From Figure 4, we notice that the strip

[4] Note that this will only hold true if the discounting uses the same day count convention as that for the cash flows. MBS securities accrue interest based on 30/360 day count convention. Hence we use a 30/360 day count convention for discounting the cash flows. Also note that if we were to use 30/360 day count convention for cash flows but actual/360 day count convention for discounting, then it would imply that for a floater security selling at par, its DM would be slightly less than its spread *s*.

floater offers higher DM than the PAC floater but less DM than the front support floater. This is consistent with the observation that the effective negative convexity (and hence the option cost) of the strip floater is more than that of the PAC floater but less than that of the front support floater. Note that although the front support floater has the shortest WAL in the base case scenario, it has the highest negative convexity and therefore it offers the highest DM. In general, investors receive higher DMs on support and sequential floaters than on PAC floaters.

Figure 4: Relative Value Indicators for 7% Cap Floater with Different Structures

Security	Structure	Coupon	DM	Price	Forward Yield	WAL	Effective Duration	Effective Convexity	LOAS (bps)
FHR 3168 FB	Strip	L + 45	42	100-04+	5.72	5.9	1.0	-1.2	-9
FHR 3213 FG	Front Support	L + 50	50	100-00	5.81	1.8	1.1	-1.7	-23
FHR 3144 FB	PAC	L + 35	32.5	100-04	5.60	6.5	0.6	-0.6	-5
FGLMC 6	Passthrough	6%	-	100-02	-	6.3	3.2	-2.5	-12

Source: Banc of America Securities. Prices as of 10/13/06 close for corp. settle. WAL is computed at Bloomberg median prepayment speed of 265 PSA.

Although it is frequently used for trading/quotation purposes, DM is not a good relative value measure. One of the major drawbacks of using DM as a relative value indicator is that it assumes that the reference rate (1-mo LIBOR) remains the same over the life of the security. Thus, a DM does not properly account for the cost of the cap option that an investor has sold short. For instance, Figure 4 indicates that although the front support floater has a DM of 50, it offers an LOAS of only -23 bps. Among the three floaters shown in the figure, the PAC floater with the lowest DM has the highest LOAS and is therefore relatively cheap compared to the other two floaters after accounting for the risk exposures of different floaters.

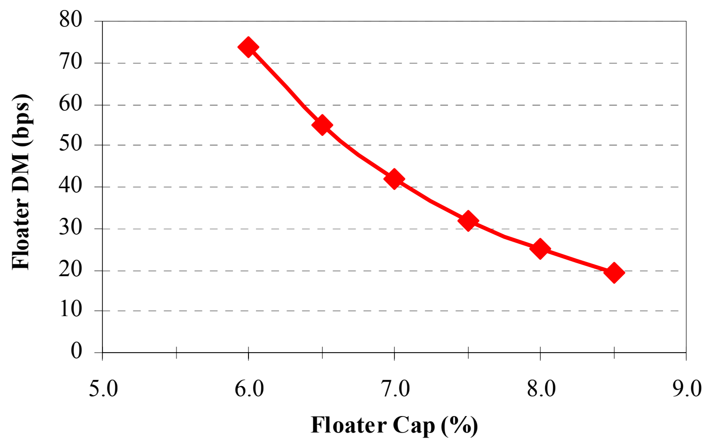
We next illustrate the effect of the floater cap on its DM. Let us take the strip floater, FHR 3168 FB, shown in Figure 4 and compute its price, DM and other parameters assuming that its LOAS remains the same (at -9 bps). The results shown in Figures 5 and 6 indicate that the DM offered on a floater security decreases with an increase in the floater cap (for the same OAS). This is consistent with the fact that as the cap on the floater increases, the cost of the option that the investor has sold decreases. Also note that the duration of the floater, which primarily comes from its hard cap also decreases with an increase in the floater cap.

Figure 5: DM (bps) on a Strip Floater with Different Hard Cap (%)

Cap	DM	Eff. Duration	Eff. Convexity
6.0	74	2.5	-2.3
6.5	55	1.6	-1.5
7.0	42	1.0	-1.2
7.5	32	0.6	-1.0
8.0	25	0.3	-0.8
8.5	19	0.0	-0.7

Source: Banc of America Securities. Results assume a constant LOAS for FHR 3168 FB.

Figure 6: DM vs. Floater Cap for a Strip Floater



Source: Banc of America Securities

Changes in Effective Duration and Convexity as Interest Rates Move

The interest rate sensitivity of floaters does not exhibit much variability as interest rates change in either direction. Since a floater and an inverse floater add up to a fixed rate bond, the relative insensitivity of a floater means that inverse floater bears all the brunt of the changes in the interest rates. We explore this issue for the floater / inverse floater combination presented in Case #1 in Figure 3, in terms of the changes in prices, effective durations and convexities as the interest rates move from the baseline case. Figure 7 shown on the next page illustrates the combined effect of changing coupon rates, discount rates and the prepayment rates on the said securities.

As interest rates fall, an increase in prepayment speeds on the underlying collateral hurts an inverse floater if it is a premium. However, the simultaneous increase in the coupon on the inverse floater coupled with the benefit of reduced discount rates gives it a price boost, which is typically significant enough to overcome the price decline from accelerated prepayments. The duration of the inverse floater reduces modestly before leveling off as the prepayment speeds and coupons are restricted by the flattening upper end of the prepayment S-curve and the cap on the inverse floater respectively. The strongly negative convexity of the inverse floater increases sharply before leveling off as rates continue to fall to reflect the relative balance in the price of the inverse floater at those interest rate levels.

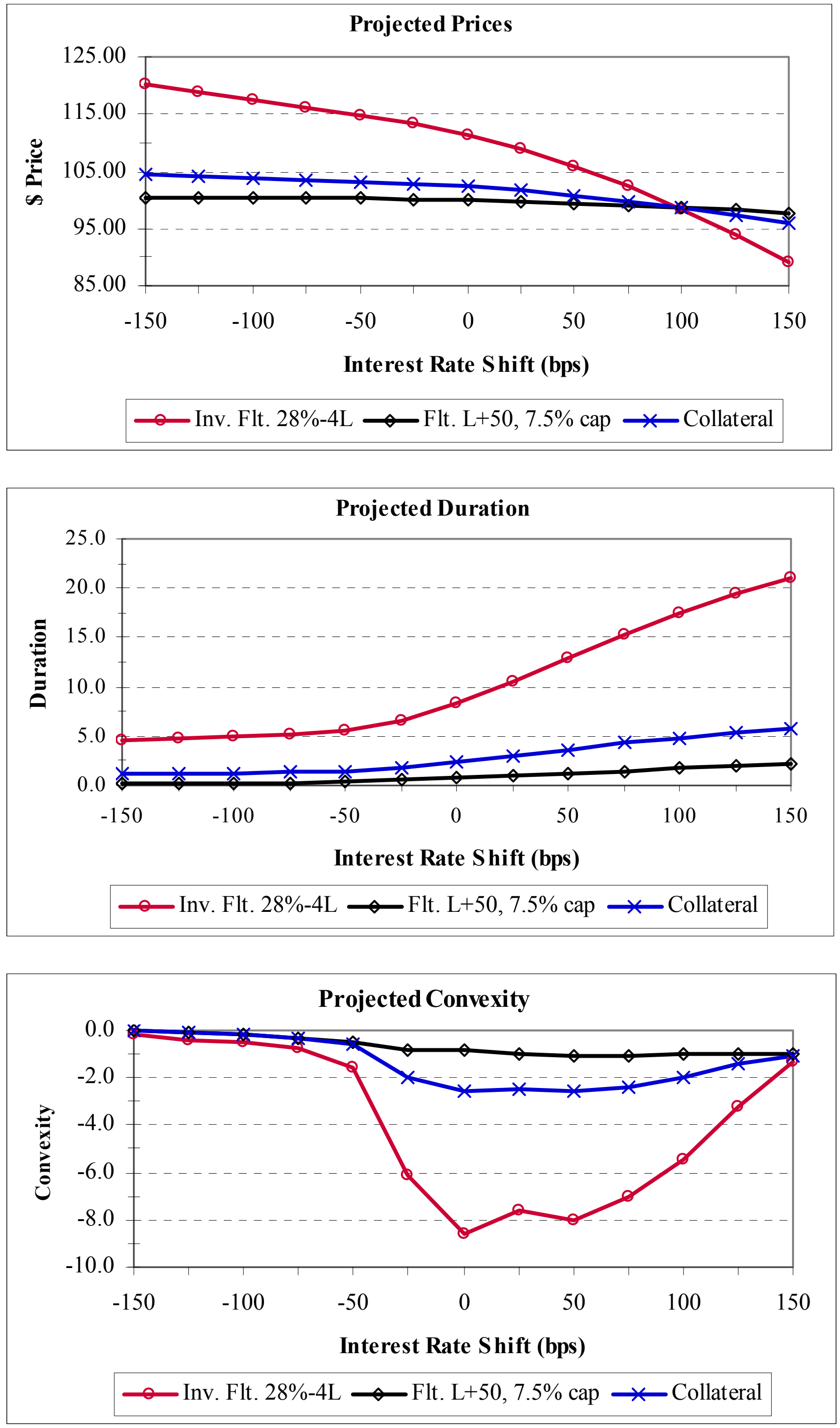
As interest rates increase, the combined effect of lower coupon rates on a higher notional for an extended period due to slower prepayments and higher discount rates slashes the price of an inverse floater. The decline continues unabated until the floor on the inverse floater and the leveling of the prepayment S-curve kick in. At this stage, the rate of decline is driven by the discount factors alone. The duration of the inverse floater follows a steep upward trajectory to reflect the serious extension experienced by the inverse floater. The convexity also increases, though stays negative, to signify the relative price symmetry at those interest rate levels.

Investment Rationale for Floaters and Inverse Floaters

Usually, floaters have very little duration, curve exposure and negative convexity when compared with the risks associated with the underlying collateral ("the fixed-rate bond"). Floaters usually appeal to investors with a bearish outlook for interest rates, particularly on short-term rates. In general, banks, domestic money managers, overseas investors, and hedge funds are active in this market.

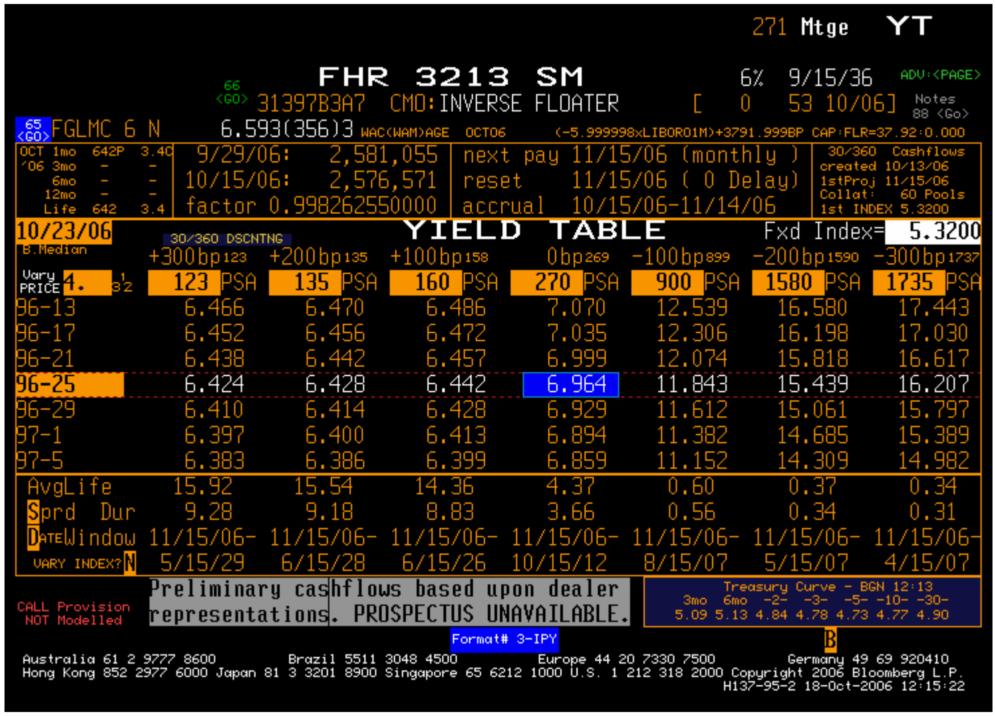
Inverse floaters on the other hand have large positive duration and, as shown in Figure 8, these securities offer high yields for a wide range of prepayment speeds (interest rates). A few reasons for investing in inverse floaters are: 1) to extend duration of portfolios with a relatively small cash investment, 2) to obtain attractive funding, 3) to make leveraged investment in mortgages, and 4) to express views on the direction of rates. In general, hedge funds, insurance companies, domestic money managers, and overseas investors are very active in this market.

Figure 7: Projected Prices, Effective Durations and Convexities of Floaters / Inverse Floaters Under Different Interest Rate Scenarios



Source: Banc of America Securities

Figure 8: Yield Table for Discount and Premium Inverse Floaters



271 Mtge YT

FHR 3213 SM 6% 9/15/36 ADV:<PAGE>

66 <GO> 31397B3A7 CMO:INVERSE FLOATER [0 53 10/06] Notes 88 <Go>

65 <GO> FGLMC 6 N 6.593(356)3 WAC(WAM)AGE OCT06 (-5.999998xLIBOR01M)+3791.999BP CAP:FLR=37.92:0.000

OCT '06 1mo 642P 3.40; 3mo - -; 6mo - -; 12mo - -; Life 642 3.4

9/29/06: 2,581,055 | next pay 11/15/06 (monthly) | 30/360 Cashflows created 10/13/06

10/15/06: 2,576,571 | reset 11/15/06 (0 Delay) | 1stProj 11/15/06

factor 0.998262550000 | accrual 10/15/06-11/14/06 | Collat: 60 Pools; 1st INDEX 5.3200

10/23/06 B.Median 30/360 DSCNTNG YIELD TABLE Fxd Index= 5.3200

Vary PRICE 4. 32	+300bp 123	+200bp 135	+100bp 158	0bp 269	-100bp 899	-200bp 1590	-300bp 1737
	123 PSA	135 PSA	160 PSA	270 PSA	900 PSA	1580 PSA	1735 PSA
96-13	6.466	6.470	6.486	7.070	12.539	16.580	17.443
96-17	6.452	6.456	6.472	7.035	12.306	16.198	17.030
96-21	6.438	6.442	6.457	6.999	12.074	15.818	16.617
96-25	6.424	6.428	6.442	6.964	11.843	15.439	16.207
96-29	6.410	6.414	6.428	6.929	11.612	15.061	15.797
97-1	6.397	6.400	6.413	6.894	11.382	14.685	15.389
97-5	6.383	6.386	6.399	6.859	11.152	14.309	14.982
AvgLife	15.92	15.54	14.36	4.37	0.60	0.37	0.34
Sprd Dur	9.28	9.18	8.83	3.66	0.56	0.34	0.31
DateWindow	11/15/06-	11/15/06-	11/15/06-	11/15/06-	11/15/06-	11/15/06-	11/15/06-
VARY INDEX? N	5/15/29	6/15/28	6/15/26	10/15/12	8/15/07	5/15/07	4/15/07

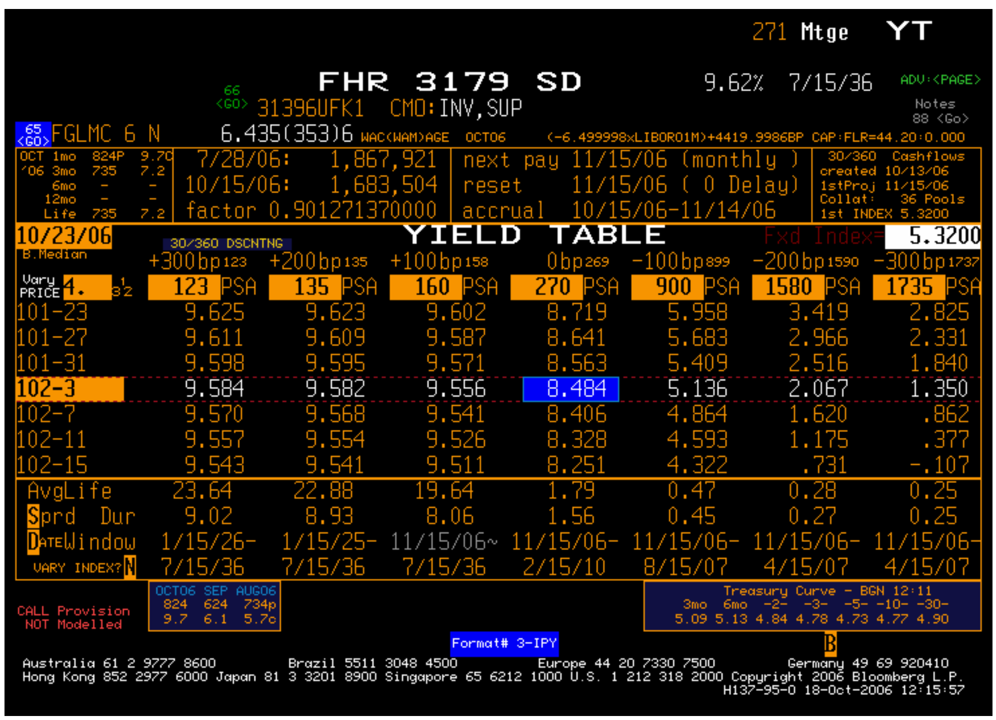
CALL Provision NOT Modelled

Preliminary cashflows based upon dealer representations. PROSPECTUS UNAVAILABLE.

Treasury Curve - BGN 12:13: 3mo 5.09; 6mo 5.13; -2- 4.84; -3- 4.78; -5- 4.73; -10- 4.77; -30- 4.90

Format# 3-IPY

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 2006 Bloomberg L.P.
H137-95-2 18-Oct-2006 12:15:22



271 Mtge YT

FHR 3179 SD 9.62% 7/15/36 ADV:<PAGE>

66 <GO> 31396UFK1 CMO:INV,SUP Notes 88 <Go>

65 <GO> FGLMC 6 N 6.435(353)6 WAC(WAM)AGE OCT06 (-6.499998xLIBOR01M)+4419.9986BP CAP:FLR=44.20:0.000

OCT '06 1mo 824P 9.70; 3mo 735 7.2; 6mo - -; 12mo - -; Life 735 7.2

7/28/06: 1,867,921 | next pay 11/15/06 (monthly) | 30/360 Cashflows created 10/13/06

10/15/06: 1,683,504 | reset 11/15/06 (0 Delay) | 1stProj 11/15/06

factor 0.901271370000 | accrual 10/15/06-11/14/06 | Collat: 36 Pools; 1st INDEX 5.3200

10/23/06 B.Median 30/360 DSCNTNG YIELD TABLE Fxd Index= 5.3200

Vary PRICE 4. 32	+300bp 123	+200bp 135	+100bp 158	0bp 269	-100bp 899	-200bp 1590	-300bp 1737
	123 PSA	135 PSA	160 PSA	270 PSA	900 PSA	1580 PSA	1735 PSA
101-23	9.625	9.623	9.602	8.719	5.958	3.419	2.825
101-27	9.611	9.609	9.587	8.641	5.683	2.966	2.331
101-31	9.598	9.595	9.571	8.563	5.409	2.516	1.840
102-3	9.584	9.582	9.556	8.484	5.136	2.067	1.350
102-7	9.570	9.568	9.541	8.406	4.864	1.620	.862
102-11	9.557	9.554	9.526	8.328	4.593	1.175	.377
102-15	9.543	9.541	9.511	8.251	4.322	.731	-.107
AvgLife	23.64	22.88	19.64	1.79	0.47	0.28	0.25
Sprd Dur	9.02	8.93	8.06	1.56	0.45	0.27	0.25
DateWindow	1/15/26-	1/15/25-	11/15/06~	11/15/06-	11/15/06-	11/15/06-	11/15/06-
VARY INDEX? N	7/15/36	7/15/36	7/15/36	2/15/10	8/15/07	4/15/07	4/15/07

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OCT06 SEP AUG06: 824 624 734p; 9.7 6.1 5.7c

Treasury Curve - BGN 12:11: 3mo 5.09; 6mo 5.13; -2- 4.84; -3- 4.78; -5- 4.73; -10- 4.77; -30- 4.90

Format# 3-IPY

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 2006 Bloomberg L.P.
H137-95-0 18-Oct-2006 12:15:57

Source: Bloomberg

III. INVERSE IOs

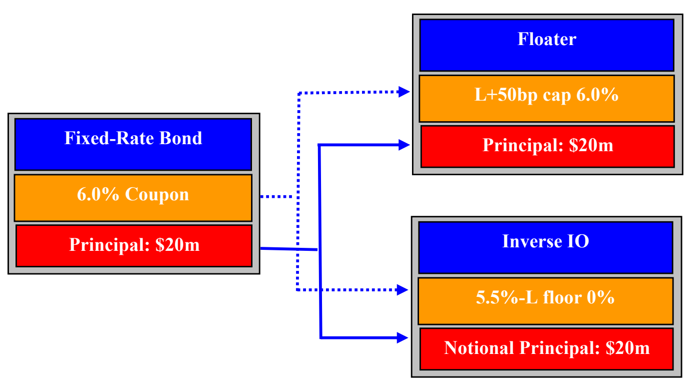
An Inverse IO (IIO) is an interest only security with a coupon formula similar to that of an inverse floater i.e., the coupon has an inverse linear relationship to its index and is subject to caps and floors. It differs from an inverse floater in that inverse IOs don't receive any principal payments. An inverse IO is usually created through one of the following two structuring approaches:

1) **From a fixed rate passthrough or a synthetically created premium security:** This leads to the creation of an inverse IO (with a leverage of 1) and a floater security. That is, instead of carving out a floater and an inverse floater from a fixed rate pass-through, a dealer can create a floater and an IIO from the fixed rate bond. Figure 9 shows the creation of an IIO from a fixed rate passthrough while Figure 10 shows IIO creation from a synthetic premium.[5] Note that the use of the synthetic premium leads to a higher caps on the floater and the inverse floater,[6] a feature desired by most investors.

2) **From an inverse floater:** Starting with an inverse floater, an IIO can be created by carving out a PO from the inverse floater (Figure 11). This leads to an IIO with a much higher cap than one typically created from pass-throughs.

From the coupon formula of IIO in Figure 9 or 10, we see that an inverse IO is equivalent to owning the underlying fixed-rate interest only (IO) bond and financing it entirely through a capped floater. Thus an inverse IO is equivalent to an amortizing capped swap (receive fixed/pay floating). However, unlike standard swaps, which benefit from falling rates, inverse IOs are typically hurt due to faster prepayments as rates fall.

Figure 9: Creating an Inverse IO from a Fixed-Rate Bond

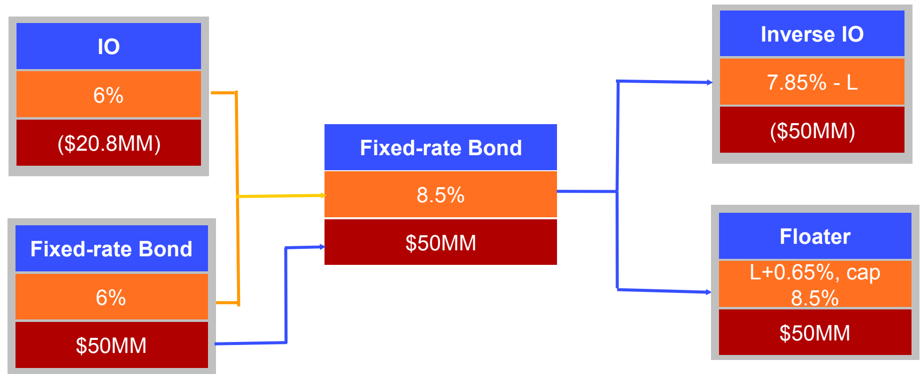


Source: Banc of America Securities

[5] Note that a synthetic premium can be created in a number of ways: i) by combining a fixed-rate bond with an IO (as shown in Figure 10), ii) by combining a PO and an IO such that the combination is a higher coupon security, or iii) by stripping off a PO from a lower coupon passthrough to create a higher coupon security.

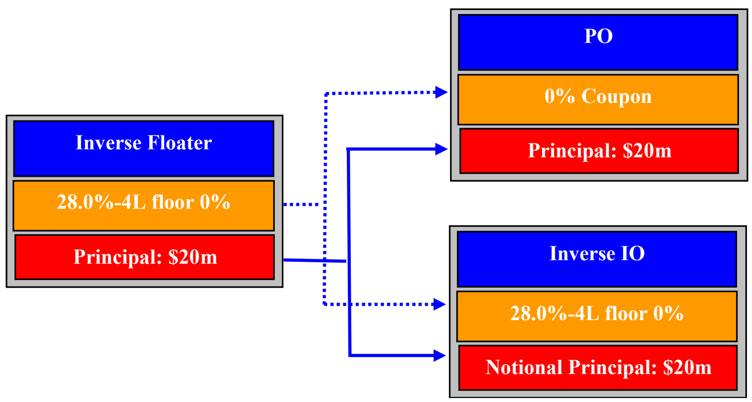
[6] The cap on IIO is equal to the difference between the floater cap and its index margin.

Figure 10: Creating an Inverse IO from a Synthetic Higher Coupon Fixed Rate Bond



Source: Banc of America Securities

Figure 11: Creating an Inverse IO from an Inverse Floater



Source: Banc of America Securities

Risk Characteristics of Inverse IOs

Figure 12 shows some risk and relative value indicators for two inverse IOs with different strike rates: FHR 3152 JS which has a strike of 6.55% and FNR 02-89 S which has a strike of 8.2%. Note that the strike rate of an inverse floater is the same as the strike rate on the equivalent floor and is essentially equal to the 1-mo LIBOR rate beyond which the IIO's coupon falls to zero. To broaden our analysis, we have also added a Trust IO: FHS 231, which is the collateral backing the FHR 3152 JS.

As indicated by the partial durations of the two IIOs, they typically have large positive short-end durations and large negative long-end durations. The positive short end duration implies that IIOs are hurt if the short rates move up. This is primarily due to a decline in the IIO's coupon as short rates move up. On the other hand, negative long-end duration for IIOs implies that they benefit due to an increase in long term rates, primarily due to the accompanying decline in prepayments. A positive short-end duration and a negative long-end duration makes IIOs very sensitive to the slope of the yield curve. They usually benefit when the curve steepens and are hurt when the curve flattens.

The overall effective duration of an IIO can be positive or negative depending on how far away the strike on the IIO is from the current 1-mo LIBOR. For instance, in Figure 12 the IIO FHR 3152 JS that has a lower strike rate of 6.55% has a positive effective duration, while FNR 02-89 S IIO that has a higher strike rate of 8.2% has a negative effective duration. Note that the overall positive effective duration of FHR 3152 JS IIO is also because of the flat (inverted) shape of the yield curve as of 10/10/2006. If the yield curve were steeper, then FHR 3152 JS IIO could also have had a negative effective duration.

Figure 12: Relative Value Indicators for Inverse IOs

Security	Coupon	Collateral Coupon	Price	Effective Duration	Effective Convexity	Partial Duration				Volatility Duration	Prepayment Duration
						2yr	5yr	10yr	30yr		
FHR 3152 JS IIO	6.55% - L	5.50%	5-08+	16.9	-43.9	25.42	26.14	-14.59	-19.25	0.42	0.60
FNR 02-89 S IIO	8.2% - L	7.00%	8-25+	-3.7	-20.1	14.77	10.34	-14.73	-13.84	0.24	0.65
FHS 231 IO	5.50%	5.50%	25-03	-31.9	-20.4	5.97	-0.25	-20.26	-17.24	0.25	0.53

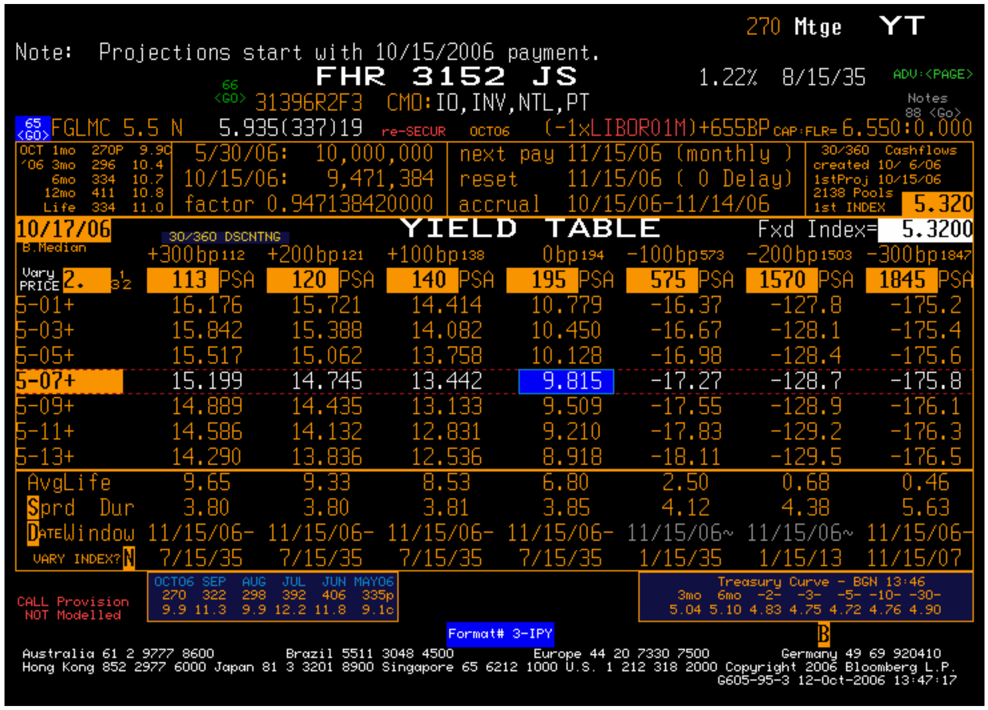
Prices as of 10/10/06 close for corp. settle. 1-month Libor = 5.32%.

Source: Banc of America Securities

Comparing the IIO (FHR 3152 JS) with the underlying Trust IO (FHS 231), we notice that the IIO possesses a much greater negative convexity and higher volatility and prepayment durations. In fact, inverse IOs are amongst the most prepayment sensitive instruments and are typically more leveraged relative to prepayments than Trust IOs. Figure 13 shows the Bloomberg Yield Tables for the two IIOs included in Figure 12. The base case yields for the two IIOs are highlighted in blue in Figure 13. Also included in the same figure are the yields offered by the two IIOs at Bloomberg median prepayment speeds corresponding to different parallel shifts of the yield curve (up to +/- 300 bps). Both the IIOs offer very high base case yields as a compensation for their very high negative convexity. Further, a back up in rates leads to a substantial increase in the yield while a rally leads to negative yields. Therefore, for investors who believe that rates in the near future will remain range bound, IIOs are an excellent (and usually cheap) way to sell convexity.

One of the important risks of investing in IIOs is faster than expected prepayments on the underlying collateral. Investors can mitigate risks associated with faster prepayments by investing in IIOs created from low loan balance (LLB) collateral rather than the ones created from high loan balance (HLB) collateral. This is because in a heavy refinancing environment, speeds on LLB pools are observed to be much lower than speeds on the HLB pools. Similarly, investors can mitigate prepayment risks by investing in IIOs created from PAC structures that offer prepayment protection over a range of prepayment speeds. For instance, Figure 14 shows weighted average life graphs for two IIOs: FHR 3179 SP that is created from a PAC structure and FHR 2772 ES that is created from a front sequential structure. Notice that the WAL of the PAC IIO remains stable over a wide range of prepayment speeds. In contrast, the front sequential IIO shows much more variability in its WAL.

Figure 13: Bloomberg Yield Table for IIOs



270 Mtge YT

Note: Projections start with 10/15/2006 payment.

FHR 3152 JS 1.22% 8/15/35

31396R2F3 CMO:IO,INV,NTL,PT

FGLMC 5.5 N 5.935(337)19 re-SECUR OCT06 (-1xLIBOR01M)+655BP CAP:FLR= 6.550:0.000

5/30/06: 10,000,000 next pay 11/15/06 (monthly)

10/15/06: 9,471,384 reset 11/15/06 (0 Delay)

factor 0.947138420000 accrual 10/15/06-11/14/06 1st INDEX 5.320

10/17/06 30/360 DSCNTNG YIELD TABLE Fxd Index= 5.3200

PRICE	+300bp 112	+200bp 121	+100bp 138	0bp 194	-100bp 573	-200bp 1503	-300bp 1847
	113 PSA	120 PSA	140 PSA	195 PSA	575 PSA	1570 PSA	1845 PSA
5-01+	16.176	15.721	14.414	10.779	-16.37	-127.8	-175.2
5-03+	15.842	15.388	14.082	10.450	-16.67	-128.1	-175.4
5-05+	15.517	15.062	13.758	10.128	-16.98	-128.4	-175.6
5-07+	15.199	14.745	13.442	9.815	-17.27	-128.7	-175.8
5-09+	14.889	14.435	13.133	9.509	-17.55	-128.9	-176.1
5-11+	14.586	14.132	12.831	9.210	-17.83	-129.2	-176.3
5-13+	14.290	13.836	12.536	8.918	-18.11	-129.5	-176.5
AvgLife	9.65	9.33	8.53	6.80	2.50	0.68	0.46
Sprd Dur	3.80	3.80	3.81	3.85	4.12	4.38	5.63
DateWindow	11/15/06-7/15/35	11/15/06-7/15/35	11/15/06-7/15/35	11/15/06-7/15/35	11/15/06~1/15/35	11/15/06~1/15/13	11/15/06-11/15/07

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Treasury Curve - BGN 13:46: 3mo 6mo -2- -3- -5- -10- -30- / 5.04 5.10 4.83 4.75 4.72 4.76 4.90

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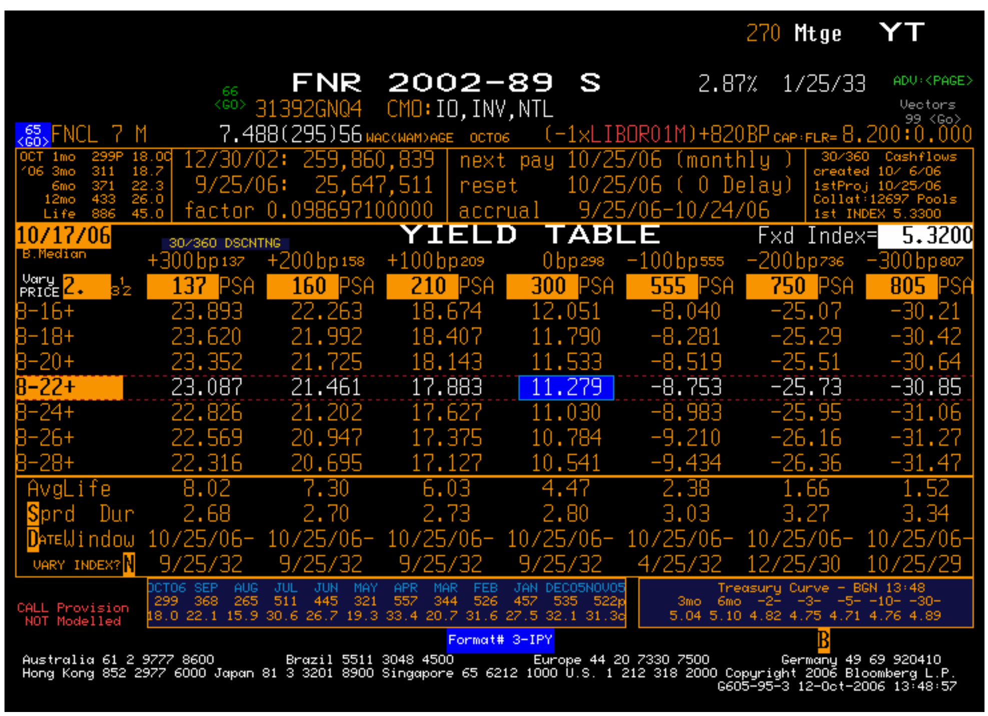


270 Mtge YT

FNR 2002-89 S 2.87% 1/25/33

31392GNQ4 CMO:IO,INV,NTL

FNCL 7 M 7.488(295)56 WAC(WAM)AGE OCT06 (-1xLIBOR01M)+820BP CAP:FLR= 8.200:0.000

12/30/02: 259,860,839 next pay 10/25/06 (monthly)

9/25/06: 25,647,511 reset 10/25/06 (0 Delay)

factor 0.098697100000 accrual 9/25/06-10/24/06 1st INDEX 5.3300

10/17/06 30/360 DSCNTNG YIELD TABLE Fxd Index= 5.3200

PRICE	+300bp 137	+200bp 158	+100bp 209	0bp 298	-100bp 555	-200bp 736	-300bp 807
	137 PSA	160 PSA	210 PSA	300 PSA	555 PSA	750 PSA	805 PSA
8-16+	23.893	22.263	18.674	12.051	-8.040	-25.07	-30.21
8-18+	23.620	21.992	18.407	11.790	-8.281	-25.29	-30.42
8-20+	23.352	21.725	18.143	11.533	-8.519	-25.51	-30.64
8-22+	23.087	21.461	17.883	11.279	-8.753	-25.73	-30.85
8-24+	22.826	21.202	17.627	11.030	-8.983	-25.95	-31.06
8-26+	22.569	20.947	17.375	10.784	-9.210	-26.16	-31.27
8-28+	22.316	20.695	17.127	10.541	-9.434	-26.36	-31.47
AvgLife	8.02	7.30	6.03	4.47	2.38	1.66	1.52
Sprd Dur	2.68	2.70	2.73	2.80	3.03	3.27	3.34
DateWindow	10/25/06-9/25/32	10/25/06-9/25/32	10/25/06-9/25/32	10/25/06-9/25/32	10/25/06-4/25/32	10/25/06-12/25/30	10/25/06-10/25/29

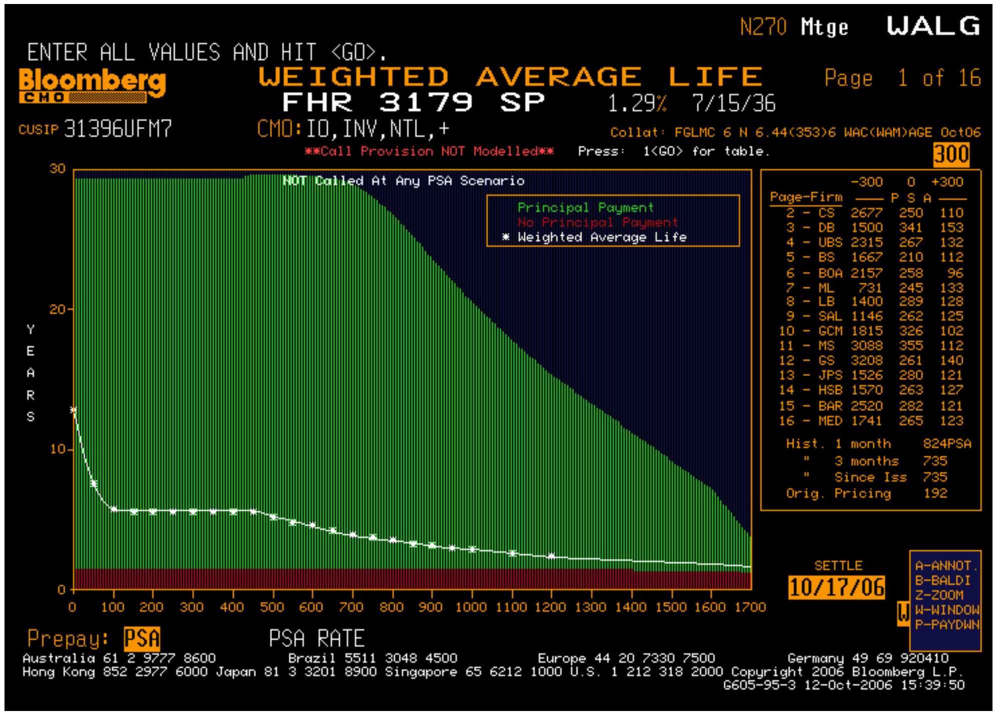
CALL Provision NOT Modelled

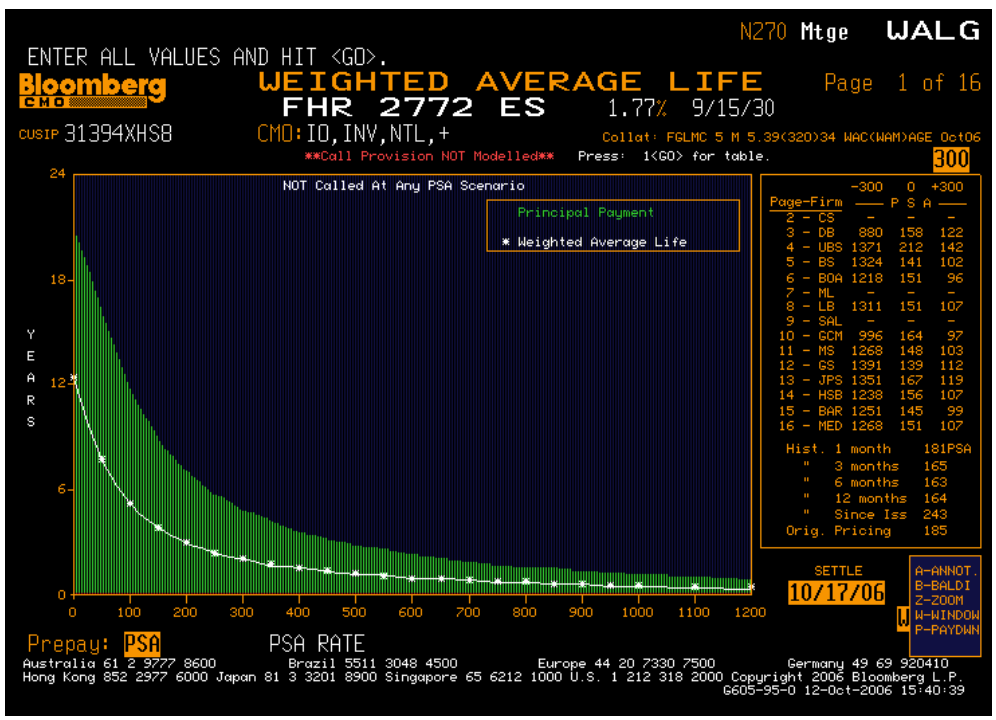
Treasury Curve - BGN 13:48: 3mo 6mo -2- -3- -5- -10- -30- / 5.04 5.10 4.82 4.75 4.71 4.76 4.89

Copyright 2006 Bloomberg L.P. 12-Oct-2006 13:48:57

Source: Bloomberg

Figure 14: WAL Graph for a PAC IIO (FHR 3179 SP) and Front Sequential IIO (FHR 2772 ES)





Source: Bloomberg

Changes in Effective Duration and Convexity as Interest Rates Move

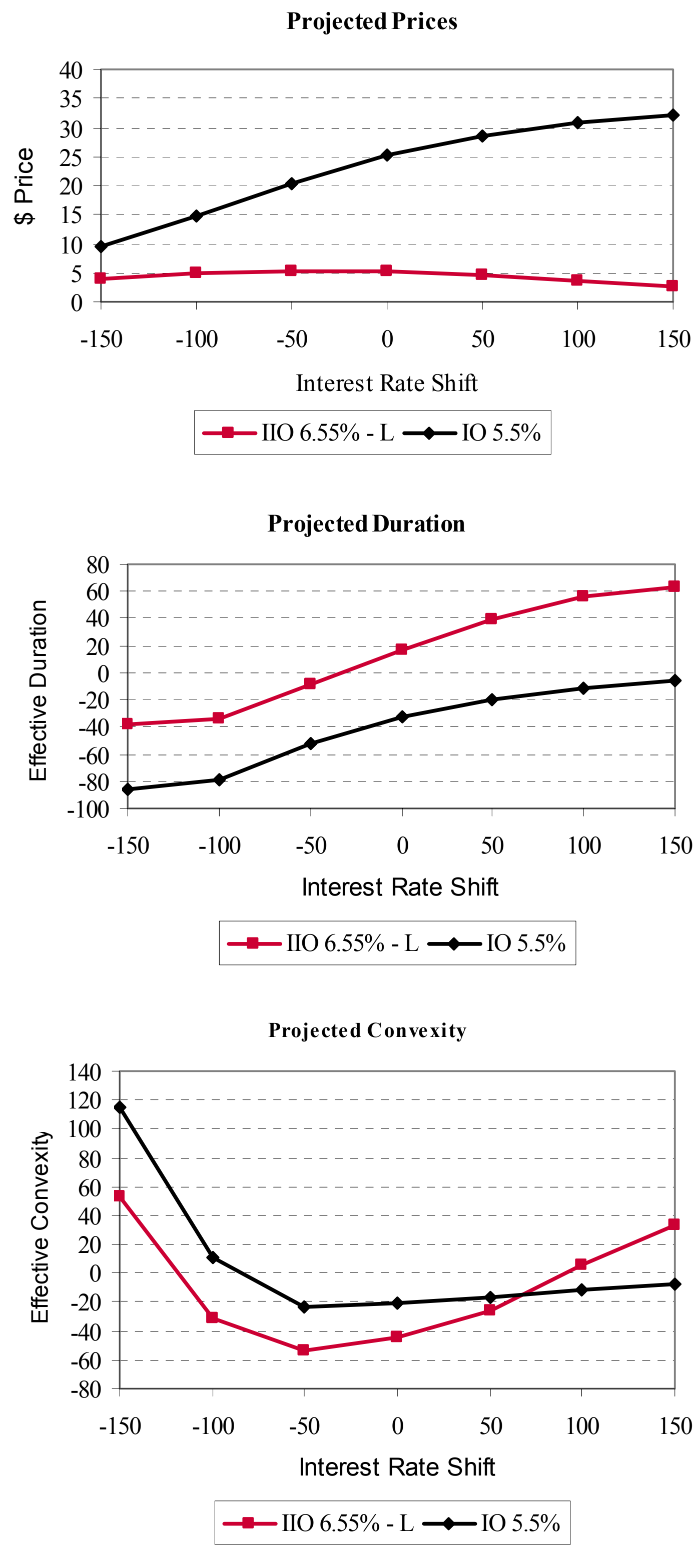
Figure 15 shows the effect of changes in interest rates on the price, effective duration and convexity of an inverse IO (FHR 3152 JS) and an IO (FHS 231). As interest rates fall, the increase in the prepayment speeds of the underlying collateral hurts an inverse IO. However, the simultaneous increase in the coupon on the inverse IO coupled with the benefit of reduced discount rates provides an offsetting effect with the result that the price decline is not as steep as that observed in the case of an IO. In fact, the IIO's price increases when rates fall by 50 bps. This is consistent with the positive baseline duration for the given IIO. The duration of the inverse IO shortens with a decrease in rates and becomes negative for an interest rate shift of -50 bps. With a further rally in rates, the duration of the IIO keeps shortening although at a slower pace. Note that for very large negative shifts in interest rates (>200 bps in this particular case and not shown in the figure), the duration of the IIO becomes positive. This is because in this kind of rate environment the effect of an increase in the coupon dominates increases in prepayment speeds.

As interest rates back-up, the price of an inverse IO declines due to lower coupons which overwhelm the benefit from slower speeds. In contrast, the price of an IO, which has a flat coupon structure, keeps increasing with an increase in rates. The back-up in rates leads to an increase in duration for both the inverse IO and the IO. However, the duration of the inverse IO increases at a much faster rate than an IO.

Investment Rationale for Inverse IOs

As seen in Figure 13, inverse IOs offer very high current yields in compensation for their high negative convexity. Therefore, investors who believe that rates are likely to remain range-bound can express this view by investing in IOs. Furthermore, inverse IOs provide a cheap vehicle for investors to express a curve steepener view.

Figure 15: Projected Price, Effective Duration and Convexity of an Inverse IO vs. an IO Under Different Interest Rate Scenarios



Source: Banc of America Securities

IV. TTIBs, DIGITAL IOs, AND SUPER FLOATERS

In this section, we present a brief introduction to the coupon payoff structure and risk characteristics of TTIBs, digital IOs and super floaters. TTIBs are securities that usually offer high current yields and are a good investment vehicle for investors that either have a bullish view on interest rates or think that rates will not back-up significantly. On the other hand, digital IOs and super floaters may offer low base case yields, but have the potential to offer very high yields if rates back up significantly. They usually offer a cheap alternative to investors for hedging their portfolios against a sell off in rates.

What is a TTIB?

TTIB Inverse bonds pay a coupon based on the level of 1-month Libor (the 'index'). When 1-month Libor is below a certain threshold (the 'strike rate'), a TTIB inverse bond pays a fixed coupon rate and when 1-month Libor is above this threshold, the coupon paid by this bond declines sharply to zero. For instance, Figure 16 shows a Bloomberg snapshot of the coupon formula for a TTIB inverse, FNR 2006-53 SD. This bond pays a constant coupon of 10% if the 1-month Libor rate is less than or equal to 5.5%. Beyond 5.5%, the coupon on the bond reduces drastically and becomes zero if the 1-month Libor rate is 6% or higher.

A digital TTIB is a variant of the TTIB inverse structure in that the coupon on a digital TTIB toggles between zero and a fixed-rate. When 1-mo LIBOR is below a certain threshold (the 'strike rate'), a digital TTIB bond pays a fixed coupon rate and when 1-mo LIBOR is above this threshold, it doesn't pay any coupon. For example, FHR 3132 ST pays 6.9% coupon when 1-mo LIBOR is below 7.0% and pays 0% when 1-mo LIBOR is above 7.01% (Figure 17). The primary advantage of TTIBs comes from the very high yield they offer over a range of prepayment and interest rate scenarios.

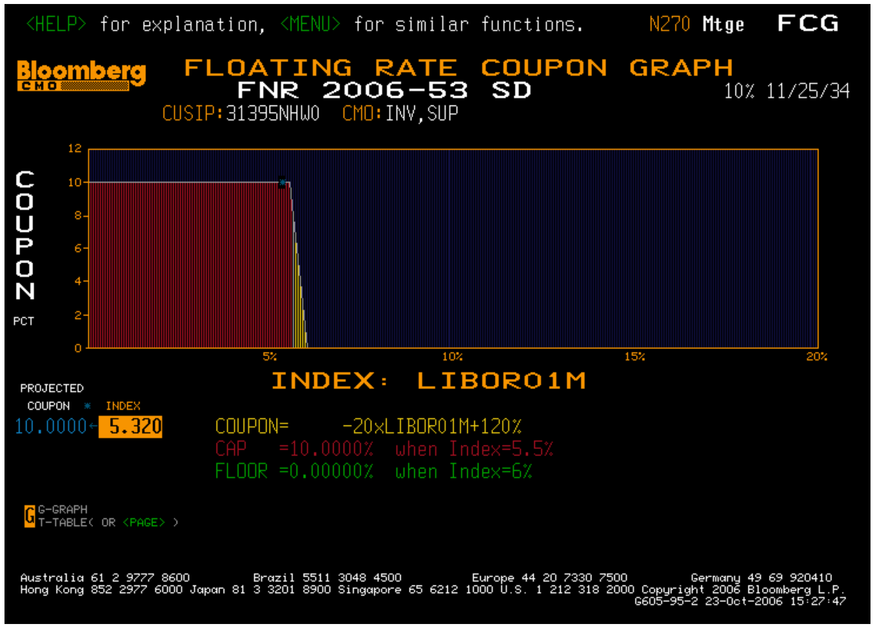
What are Digital IOs and Super Floaters?

An MBS digital IO is an interest-only (IO) tranche on an agency CMO that is structured to be analogous to a digital cap in the interest rate derivatives market. A digital IO makes a monthly coupon payment to the investor if 1-mo LIBOR exceeds the strike rate. Otherwise, no coupon is paid. Thus, a digital IO is the exact opposite of a digital TTIB, which pays a fixed coupon when 1-mo LIBOR is below the strike rate and pays nothing if 1-mo Libor exceeds it. Note that the coupon payments are not "sticky" as the investor only receives coupon payments when 1-mo LIBOR is above the strike. The notional balance of a digital IO amortizes depending on prepayment speeds of the underlying collateral and the structure backing its cash flows.

Digital IOs share the characteristics of interest only (IO) products in the MBS market and of digital caps in the interest rate derivatives market. They are similar to other interest only (IO) products in the MBS market because the payments on a digital IO are based on a notional amount (no principal payments). The main difference between other IO products and a digital IO is that the investor in a digital IO receives interest payments only when 1-mo LIBOR exceeds the strike. This is where they resemble "Digital Caps" in the interest rate derivatives market. The main difference between Digital IOs and Digital Caps comes from the fact that the amortization schedule of a digital IO changes with interest rates (through changes in prepayment speeds), whereas the amortization schedule of a digital cap in the rates market is fixed at the time of the initiation of the contract.

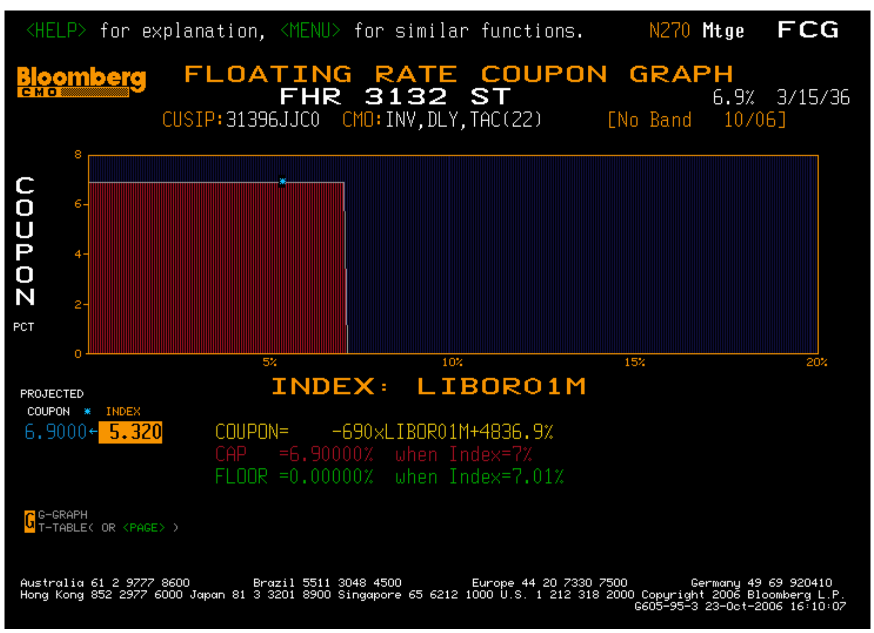
Typically, super floaters are created by combining structured POs and digital IOs. Thus, super floaters pay principal, which is unlike with digital IOs that receive no principal payments. Super floaters pay a very large coupon if 1-mo LIBOR exceeds the strike rate and no coupon is paid otherwise.

Figure 16: Coupon Payoff Structure of a TTIB Inverse



Source: Bloomberg

Figure 17: Coupon Payoff Structure of a Digital TTIB



Source: Bloomberg

Structuring of a TTIB Inverse

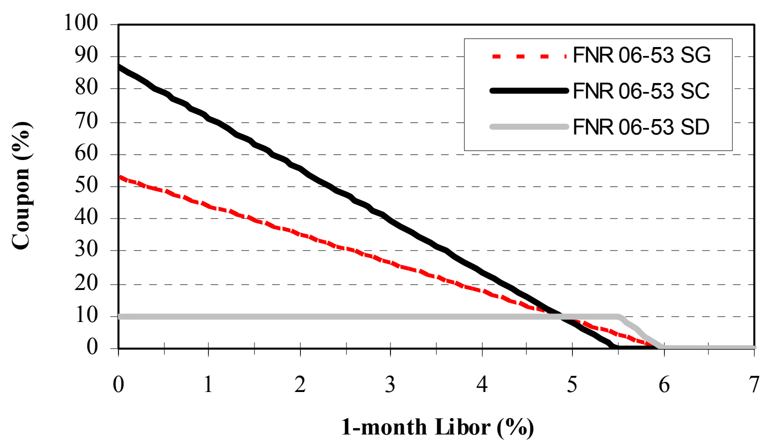
A TTIB inverse can be structured by starting with an inverse floater and creating a combination of a new inverse floater with higher leverage and a TTIB inverse. To illustrate this, let's say that we have $100mm principal balance of inverse floater FNR 06-53 SG. Starting with this inverse floater, one can structure $44.1176mm principal balance of TTIB inverse, FNR 06-53 SD and $55.8824MM principal balance of a new inverse floater FNR 06-53 SC, which has a higher leverage than the starting inverse floater. We present the equations for the coupon formula below while a graph of the coupon payoff is shown in Figure 18. The weighted average coupon of the TTIB inverse FNR 06-53 SD and the inverse floater FNR 06-53 SC, for all different values of the 1-mo LIBOR rate, is equal to the coupon of the inverse floater FNR 06-53 SG.

100% of Inverse Floater (FNR 06-53 SG): 52.9412% - 8.82352 * 1-mo LIBOR =

55.8824% of Inverse Floater (FNR 06-53 SC): 86.8421% - 15.7895 * 1-mo LIBOR +

44.1176% of TTIB Inverse (FNR 06-53 SD): 120% - 20 * 1-mo LIBOR, cap of 10%

Figure 18: Structuring of a TTIB Inverse From an Inverse Floater

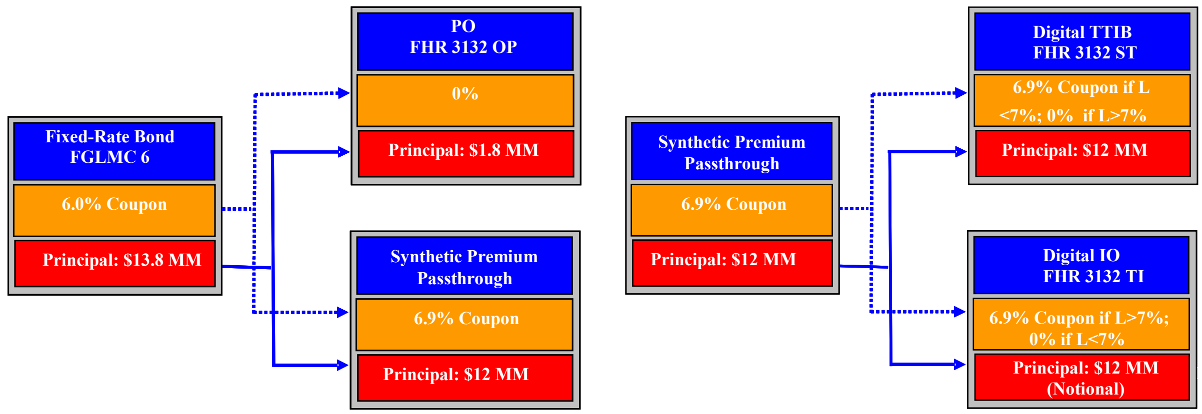


Source: Banc of America Securities

Structuring of Digital TTIBs and Digital IOs

Digital TTIBs and Digital IOs are usually structured from synthetically created premium pass-throughs. We illustrate the structuring of a Digital TTIB and Digital IO by using FHR 3132 as a representative example in Figure 19. Using $13.8MM of FGLMC 6% collateral, the dealer creates a synthetic premium passthrough with a coupon of 6.9% and a principal balance of $12MM and a PO (FHR 3132 OP) with a principal balance of $1.8MM. Using the synthetic premium pass-through, the dealer then creates a Digital TTIB and a Digital IO. For instance, FHR 3132 ST is a Digital TTIB that pays a coupon of 6.9% if 1-mo LIBOR is less than or equal to 7%, and 0% if the rate exceeds 7.01% (Figure 20). In contrast, FHR 3132 TI is a Digital IO that pays a coupon of 0% if 1-mo LIBOR is less than or equal to 7%, and 6.9% coupon if rate is equal to or exceeds 7.01% (Figure 20). Note that the Digital IO has only a notional principal balance that amortizes as per the actual amortization of principal balance on the Digital TTIB.

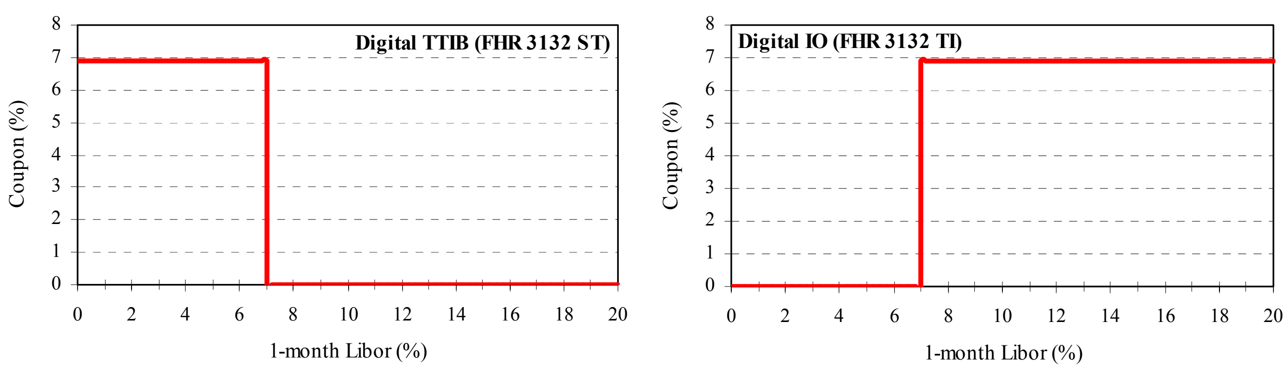
Figure 19: Structuring of a Digital TTIB and Digital IO



Step 1: Create a synthetic premium passthrough and a PO from lower coupon collateral.
Step 2: Create a Digital TTIB and Digital IO combination from the premium passthrough created in Step 1.

Source: Banc of America Securities

Figure 20: Coupon Payoff Structure of a Digital TTIB and Digital IO

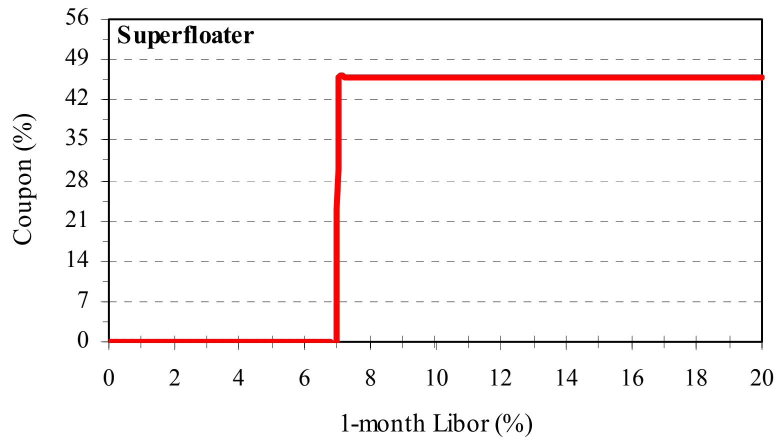


Source: Banc of America Securities

Structuring of Super Floaters

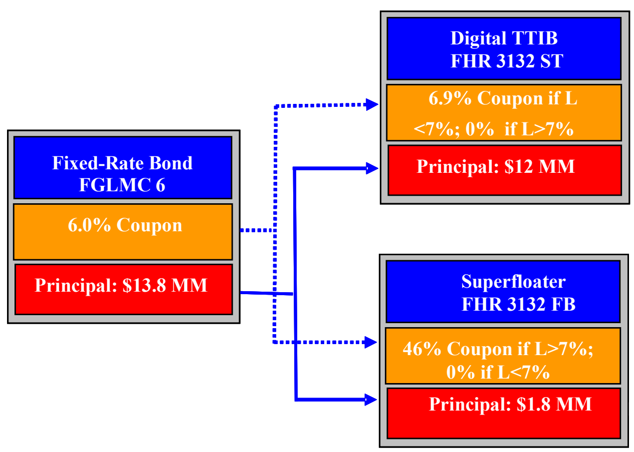
FHR 3132 FB is a super floater that pays a coupon of 46% when 1-mo LIBOR is 7.01% or higher. Otherwise no coupon is paid (see Figure 21). As mentioned earlier, a super floater can be thought of as a combination of a Digital IO and a PO. For instance, in Figure 19, we saw the structuring of a Digital IO (FHR 3132 TI) and a PO (FHR 3132 OP). The Digital IO, FHR 3132 TI makes a coupon payment of 6.9% when 1-mo LIBOR is 7.01% or higher and no coupon payment for LIBOR less than or equal to 7%. Using FHR 3132 TI Digital IO, one can create a security that pays a coupon of 46% if one uses 6.67 units (46%/6.9% = 6.67) of FHR 3132 TI Digital IO per unit of the PO, FHR 3132 OP, to create one unit of FHR 3132 FB super floater. For instance, one can combine $1.8 MM of the PO (FHR 3132 OP) security with $12 MM notional principal ($1.8 MM x 6.67 = $12 MM) of the digital IO (FHR 3132 TI) to create $1.8MM principal balance of the super floater, (FHR 3132 FB). Figure 22 shows a schematic diagram of how to create a super floater and Digital TTIB combination directly from the pass-through collateral.

Figure 21: Coupon Payoff Structure of a Super Floater (FHR 3132 FB)



Source: Banc of America Securities

Figure 22: Structuring of a Super Floater



Source: Banc of America Securities

Risks and Rewards of Investing in TTIBs

Figure 23 shows some of the risk characteristics of a TTIB FNR 06-53 SD, whose coupon payoff graph is shown in Figure 18. Also shown for comparison are the two inverse floaters involved in structuring of this TTIB inverse (please refer to Figure 18 and the section on *Structuring of Regular TTIBs*). We have assumed a LOAS of zero for all three securities. Figure 23 indicates that the risk characteristics of a TTIB inverse bond are very similar to those of inverse floaters. Essentially, starting with FNR 06-53 SG inverse floater, one creates a regular TTIB with a lower duration (and more negative convexity) and a more leveraged inverse floater which has a higher duration (and less negative convexity). Note that the yield on the TTIB inverse is also higher than the starting inverse floater. In return, the yield on the leveraged inverse floater is lower than the original inverse floater.

Thus, one can say that the main benefit of TTIBs comes from the very high yield they offer over a range of prepayment and interest rate scenarios as long as the index value does not exceed the strike rate. Hence, they primarily appeal to investors who seek high yields and have a bullish view on short-term rates or expect short-term rates to stay range bound.

For illustration, we show the yield on FNR 2006-53 JT, a TTIB inverse with a strike of 6.42%, under Bloomberg median speeds over a range of index values in Figure 24. The bond offers a yield of 8.42% in the base case corresponding to an index value of 5.29% and prepayment speed of 163% PSA. The yield is fairly stable across different prepayment speeds for a given index value, but increases at very high speeds due to the discount price of the bond. Furthermore, the yield remains unchanged for a given prepayment speed as long as the index value stays lower than the strike rate. The yield on the bond drops sharply as soon as the index value exceeds the strike rate across all prepayment speeds. Hence, the primary risk in TTIBs is that the index rate exceeds the strike rate. Since a TTIB inverse bond can be viewed as a long position in a fixed rate bond and a short position in an amortizing cap corridor option on the index, the index risk can be hedged by buying (selling) the cap options that the TTIB bond is short (long). However, doing so will reduce the bond's yield.

Figure 23: Risk Characteristics of a TTIB Inverse Bond

Security	Type	Price	Yield	Effective Duration	Effective Convexity	Partial Duration			
						2yr	5yr	10yr	30yr
FNR 06-53 SD	Regular TTIB	97-16	13.11	15.4	-30.6	4.59	2.89	5.17	2.85
FNR 06-53 SC	Inverse Floater	92-13+	11.43	23.6	-12.3	8.87	4.09	7.33	3.52
FNR 06-53 SG	Inverse Floater	94-21	12.19	19.9	-20.6	6.93	3.55	6.35	3.22

Source: Banc of America Securities. All securities priced at a LOAS of zero as of 10/20/06 close.

Figure 24: Yield Sensitivity of a TTIB Bond to Index and Prepayment Speeds

FNR 2006-53 JT	Px = 99						
	Bloomberg Median Speeds						
Index	**113 PSA**	**122 PSA**	**131 PSA**	**163 PSA**	**265 PSA**	**747 PSA**	**1172 PSA**
4.2944	8.33	8.35	8.36	8.42	8.85	10.85	12.89
4.7944	8.33	8.35	8.36	8.42	8.85	10.85	12.89
5.2944	8.33	8.35	8.36	**8.42**	8.85	10.85	12.89
5.7944	8.33	8.35	8.36	8.42	8.85	10.85	12.89
6.2944	8.33	8.35	8.36	8.42	8.85	10.85	12.89
6.7944	4.07	4.08	4.10	4.15	4.58	6.56	8.56
7.2944	0.09	0.10	0.11	0.16	0.59	2.54	4.51

Coupon = 78.65% -11*1-mo LIBOR, with cap of 8.03% when index = 6.42% and floor of 0% when index = 7.15%.

Source: Banc of America Securities

Risks and Rewards of Investing in Digital IOs and Super Floaters

We now look at some of the risks and benefits of investing in Digital IOs and super floaters. A super floater can be viewed as a combination of a Digital IO and a PO and super floaters and Digital IOs share several characteristics. Therefore, most of our comments below about Digital IOs apply to both Digital IOs and super floaters.

In Figure 25, we present some of the risk characteristics of a digital IO, FHR 3035 CI and a few super floaters. The IOx (IO multiple) in Figure 25 refers to the number of IOs per unit of PO in the super floater. To put it differently $100mm principal balance of a super floater can be structured by combining $100mm of a PO with IO multiple times $100mm notional principal balance of a digital IO. Note that since a digital IO does not have any PO component, it has the lowest price. The price of a super floater is equal to the price of the underlying PO plus the total price of the digital IOs in the super floater. Therefore, the price of a super floater increases as more IOs are added to it.

From Figure 25, it may be noticed that the Digital IO and the super floaters have very large negative duration and very large positive convexity. These bonds also offer very high OAS and are long volatility of rates. Note that super floaters have smaller negative duration and smaller positive convexity than Digital IOs due to the presence of the PO component in super floaters. In general, super floaters have muted prepayment risk compared to Digital IOs.

Digital IOs and super floaters have very different risk characteristics than the other mortgage derivatives we have seen so far due to their large positive convexity. A high positive convexity implies that the potential for price gains due to interest rate changes is much higher than the risk of price declines for these securities. We highlight this in Figure 26 where we show the effect of different parallel shifts of yield curve on the prices of the Digital IO (FHR 3035 CI) and the super floater (FHR 3132 FB). The underlying collateral for the Digital IO (FHR 3035 CI) is 20 WALA Gold 5.5s with a GWAC of 5.91%. The IO pays a fixed coupon of 6% when 1-mo LIBOR is more than 7% and no coupon otherwise. The super floater, FHR 3132 FB has 6 WALA Gold 6s (with a GWAC of 6.41%) as its underlying collateral and pays a fixed coupon of 46% when 1-mo LIBOR is more than 7% and no coupon otherwise.

For the Digital IO, as rates back-up prepayments on the underlying collateral slow down and the WAL of the IO increases. Thus, there is more time available for the option[7] to hit the strike rate. This phenomenon in addition to the rates being closer to the strike rate increases the price of a Digital IO when rates back-up. On the other hand, when rates rally the option is farther away from the strike rate and the accompanying increase in collateral prepayments reduces the life of the Digital IO. Therefore, its price decreases when rates rally. Such a price movement can also be inferred from the very large negative duration (-85.9) of the Digital IO.

A super floater is just a combination of a digital IO and a PO. Since POs have high positive duration, a combination of a digital IO and PO to form a super floater usually results in a security that also has a very large negative duration (but less than that of a Digital IO on a standalone basis). For instance, the super floater considered here has an effective duration of negative 26.8. Due to its negative duration, the price of the super floater also increases if rates back-up and decreases if rates rally (see Figure 26).

Another interesting observation that one can make from Figure 26 is that for both these products, the increase in price when rates back-up is much more than the decrease in price when rates rally by the same amount. Such a price movement is to be expected based on the very large positive convexity that these products have. Figure 27 shows the effect of bear and bull steepeners and flatteners on the price movement of the super floater. The super floater is observed to have price increases for both the bear steepener and bear flattener scenarios presented in the figure. Furthermore note that due to the presence of a PO in the super floater, the downside risk in a super floater is limited to $100, while the upside potential is much higher.

[7] A Digital IO holder is effectively long an interest rate cap option with an amortizing notional principal balance.

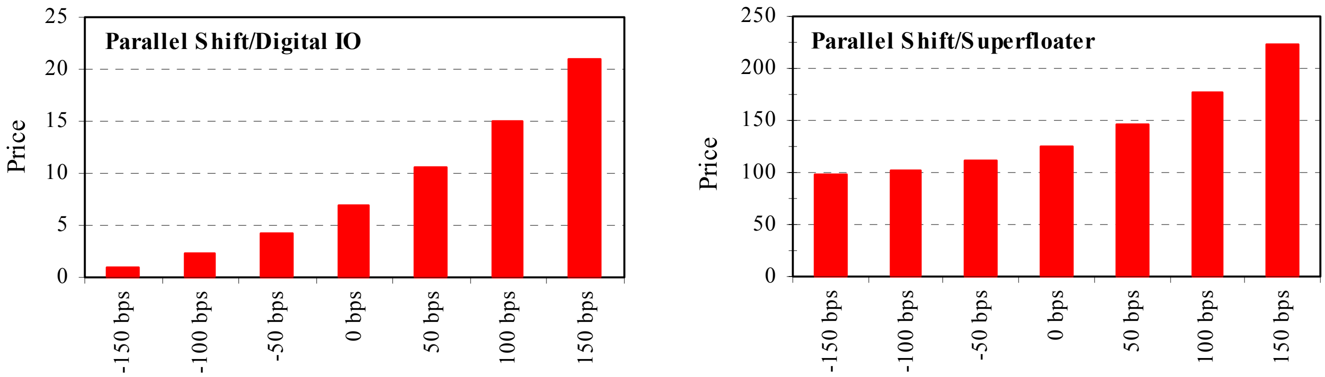
Figure 25: Risk Characteristics of Digital IOs and Super Floaters

Security	Description	Coupon if ITM	1-mo Libor Strike Rate	IO X	Price	WAL	LOAS	Eff Dur	Eff Conv
FHR 3035 CI	Digital IO	6.0%	7.0%	1.00	7-27	9.45	366	-85.9	53.4
FHR 3072 TU	Superfloater	21.4%	7.0%	2.89	95-04	6.93	131	-4.1	14.1
FNR 05-97 DS	Superfloater	27.0%	6.5%	4.00	108-12	7.82	206	-19.8	25.4
FHR 3132 FB	Superfloater	46%	7.0%	6.67	124-20	8.71	211	-26.80	27.50

ITM refers to in-the-money.

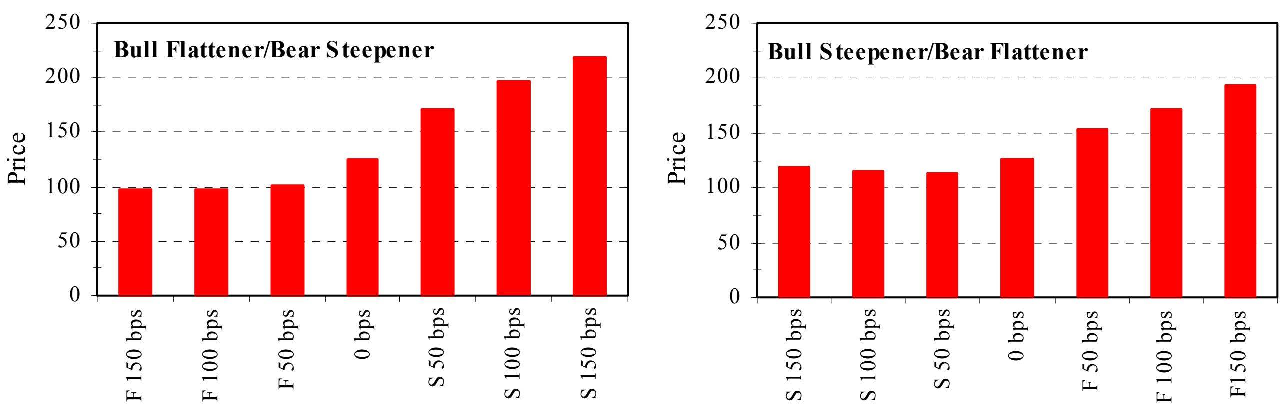
Source: Banc of America Securities. Prices as of 06/28/06 close.

Figure 26: Effect of Parallel Shift in Rates on Prices of a Digital IO (FHR 3035 CI) and a Super Floater (FHR 3132 FB)



Effect on instantaneous changes in yield curve assuming constant OAS is shown here.
Source: Banc of America Securities

Figure 27: Price Change of a Super Floater (FHR 3132 FB) Due to Changes in Yield Curve Shape



Bear Steepener: S 50 is +50 2yr, +100 10yr; S 100 is +50 2yr, +150 10yr; S 150 is +50 2yr, +200 10yr Bull Flattener uses negative shifts.
Bear Flattener: F 50 is +100 2yr, +50 10yr; F 100 is +150 2yr, +50 10yr; F 150 is +200 2yr, +50 10yr. Bull Steepener uses negative shifts.
Effect of instantaneous changes in yield curve assuming constant OAS is shown here.

Source: Banc of America Securities

Figures 28 and 29 show yield tables for the Digital IO (FHR 3035 CI) and super floater (FHR 3132 FB) for different assumed constant collateral prepayment speeds. Both the Digital IO and super floater offer very high yields if the 1-mo LIBOR hits and stays beyond the strike rate. As expected, the realized yield decreases with an increase in the prepayment speed of the underlying collateral.

Figure 28: Yield Table For a Digital IO (FHR 3035 CI)

Index/PPY (CPR)	4	6	8	10	12	14	16
6.01	-	-	-	-	-	-	-
6.51	-	-	-	-	-	-	-
7.01	97.6	95.9	87.3	74.9	60.4	44.1	28.5
7.51	97.6	95.9	87.3	74.9	60.4	44.1	28.5
8.01	97.6	95.9	87.3	74.9	60.4	44.1	28.5
WAL	19.3	15.7	10.9	6.9	3.9	2.2	1.6
Next Principal (mo/yr)	5/21	7/6	7/6	7/6	7/6	7/6	7/6
Last Principal (mo/yr)	5/30	1/28	3/25	3/15	11/18	10/14	8/10

Source: Banc of America Securities. As of 06/20/2006 close.

Figure 29: Yield Table For a Super Floater (FHR 3132 FB)

Index/PPY (CPR)	4	6	8	10	12	14	16
6.01	-0.9	-1.1	-1.4	-1.8	-2.5	-3.7	-9.2
6.51	-0.9	-1.1	-1.4	-1.8	-2.5	-3.7	-9.2
7.01	39.7	39.2	38.3	37.4	35.6	33.3	29.8
7.51	39.7	39.2	38.3	37.4	35.6	33.3	29.8
8.01	39.7	39.2	38.3	37.4	35.6	33.3	29.8
WAL	21.0	17.1	13.3	10.4	7.2	4.5	2.0
Next Principal (mo/yr)	7/06	7/06	7/06	7/06	7/06	7/06	7/06
Last Principal (mo/yr)	8/34	11/33	10/33	1/36	1/36	1/36	2/13

Source: Banc of America Securities. As of 06/20/2006 close.

Investment Rationale for Digital IOs and Super Floaters

A Digital IO is a good hedge instrument for investors or liability managers with LIBOR or duration exposure. Note that the market offers less-than-perfect ways to hedge rising LIBOR risk, especially on MBS portfolios. Most products or methods are inefficient, costly, or only partially effective in hedging LIBOR risk. A digital cap on Libor offered in the OTC options market has offered the most levered protection to date in terms of hedging rising LIBOR risk but is not typically available for tenors longer than 10 years. In comparison, a Digital IO not only provides highly leveraged exposure to LIBOR and hence hedging value for a small investment amount, but also much longer maturities are available for a Digital IO versus other alternatives. Thus, a digital IO provides superior hedge management costs and characteristics for MBS portfolios.

V. TOGGLE FLOATERS

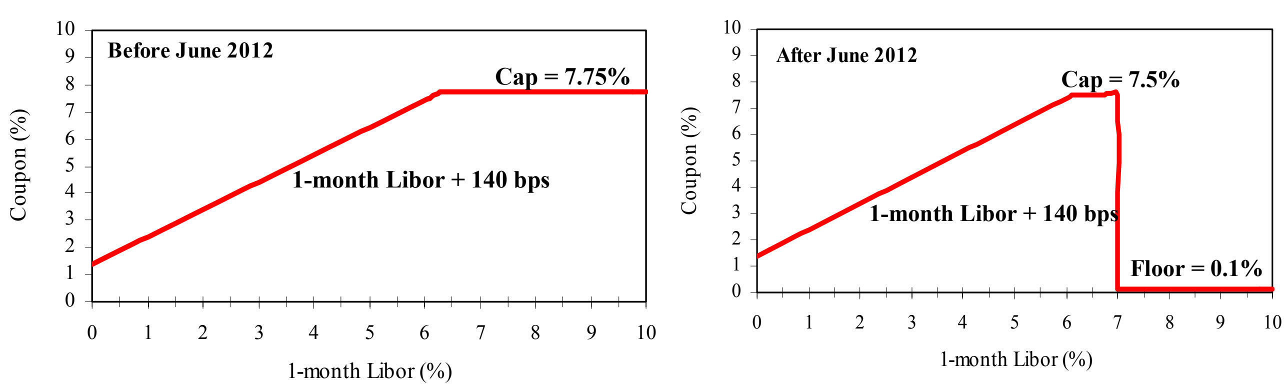
Toggle floaters are an attractive option for investors willing to take on some LIBOR risk for earning higher spreads. For instance, investors can potentially earn a spread of 125-250 bps over 1-mo LIBOR by investing in toggle floaters. Compared to this, other typical agency CMO floaters offer a spread of 30-50 bps over 1-mo LIBOR. Essentially, investors earn this higher spread offered by toggle floaters by selling out-of-the-money cap options.

To make the discussion more concrete, let's look at the payoff structure of a representative toggle floater FHR 3165 EF. The coupon structure of this floater is as follows (Figure 30):

- For payment dates on or before June 2012, the floater pays 1-mo LIBOR + 140 bps with a cap of 7.75%.
- For payment dates after June 2012:
  - a. If 1-mo LIBOR is less than 7%, the floater pays 1-mo Libor + 140 bps with a cap of 7.5%.
  - b. If 1-mo LIBOR is greater than or equal to 7%, the floater pays a coupon of 0.1%.

Hence, before the initial lock-out period, which is June 2012 for FHR 3165 EF, the toggle floater has a payoff structure similar to that of a regular hard cap floater except for its higher index margin. However, after the end of the lock-out period, the coupon on the toggle floater drops down to a floor value if 1-mo LIBOR is above a specified strike rate. Thus, investors are essentially short a forward starting digital IO and the excess current yield, or the higher index margin that an investor earns, is compensation for selling the digital IO. Note that dealers usually have a lot of flexibility in structuring these deals and can create toggle floaters with the initial lock-out period, margin, cap, floor, strike, and structure as per the preferences of different investors.

Figure 30: Coupon Payoff Structure of a Toggle Floater



Source: Banc of America Securities

Figure 31 shows the DM on the FHR 3165 EF floater for different 1-mo LIBOR rates and different prepayment speeds (corresponding to different interest rate scenarios). This bond offers very high DMs even if 1-mo LIBOR reaches as high as 6.5%.

Toggle floaters also present an investment alternative for investors who want to express a view on 1-mo LIBOR. For instance, by taking a long position in FHR 3165 EF, investors are essentially expressing a view that after the initial lock-out period, 1-mo Libor will not reach 7% or will not stay above 7% for an extended period of time. Also, if the toggle floater FHR 3165 EF pays as per our prepayment projections, 60% of the principal balance would have been paid down by June 2012. Thus, after the initial lock-out period, even if 1-mo LIBOR goes above 7%, investors will lose their coupon payments for some period of time on a smaller principal balance. Furthermore, since the coupon payments are not sticky, investors will be able to earn high margins over the index when the reference rate drops below the strike rate again. Finally, it's worth pointing out that if higher LIBOR rates (above 7%) are associated with higher long term rates and slower prepayment speeds, the principal balance in this context will remain outstanding for a longer period of time. In this situation, investors will have the potential to earn higher margins over the reference rate again if and when the reference rate drops back below the strike rate.

Figure 31: Discount Margin of a Toggle Floater For Different LIBOR Rates and Interest Rate Scenarios

	300 bps	**200 bps**	**100 bps**	**0 bps**	**-100 bps**	**-200 bps**	**-300 bps**
Index|PPY	**124 PSA**	**129 PSA**	**152 PSA**	**197 PSA**	**544 PSA**	**1400 PSA**	**1667 PSA**
3.5	140	140	140	140	140	140	140
4.5	140	140	140	140	140	140	140
5.5	140	140	140	140	140	140	140
6.5	114	114	116	119	126	126	126
7.5	-366	-356	-305	-192	30	33	34
WAL	11.8	11.3	9.2	6.0	1.5	0.8	0.7

Source: Banc of America Securities. As of 07/19/06 close for a price of $100.

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