

## Strategies in a steep curve environment

**We examine the impact of the steep curve on relative value in the short duration sector of the mortgage market. In the short end, we caution against securities that can roll 'up' the curve owing to extension risk, such as sequentials. In contrast, we recommend balloons and PACs, which provide good extension protection and attractive valuations.**

Mortgages came under some pressure over the past week, with LIBOR OASs across most coupons widening 2–3 bp. Lower rates have pressured the sector, as refinancing and supply concerns have grown with conventional 6.5s approaching par. We remain modestly positive on mortgages versus other spread product, as spreads remain on the wide end relative to the past six months for the current level of rates. In particular, we recommend 7s within the conventional coupon stack (owing to their wide OASs versus neighboring coupons and roll financing), and recommend semi-seasoned GNMAAs over TBAs.

### Strategies in a steep curve environment

The steep curve has generally been viewed as a boon to mortgage investors. As shown in Exhibit 1, with the one-year to 10-year swap slope having reached more than 200 bp, the curve is now at its steepest level since late 1993. The benefits of a steeper curve are clear: Funding rates are low relative to security yields; forward rates are higher, pushing the implicit prepayment option further out-of-the money; and rolldown gives a boost to total return. However, the steeper curve does have a downside as well. Specifically, extension risk becomes more acute as bonds have the potential to roll "up" the curve. With much of the mortgage market now priced relative to the swaps curve, securities at the bottom of a steep section of the curve (particularly the one- to two-year area currently) can be susceptible to greater extension risk, if the market reprices them at a spread to the curve but at slower speeds. **We recommend that investors in the very short end of the curve (two-years and in) look to extension-protected cash flows such as balloons and PACs, while avoiding securities with greater extension risk, such as sequentials.**

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**Exhibit 1: The curve has reached historically steep levels**  
 Swap curve slope between one-year and 10-year

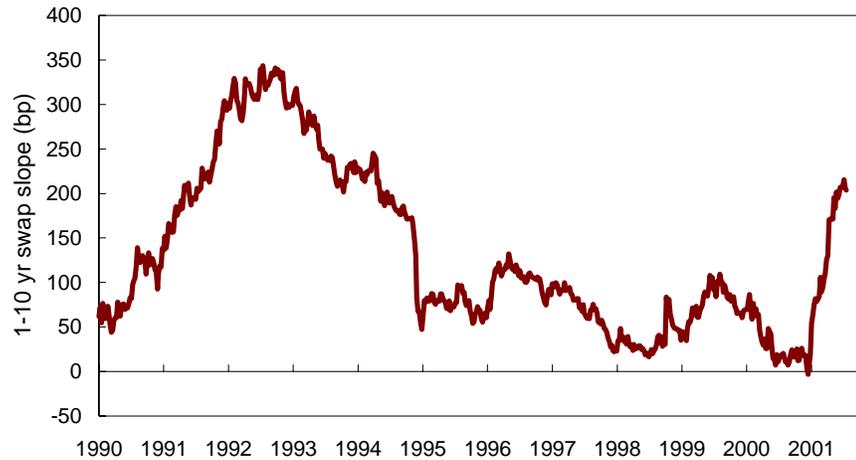
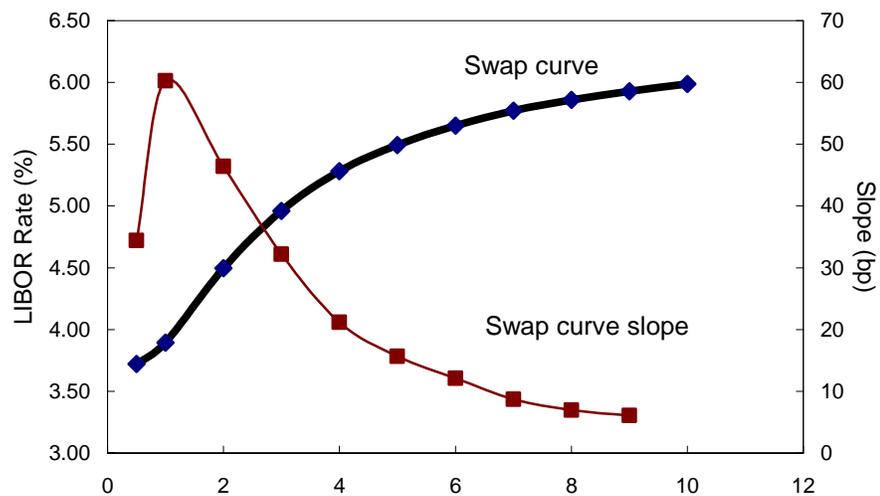


Exhibit 2 highlights the level of swap yields by maturity, as well as the slope of the curve at each point (measured as the change in yield for a one-year extension out the curve). As shown, the steepest part of the swaps curve is currently in the one- to two-year area. While the nine- to 10-year part of the curve is 6 bp steep, the one- to two-year section has a slope of 61 bp. To put this in perspective, since mid-December the one- to 10-year swap curve has steepened 200 bp, reflecting the Fed's rate cuts over this period.

**Exhibit 2: The curve is steepest in the one- to two-year area**  
 Swap rates and slope by maturity, as of July 25, 2001



*Slope defined as the change in yield per additional one-year maturity*

### Investment implications: Extending up the curve

The risk of extension in the short end can be seen in a comparison of two short securities: a seasoned seven-year balloon 6% and a short sequential backed by 30-year conventional 6.5s. We selected these two examples to highlight the contrast in extension risk in the short end. The balloon has excellent call protection for several reasons: First, turnover speeds on balloons have traditionally been very high, reflecting the fact that borrowers with shorter horizons in their home have often opted for shorter-duration mortgages. This can be seen in recent speeds on discount balloons, where even 1998-99 vintage seven-year 5.5s are prepaying at 20–25% CPR, if not faster. Second, the stated final clearly limits the extension potential of balloons and provides a defined principal window. Third, the seasoning of these securities helps to insure fast turnover, while bringing the final maturity closer (August 2004 in this example). In contrast, the sequential lacks structural protection to limit extension, and also has a wide window (July 2006 final at GS projected speeds).

As shown in Exhibit 3, while the balloon extends only 0.1 year if rates back up 50 bp, the sequential can extend 0.7 year. With the two- to three-year part of the swaps curve currently 46 bp steep, extending 0.7 year means the sequential would be priced at a point on the curve roughly 30–35 bp higher than where it is now. **The OAS difference reflects the value in the balloon: At a LIBOR OAS of 19 bp, the balloon offers a 24 bp pickup versus the sequential.**

#### Exhibit 3: Balloons offer good extension protection

Pricing as of July 26, 2001

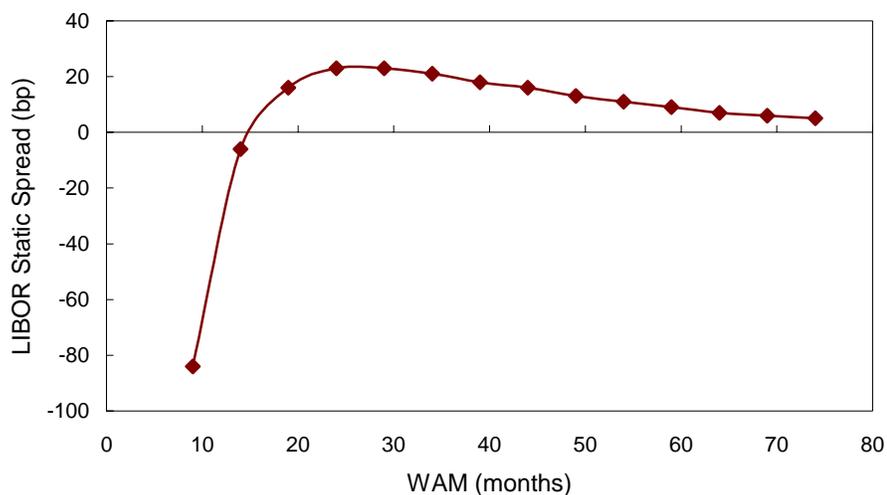
Security	Coup	WAC	WAM	WALA	Pricing	Price	Average Life					LIBOR OAS
							-100	-50	0	+50	+100	
7-yr 6% FG40308	6.0	6.75	37	47	E+25, 25 CPR	101-24	1.7	1.9	2.1	2.2	2.2	19
FH 2018 K Sequential	6.5	7.26	297	49	147/c	102-03	0.7	1.1	2.0	2.7	2.8	-5

In a steep curve, balloon dispersion and faster pricing speeds may not hurt. An interesting additional benefit of the steep curve environment is that balloon dispersion — the fact that balloon pools generally have a range of final maturities — may not adversely affect spread. For instance, the balloon mega highlighted above (FG40308) has an average WAM of 37 months. However, within the security, there are pools with WAMs as short as 19 months and as long as 42 months. With a dollar price of 101-24, one would expect that the shorter WAM pools would be worth considerably less. However, owing to the steepness of the curve, this is not the case (up to a point). Exhibit 4 shows the LIBOR static spread of a series of hypothetical balloons with 6% coupons, with various maturities (WAMs ranging from nine to 74 months), all priced at 101-24. **As shown, while the security has a 37-month WAM, pools with a WAM between 20 months and 37 months actually offer a wider static spread.** It is not until WAMs fall below 20 months that the “pull-to-par” effect begins to drive spreads narrower. Thus, being delivered shorter maturities can be offset by

the steep curve in the short end.

A similar effect is that certain premium securities can have wider spreads at faster pricing speeds than at slower pricing speeds. We have seen this in several markets, including home equities. For instance, IRWHE 01-1 A3 is a 2.3-year home equity priced at N+60 at 15% CPR, or a 101-15 dollar price. However, at faster speeds (such as 20% CPR) the spread widens, as the average life shortens and the security rolls down the curve. This is not to suggest that fast speeds are necessarily beneficial for these securities, since yields decline with faster speeds. However, the curve shape does help add to total return if the securities are repriced at the horizon.

**Exhibit 4: Impact of balloon WAM dispersion on LIBOR static spread**  
LIBOR static spread of hypothetical balloon 6% by WAM at 101-24 price



### Rolling down the curve with PACs

The steep swap curve can boost total returns if it remains intact, as bonds roll down the curve. Of course, however, the curve shape can change over a holding period, and forward rates point to a significantly flatter curve in a year than is currently in place. (For a related discussion on implementing a view that the future curve will be steeper than implied by forwards, please see the Derivatives section.) However, in addition to the steepness of the swap curve, the *spread* curve is also quite steep in certain sectors, providing investors with an additional source of price appreciation over a holding period. The advantage of buying on a steep part of the spread curve is that these curves almost always tend to be upward sloping, reflecting buyer segmentation by duration (e.g., banks help keep shorter-duration securities tight, while the six- to eight-year sector has traditionally lacked sponsorship and is generally wide).

Exhibit 5 compares valuations across a 6% PAC deal. As shown, while investors benefit from the steep swap curve, the LIBOR OAS curve is even steeper. For

instance, the yield slope between the 2.4-year and 3.9-year tranches is about 49 bp, slightly steeper than the swap curve in this sector. However, the LIBOR OAS of the 3.9-year is 12 bp wider than the 2.4-year, implying that the security may tighten in OAS as it shortens. Moreover, since these securities have principal lockout, they roll down the curve one-for-one (i.e., their average life is one year shorter in a year.) **With an implied OAS tightening of 9 bp per annum, the OAS rolldown of the 3.9-year PAC would add 7–8 ticks in price appreciation over a one-year horizon, or roughly 25 bp in total return.** On a purely fundamental basis, it should also be noted that the PAC bands provide good extension protection, and the PACs offer considerably wider OAS than their sequential counterparts.

#### Exhibit 5: Rolldown in the PAC market

FH 2164 deal, 319 WAM conventional 6s

Tranche	Avg Life	Price	Yield	LIBOR OAS	Implied Annual LIBOR OAS Rolldown
QB	1.4	102-07	4.23	7	—
QC	2.4	102-17	4.82	11	3
QD	3.9	101-17	5.55	23	9
QE	5.7	100-08	5.97	24	0
QG	8.9	98-03	6.33	25	0

In summary, the steep front end of the yield curve should affect security performance and relative value in the short end. We recommend the following strategies to take advantage of the steep curve:

- Buy balloons, which provide good extension protection from turnover and stated final maturity.
- Buy PACs, where structural protection limits extension risk, and where tight principal windows allow for efficient rolldown the spread curve.
- Avoid wider window, extendable structures such as sequentials (particularly in the two-year area), where extending out the curve can negatively affect total return.
- Emphasize seasoning, where higher turnover rates limit extension.

#### Mortgage model portfolio performance in June

The Goldman Sachs mortgage model portfolio underperformed the mortgage index by 6 bp on a duration-adjusted basis in June. The month of June was characterized by a general lack of substantial moves in mortgage market fundamentals, i.e., level of interest rates, shape of the yield curve, intermediate- to long-term implied volatilities and mortgage/swap and mortgage/agency bases. Mortgage rates crept 10 bp higher in June, following the widening in the 10-year swap spreads of the same magnitude; the curve between two- and 10-years remained largely unchanged, while intermediate- to long-term swaption volatilities inched up by 20–40 bp. The absence of large moves in the market was manifested in a sharp drop-off in the actual volatility of mortgage prices, with the rolling one-month annualized realized

volatility for TBA FNMA 6.5s declining to under 4%. There were no material shifts in the bases as well, with 30-year current coupon mortgages marginally tightening by less than 1 bp versus both swap and agency debentures. Carry was the major component of mortgage performance, as it was during the summer of 1998.

The core portfolio lost 7 bp in return versus the index last month, which was only partially offset by a 1 bp gain attributable to our modest overweight in better carrying FNMA 6.5s versus agency debentures. Underperformance was concentrated in our pass-through holdings (-9 bp), which more than offset the solid performance of our 3% position in CMBS IO (+2 bp contribution to portfolio incremental returns versus the index). Part of the pass-through portfolio underperformance can be explained by our underweight in TBA 30-year higher coupons (7.5s and above), which posted solid price performance in June, tightening 2–5 bp in OAS versus lower coupons. However, the major factor of the June underperformance was lower carry on our pass-through holdings. In 30-year conventionals, this was due to a significant underweight in TBA 6.5s and 7s (combined model portfolio weight of 19% versus the index weight of 33%) — the best carrying (and rolling) coupons in June. In 30-year GNMAAs, the portfolio lost 6 bp in returns versus the index because of our significant exposure in 1993 and 1997 vintage GNMA 7s, which, with a combined portfolio weight of 14%, accounted for over half of our GNMA holdings (27%). As speeds on these premium-priced vintages accelerated by another 2% CPR in May (for June payments) to reach 21% CPR and 22% CPR, respectively, vintage GNMA 7s monthly returns ended 10–13 bp lower than those on TBAs, which rolled fairly well at 8+ /32nds at the end of May.

As the June portfolio experience shows, barring a significant rally in mortgage rates, carry and dollar rolls should be just as important factors as OAS comparisons in achieving superior portfolio returns. Our most recent portfolio trade of selling 6% in 30-year conventional 7.5s and moving down in coupon into TBA 7s (July 20, 2001) was predicated not only on the OAS advantage of 7s, but also on the better carry and dollar rolls in this coupon versus the rest of the conventional coupon stack.

**Exhibit 6: Goldman Sachs mortgage model portfolio performance in June**

	Core vs. Basis Returns				Composition of Core Returns			
	Basis (Over/Under Weight)	Core Pickup (bp)	Basis Pickup (bp)	Total Pickup (bp)	Non-Index Weight In the Core	Index Pickup (bp)	Non-Index Pickup (bp)	Total Core Pickup (bp)
1998	0	92	47	139	10	95	-3	92
1999	25	36	85	121	10	-6	42	36
2000	20	49	23	72	NA	35	14	49
Jan-01	10	2	0	2	12	11	-9	2
Feb-01	0	9	1	10	9	-1	10	9
Mar-01	0	-5	0	-5	9	2	-7	-5
Apr-01	0	14	0	14	9	9	5	14
May-01	0	-4	0	-4	9	0	-4	-4
<b>Jun-01</b>	<b>5</b>	<b>-7</b>	<b>1</b>	<b>-6</b>	<b>6</b>	<b>-9</b>	<b>2</b>	<b>-7</b>
<b>YTD 2001</b>	<b>NA</b>	<b>9</b>	<b>2</b>	<b>11</b>	<b>NA</b>	<b>12</b>	<b>-3</b>	<b>9</b>

*Note: Basis positions are reported versus Treasuries and bullet agencies, respectively. Core portfolio returns assume that TBA pass-through positions are rolled. The mortgage basis position and non-index weight in the core are reported as of the beginning of the period. Basis returns are computed against the Benchmark/Reference agency notes as a hedge and reflect intra-month changes to the mortgage basis position within the model portfolio. Both core portfolio and basis returns incorporate all trades effected during each month. Returns are computed using bid-side prices and do not reflect bid-asked spreads. The cumulative return outperformance is not compounded, and the sum of monthly excess returns may differ from cumulative excess returns because of rounding.*

