

## The term structure and term premium of interest rates

A basic of bank A/LM, or indeed that of finance, is the consideration of the term structure of interest rates. The construction of future rates underlies both bank- and market-level pricing. The SEC's Market Risk Disclosure and the OTS's NPV model both require the use of implied forward rates for valuation of bank assets and liabilities. Indeed, marketplace valuations are typically based on implied forward rates and/or volatilities.

Many banks and A/LM service bureaus use a current, or flat, rate scenario to project future cash flows and values, in contrast to SEC and OTS requirements. Others use the same implied forward rates as a basis for net interest margin and earnings projections despite the intuitive "feeling" that the implied forward rates may not be an unbiased estimator of future rates. Others use an economic consensus forecast as a basis for projecting income, cash flows, and margins.

Despite regulatory and marketplace pressures for backtesting crucial assumptions, not all banks have reviewed the actual path of interest rates versus

3M rate forecast comparison (1Y forecast)  
Period July 1992 to Dec 2001

Country	Consensus	Forward	Actual	% Fwd>Act	Fwd Bias
US	5.07%	5.42%	4.67%	74.6%	75 bps
Germany	4.93%	5.37%	4.60%	78.0%	77 bps
Japan	1.91%	2.03%	1.18%	93.0%	85 bps

Source: Bloomberg and Consensus Forecasts

Given these results, we discuss a strategy of buying floors. This strategy amounts to a geared carry trade. Recent performance has been impressive but we believe there is more to come. A related question is to what extent buying floors and selling caps would have been profitable. Because a floor is a leveraged long position on the term premium, then it should generate higher returns. Conversely, a cap is a leveraged short position on the term premium and should therefore be a "money loser". **As**

consensus rate forecasts and implied forward rates. In the remainder of this article, we review actual vs. implied three-month LIBOR rates, with reference to consensus forecasts.

## Results over the past 10 years

In the U.S., many banks and thrifts utilise interest rate caps to hedge perceived interest rate risk to increasing rates, despite their stated A/L profile of "asset sensitivity". The more appropriate hedge for an "asset sensitive" bank is, of course, an interest rate floor. Review of these strategies in the context of backtesting interest rate projections is quite appropriate.

In the past, we **have alluded repeatedly to the so-called forward bias in the yield curve. Forward bias is the tendency of forward rates to overestimate actual rates.** The following table is just an example of this bias: should one have bought systematically one-year Eurostrips in USD, EUR (or DEM prior to 1999), and JPY four times a year from July 1992 till December 2001, a contract would have made on average 75 bps in USD, 77 basis points in EUR, and 85 bps in JPY.

**expected, buying at-the-money-forward (ATMF) floors has been a winning proposition with the average return hovering around 43%.**

Source: DB Global Markets Research

We can take the argument further and look at the profit and loss statistics of floors and caps at different strikes going forward. To do that, we perform a Monte Carlo simulation, which makes the following assumptions:

- (i) spot rates (not forward rates) are optimal predictors of future rates, an assumption that is not off-base over long time periods.
- (ii) Proxies for spot rate volatilities are volatilities implied from prices of options on LIBOR futures and include a skew factor that varies with the strike.

We find that out-of-the-money floors are highly profitable on average in both USD and EUR. But the Sharpe ratio actually increases, as floors become in-the-money because volatility drops more quickly than profitability as the strike rate increases. As a reference point, an ATMF one-year floorlet is expected to yield close to 300% and

<b>3 month LIBOR rates</b>	<b>Current</b>	<b>1 year forward</b>	<b>Premium</b>
<b>April 24<sup>th</sup></b>	1.94	3.54	<b>1.60</b>
<b>July 24<sup>th</sup></b>	1.82	3.02	<b>1.20</b>
<b>Delta</b>	-0.12	-0.52	<b>-0.40</b>

Source: Bloomberg

<b>3 year swap rates</b>	<b>Current</b>	<b>1 year forward</b>	<b>Premium</b>
<b>April 24<sup>th</sup></b>	4.28	5.14	<b>0.86</b>
<b>July 24<sup>th</sup></b>	3.40	4.49	<b>1.09</b>
<b>Delta</b>	-0.88	-0.65	<b>+0.23</b>

Source: Bloomberg

Over the last three months, the market has taken 40 bps out of the forward premium in the 3-month USD LIBOR rate and a lesser amount in the 3-year rate. The flatter rate scenario that many market participants projected earlier in 2002 occurred by mid-

<b>3 year – 3 month rates</b>	<b>Current</b>	<b>1 year forward</b>	<b>Premium</b>
<b>April 24<sup>th</sup></b>	2.34	1.60	<b>-0.74</b>
<b>July 24<sup>th</sup></b>	1.58	1.47	<b>-0.11</b>
<b>Delta</b>	0.76	0.13	<b>0.63</b>

Source: Bloomberg

200% in USD and EUR respectively. Corresponding Sharpe ratios are about 2.5 and 1.2. Caveat emptor: These results follow directly from the assumptions underlined above. As expected, we find a mirror image of these results when it comes to caps. **The expected return on an ATMF cap is -99% in USD and -90% in EUR.** Source: DB Global Markets Research

### A quick look at 2002

In 2002, slope measures of the term structure and short-term rate volatility have both been high from an historical perspective. The following tables illustrate current (July 24<sup>th</sup>) and one-quarter prior 3 month USD swap rates and 3 year USD LIBOR rates and one-year forward rates.

year. This was not by increases in short rates that the consensus forecast predicted, but rather by a decrease in intermediate and long rates, much as occurred in 1993. As a reference, compare the delta of 3 year to 3-month USD changes.

### **A Tale of Two Banks**

The first half of 2002 for banks was both the best of times and the worst of times. Earlier this year, we discussed the implications of this research with the CEO of two U.S. regional banks. Their questions were similar “why should I buy an interest rate floor when Fed Funds is 1.75% and I expect it to be 1.75% for the next year?”

Our response was simple – you are an “asset sensitive” bank whose margins will compress the longer Fed Funds stays at 1.75%. The market has priced (as of April 24<sup>th</sup>) a 160 bps increase into the price of an

Fred Poorman Jr., CFA

This article appeared in 2002 in *Bank/Asset Liability Management*, published by A.S. Pratt & Sons, a Thomson Financial company.

ATMF floor. Hedge your interest rate risk of your hard earned “asset sensitivity” of your balance sheet appropriately by buying floors. Coincidentally, Deutsche Bank’s Global Market Research shows that over the past 10 years, you would have made 43% utilising this strategy.

The CEOs and CFOs took opposing views on this strategy at both banks. In both cases, the CFO favored the hedge transaction (FAS 133 considerations notwithstanding). As happens, one hedged via floors, one didn’t.