

CALCULATING THE "ROLL" IN THE WHEN-ISSUED US TREASURY MARKET

Immediately after the US Treasury announces the specific terms of a new note or bond auction, the prospective new issues immediately begin trading on a when-issued basis¹. It is also common for investment dealers to start trading the "roll" from the outstanding cash security to the new when-issued security. Because all such trades settle on the issue date of the new securities, the valuation of this roll is complicated by "special" repo considerations on the outstanding securities. In fact, when the yield curve is fairly flat, such considerations can dominate the roll valuation. The purpose of this note is to lay out the typical framework that dealers use to value the roll, using the April 17 two- and five-year Treasury note announcement as an example.

Basically, the roll can be constructed as a sum of four factors, which are enumerated in the table on the following page:

1. A yield differential due to maturity extension from the cash- to the when-issued security. In the case of the April 17 two-year announcement, the ?? dealers that I talked to estimated the curve to be worth about x bps from the old 6.125% notes due March 31, 1998 to the new notes due April 30, 1998, and in the case of the five-year note the curve was said to be worth about x bps from the old 6.375% notes due March 31, 2001 to the new notes due April 30, 2001.
2. The yield impact of any "bad" coupon or maturity payment dates on either the old or the new security. The "bad days" are those on which the security's contractual payment date falls on a weekend or holiday, in which case actual payment is made on the next business day. For example, the old five-year note (the 6.375% of March 31, 2001) matures on a Saturday, and the two-day payment lag is worth about 0.5 bps of yield. The two-year notes had no bad days.
3. A yield pick-up based on the positive "carry" given up on the outstanding cash security, which can be quite significant if the yield curve is upward sloping and the cash security is on special in the repo market. The mathematics of this calculation is discussed in the appendix, but basically it is the yield equivalent of the cash security's cost of carry from the regular cash settlement date (usually the day following the trade date) to the when-issued security's issue date. On April 17, the "special" term repo rate on the then current two-year note from April 18 (regular settlement) to April 30 (the issue date of the new two-year) was about x.xx%, which translated into x.x bps of carry on the old two-year note. The special rate on the old five-year note was about x.xx%, which translated to x.x bps of carry.
4. A yield give-up based on the expected "scarcity" value in the special repo market of the new when-issued security after it is issued. This is also discussed in the appendix, but it basically involves calculating the yield equivalent of the benefit of the lower financing cost that the new issue is expected to enjoy (due to its "special" status in the repo market) from its issue date to the issue date of the next new issue of the same initial term to maturity. Estimates of the likely spread between the general collateral repo rate and the "special" rates expected are quite subjective, but recently this spread has averaged about 100 bps on the two-year note and 200 bps on the five-year. However, the dealers that I surveyed showed me implicit spreads of about 25 bps and 100 bps, respectively, which translated into yield differentials of x.x bps and x.x bps. Lehman complicated matters somewhat by not explicitly estimating a scarcity value, but they showed me what they call a "liquidity" premium that was supposed to reflect all of the advantages inherent in an

1 Sometimes when-issued trading is delayed when there are some uncertainties regarding the ultimate issuance of the securities. This has happened recently when debt limit legislation has been pending.

"on-the-run" issue².

Hence, the roll was expected to open up at around x bps on the two-year note and x bps on the five-year note. Of course, the old-issue carry component of the roll should be expected to diminish as the issue date of the new issues (April 30) approaches, but the other three components may not be expected to change that much.

	Roll Estimates (basis points)					
	Two-Year			Five-Year		
	Lehman			Lehman		
"Curve" Extension	+1.3			+1.0		
"Bad" Days	0.0			-0.7		
"Carry" on old issue ^a	+1.4			+1.4		
"Scarcity" of new issue ^b	-1.0			-1.0		
Total Roll	+1.7			+0.7		
^a Financing on old	5.05%			4.40%		
^b Financing on new	n/a			n/a		

2 A Treasury security goes on the run in the cash market immediately after its auction, and goes off-the-run after the next auction of the same maturity takes place. On-the-runs typically trade at tighter bid/offer spreads. Lehman claims that their "fuzzier" estimate of the scarcity/liquidity premium has proven to be quite accurate on an *ex-post* basis. They claim that it is quite impossible to estimate the *ex-ante* special repo rate, because it is driven to a large degree by what happens at and after the auction. For example, someone "scoops" the issue at auction, it will surely trade very special in the repo market, but one can never accurately predict "scoops".

APPENDIX

THE REPO MARKET AND TREASURY SECURITY PRICING

The market for repurchase agreements exists to facilitate the trading of Treasury and other fixed-income securities, by providing investment dealers a market through which they can obtain collateralized financing and short sellers with a market through which they can obtain as collateral the securities needed to fulfill their delivery obligations. In a repo transaction, a dealer sells securities to an investor and simultaneously agrees to repurchase them at a higher price on a specified future date. The interest rate corresponding to the difference between the sale price and the repurchase price is called the repo rate. In a reverse repo agreement, on the other hand, the dealer buys the securities and agrees to resell them at an agreed upon price on a specified future date. Dealers use these reverse repo agreements to establish short positions³. The following formula can be used to calculate the forward price (including accrued interest) for a repo trade that settles n days hence:

$$\text{Forward price} = b \cdot (1 + r \cdot n / 360)$$

where b is the security's starting price (including accrued interest) and r is the repo rate. The "cost of carry" is the difference between the forward and the cash price.

Although most securities can be financed in the repo market at "general collateral" rates that typically trade close to Fed funds rates, market conditions sometimes allow owners of certain issues to finance their securities at "special" rates. Short sellers are often willing to provide financing at special rates in exchange for issue-specific collateral that can be used to cover their shorts. Depending upon the extent to which the demand for a particular security exceeds the supply thereof, specials rates trade below general collateral rates, and can even trade down to zero percent in a "squeeze".

An issue's "scarcity value" measures the incremental value attributable to the difference between its special repo rate and the rate on general collateral. Scarcity value may depend on several factors, the most important of which is the issue's status as either "on-the-run" or "off-the-run", on-the-runs usually trading with more scarcity value than do off-the-runs.. A Treasury security goes on-the-run in the repo market on its issue date and remains so until the issue date of the next Treasury security with the same original maturity. An on-the-runs scarcity value tends to peak during the when-issued trading period of the next issue, on dealer short selling aimed at hedging positions that they accumulate in the when-issued security, but declines rapidly thereafter.

The following formula can be used to estimate the scarcity value of a special security:

$$\text{Scarcity} = ((b \cdot n \cdot (100/h) \cdot (r - x)) / 360) / (1 + r \cdot n / 360)$$

where r is the general collateral repo rate, x is the n - day special term repo rate and h is the "haircut" - the collateral amount as a percent of the money lent. Basically, the formula calculates the value of being able to borrow funds at the special rate and invest them at the general collateral rate.

3 Shorted securities must be borrowed through reverse repo agreements, under which the short seller has to borrow the security using the proceeds of the sale, on which he earns a negotiable rate, as collateral. This rate will likely be below the general collateral repo rate, depending upon the scarcity of the security. In addition, non-dealer short sellers have to pay the dealer's financing desk a spread of as much as 50 bps.