Section 3

Basis Trading

Exhibit 3.1

Basis Trading

- Things that affect the basis
- Trade construction
- P/L profiles for long and short basis positions
- Types of basis trades
- Examples of basis trades

Exhibit 3.2

Basis Trading

- **Basis trading**
  The simultaneous trading of cash bonds and bond futures to take advantage of expected changes in the basis. Basis trades can be done as spreads in the EFP (exchange of futures for physicals) market through various government bond brokers as well as in the conventional way, which involves separate cash and futures trades.

- **Buying the basis**
  By definition, "buying the basis," or "going long the basis" is buying cash bonds and selling a number of futures equal to the bond's conversion factor for every $100,000 par value of the cash bond.

  For example, buying $100 million of the basis of the 8-3/4s of 5/15/17 (whose conversion factor is 1.0771) would mean buying $100 million face or par amount of the bond and selling 1,077 [= $100,000,000 x (1.0771 / $100,000)] bond futures.

- **Selling the basis**
  To sell or go short the basis is just the opposite: selling or shorting the cash bond and buying a number of futures equal to the bond's conversion factor for every $100,000 par amount of the bond sold.

  For example, selling $10 million of the basis of the 7-5/8s of 2/15/25 (conversion factor = 0.9575) would entail selling $10 million face amount of the bond and buying 96 [= $10,000,000 x (0.9575 / $100,000)] futures contracts.

- Strict constructionists use the conversion factor to determine the number of futures contracts to buy of sell in a basis trade. This approach allows one to tie changes in the P/L to changes in the basis as it is defined. Basis positions usually have some directional bias, which bothers traders who want to trade the cash/futures price spread buy who do not want to take a directional position. A duration neutral cash/futures spread trade will have a slightly different P/L than a strict basis trade.

Exhibit 3.3

P/L for a Long Basis Position

■ Setting

Suppose that on August 6, 1992, September '92 bond futures are trading at 105-04/32nds. At the same time, the 7-1/4s of 5/16 are trading at 97-18.5/32nds.

You think that 23.9/32nds is a narrow basis at this time in the delivery cycle and that a long basis position is likely to be profitable. The 7-1/4s have a conversion factor of 0.9211. Your opening trade would be:

Opening trade on 8/6/92 (settle 8/7/92)

Buy $10 million of the 7-1/4s of 5/16 at 97-18.5/32nds
Sell 92 September 1992 futures at 105-04/32nds

Basis = 23.9/32nds

By August 20th, your views have been borne out, and you want to unwind the position. Your closing trade would be:

Closing trade on 8/20/92 (settle 8/21/92)

Sell $10 million of the 7-1/4s of 5/16 at 98-17/32nds
Buy 92 September 1992 futures at 106-08/32nds

Basis = 21.3/32nds

Exhibit 3.4

P/L for a Long Basis Position (continued)

■ **Bonds**

Buy $10 million of the 7-1/4s of 5/16 at 97-18.5/32nds
Sell $10 million of the 7-1/4s of 5/16 at 98-17/32nds

Gain = 30.5/32nds x $3,125 (per 32nd) = $95,312.50

■ **Futures**

Sell 92 September bond futures at 105-04/32nds
Buy 92 September futures at 106-08/32nds

Loss = 36/32nds x 92 x $31.25 (per 32nd) = ($103,500.00)

The sum of these two amounts represents the value of the change in the basis.

■ **Coupon interest earned (14 days)**

$10,000,000 x (0.0725/2) x (14/184) = $27,581.52

■ **RP interest paid (14 days)**

$9,929,210 x .0335 x (14/360) = ($12,935.55)

The sum of these two amounts represents the value of carry.

- Coupon payments are made semiannually. Coupon income is calculated by multiplying the semiannual coupon amount by the number of days in the holding period divided by the actual number of days in the particular semiannual coupon period. In this example, the actual number of days between the last coupon and the next is 184.
- RP interest is a conventional money market interest calculation assuming that one finances the entire full price — that is, price plus accrued interest — of the bond.

Exhibit 3.5

Summary P/L for a Long Basis Position

■ **Change in the basis**

7-1/4s of 5/16	$95,312.50
September 1992 futures	($103,500.00)
Net	**($8,187.50)**

■ **Carry**

Coupon interest	$27,581.52
RP interest	($12,935.55)
Net	**$14,645.97**
Total	**$6,458.47**

- As a rough check on your trade construction, you can compare what you realized on the change in the price relationship between cash bonds and futures with what you should have made. The basis narrowed from 23.9/32nds to 21.3/32nds, for a change of 2.6/32nds. For a basis position of $10 million, each 32nd is worth $3,125. Thus, your profit on the change in the basis should have been -$8,125 [= -2.6 x $3,125]. The difference between the theoretical gain and what you realized is due to rounding the number of futures. The strict definition of the basis would require you to sell 92.11 futures, but you could only sell 92.
- Notice that this long basis position made money even though the basis fell. As it was, what the position earned in carry was more than enough to offset the loss associated with the decrease in the basis.

Exhibit 3.6

P/L for a Short Basis Position

- **Setting**
  In contrast to the basis of the 7-1/4s, you believe that the basis of the 11-3/4s of 11/14-09 on August 6 is too wide and will narrow more than enough over the next few days to offset any negative carry in a short basis position. The conversion factor of the 11-3/4s is 1.3452.

- **Opening trade on 8/6/92 (settle 8/7/92)**
  Sell $10 million of the 11-3/4s of 11/14-09 at 143-06.25/32nds
  Buy 135 September 1992 futures at 105-04/32nds

  Basis = 57/32nds

- **Closing trade on 8/20/92 (settle 8/21/92)**
  Buy $10 million of the 11-3/4s at 144-11/32nds
  Sell 135 September 1992 futures at 106-08/32nds

  Basis = 45.3/32nds

Exhibit 3.7

P/L for a Short Basis Position (continued)

- **Bonds**
  Sell $10 million of the 11-3/4s at 143-06.25/32nds
  Buy $10 million of the 11-3/4s at 144-11/32nds

  Loss = 36.75/32nds x -$3,125 = ($114,843.75)

- **Futures**
  Buy 135 September 1992 futures at 105-04/32nds
  Sell 135 September 1992 futures at 106-08/32nds

  Gain = 36/32nds x 135 x $31.25 (per 32nd) = $151,875.00

- **Coupon interest paid (14 days)**
  $10,000,000 x (0.1175 / 2) x (14/184) = ($44,701.09)

- **Reverse RP interest earned (14 days)**
  $14,597,320 x .0325 x (14 / 360) = $18,449.39

- In this example, the reverse RP rate (at which one lends) is assumed to be 10 basis points lower than the RP rate (at which one borrows).
- If the reverse RP rate had instead been .0335 — or 10 basis points higher — the RP interest earned would have been $19,017.06, or $567.67 more.

Exhibit 3.8

Summary P/L for a Short Basis Position

■ **Change in the basis**

11-3/4s of 11/14-09	($114,843.75)
September 1992 futures	$151,875.00
Net	**$37,031.25**

■ **Carry**

Coupon interest	($44,701.09)
RP interest	$18,449.39
Net	**($26,251.70)**
Total	**$10,779.55**

- In this example, the short basis position made money despite negative carry. The decrease in the basis was more than enough to offset the cost of financing the short bond position for the life of the trade.

Exhibit 3.9

Things that Affect the Basis

- **Changes in the RP rate**

  Changes in the slope of the yield curve

  Changes in yield spreads

  Changes in yield levels

  Changes in yield volatility

  Carry and convergence

- A decrease in the RP rate, or an increase in the slope of the yield curve, will tend to increase carry, which in tern increases the basis of any given bond.
- Also, an issue's RP rate falls if it leaves the general collateral pool and goes "on special." Because a decrease in an issue's RP rate increases its net carry, it also increases that issue's basis.
- A decrease in a bond's yield relative to yields on other deliverable bonds will increase its basis.
- Pure basis positions are seldom duration neutral. The basis of a low-duration bond tends to behave like a put option, increasing in value as bond yields rise. The basis of a high-duration bond tends to behave like a call option, increasing in value as bond yields fall.
- The value of the strategic delivery options depend on the market's perception of yield volatility. An increase in expected yield volatility increases the value of the short's strategic delivery options, thereby lowering the futures price and raising the basis of all bonds in the deliverable set.

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Things that Affect the Basis

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  Changes in the slope of the yield curve

  Changes in yield spreads

  Changes in yield levels

  Changes in yield volatility

  Carry and convergence

- Extended descriptions of these trades are provided in Chapter 6 of Burghardt, et. al., *The Treasury Bond Basis*, revised edition, Probus, 1994.
- Selling the basis when you think the embedded delivery options are overvalued can make money as an outright basis trade. Yield enhancement is a variant of this trade. In yield enhancement, you sell the bonds you own and replace them with synthetic bonds that comprise cash and long positions in cheap futures.
- Selling the basis of a non-cheap bond differs from selling the basis of the cheapest to deliver in two ways. First, the basis net of carry for a non-cheap bond is expected to converge to a positive number rather than to zero. Second, the basis of a non-cheap bond depends much more on the spread between its yield and the yield of the cheapest to deliver. Basis traders often sell the basis of the "on-the-run" bond or note. Newly issued bonds and notes tend to trade at a premium to older issues.

- Selling the on-the-run's basis has two attractions. The first is liquidity. The second is the cheapening of the bond (and corresponding decrease in its basis) when it is replaced at the next auction by a new issue.
- Buying cheap bases can make sense as outright basis trades or as ways of buying cheap options in lieu of buying outright calls or puts on futures.
- If one contract month's basis is rich or cheap relative to another's, one can take advantage of the difference by trading the calendar spread — that is buying futures in the month for which the basis is relatively expensive and selling futures in the month for which the basis is relatively cheap.
- Issues pass in and out of the general collateral pool in the RP market. As they leave the pool and go "on special," their RP rates fall and their bases increase. As they go off special and reenter the general collateral pool, their RP rates increase, and their bases fall. One can, therefore, trade RP special effects.

Exhibit 3.11

Trading a Shift in the Cheapest to Deliver

Market data

Issue	Date	
	5/31/90	6/1/90
7-1/2s of '16		
Price (decimal)	88.0000	89.4844
Full price (decimal)	88.4076	89.9124
Factor	0.9453	0.9453
Implied RP	5.44%	3.63%
Basis (32nds)	5.62	8.69
Carry ($/day)	$4.89	$1.50
11-3/4s of '14-09		
Price (decimal)	127.2813	129.0625
Full price (decimal)	127.9198	129.7330
Factor	1.3649	1.3649
Implied RP	3.66%	5.97%
Basis (32nds)	15.15	8.00
Carry ($/day)	$31.47	$27.39
Futures (June '90)		
Price (decimal)	92.9063	94.375
Days to last delivery	25	24
Overnight RP	8.10%	8.10%
Term RP	8.30%	8.30%

- Selling the basis is akin to selling the strategic delivery options. A measure of how much the market is paying for these options is the spread between the market RP rate and the implied RP rate on the cheapest to deliver (i.e., the 7-1/2s on 5/31).
- Between 5/31 and 6/1, the 7-1/2s are replaced by the 11-3/4s as cheapest to deliver.