**Case study**

Date of Analysis: Oct-05-2006

TIPS: 912828EA Govt

TBond: 912828EE Govt

**Input Data:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | TIPS |  | Tbond |
| IDENTIFIER -> | 912828EA Govt |  | 912828EE Govt |
| Maturity | 7/15/2015 |  | 8/15/2015 |
| Issue\_Dt | 7/15/2005 |  | 8/15/2005 |
| Coupon | 1.875% |  | 4.250% |
| First Cpn | 1/15/2006 |  | 2/15/2006 |
| Second Cpn | 7/15/2006 |  | 8/15/2006 |
| Ref. CPI at dated date | 194.50968 |  |  |
| Price Quote | 96.625 |  | 97.484375 |

CPI (Jul-06) = 203.50  
CPI (Aug-06) = 203.90

**Step 1: Calculate the full price of the TBond**

Current Date = 10/05/2006  
Last Coupon = 8/15/2006  
Next Coupon = 2/15/2007

Days in coupon period = 184  
Days since last coupon = 51





**Step 2: Create synthetic TBond**

First, consider the general case. The concrete example follows.

Notation:

= Price of TIPS security  
= Price of TBond security  
= Price of STRIPS security

 = reference CPI index value at issuance of the TIPS.  
 = reference CPI index value at current date, i.e. the date at which the strategy is implemented.  
 = reference CPI index value at date t (random variable).  
 = reference CPI index value at date T, the maturity date of the TIPS (random variable).

= coupon amount of the TIPS security ()  
= coupon amount of the TBond ()

= fixed leg of the inflation swap   
 NOTE: tenor = (number of days between current date and coupon date of the TIPS)/**360**  
 NOTE: since there are no inflation swaps for fractional years, the day-count convention is assumed to be the same as for U.S. interest rate swaps (actual/360 days).

 = number of STRIPS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Time | TIPS | Infl. Swaps | STRIPS | TBond |
| 0 |  | 0 |  |  |
|  |  |  |  |  |
| t |  |  |  |  |
|  |  |  |  |  |
| T |  |  |  |  |

Since, in general , the TIPS must be adjusted as follows

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Time | TIPS | Infl. Swaps | STRIPS | TBond |
| 0 |  | 0 |  |  |
|  |  |  |  |  |
| t |  |  |  |  |
|  |  |  |  |  |
| T |  |  |  |  |

Hence, the number of TIPS to buy is .

Set the number of STRIPS  such that the random variable cancels out

time t:



time T:



**Concrete Example**

Ref. CPI at TIPS dated date: 194.50968 (calculated value, verified against published index value from the U.S. treasury).

Calculate Ref. CPI at Oct-05-2006



Note: value verified against published index value from the U.S. treasury

Hence,  and .

The clean price for the TIPS is



However, as seen above, the adjustment requires this amount to be multiplied by .

The clean price for the TIPS is hence



Next, calculate accrued interest for the TIPS

Current Date = 10/05/2006  
Last Coupon = 7/15/2006  
Next Coupon = 1/15/2007

Days in coupon period = 184  
Days since last coupon = 82





Time 0 is the date of analysis (Oct-05-2006).  
Note, initially it is assumed that the TIPS and TBond are perfectly matched. The 'Time' column lists the coupon payment dates of the TIPS.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Time | TIPS | Infl. Swaps | STRIPS | TBond |
| 10-05-06 | 97.0428 | 0 |  | 98.07337 |
| 1/15/2007 |  |  |  |  |
|  |  |  |  |  |
| 7/15/2015 |  |  |  |  |

The table shows the relevant quantities for the cash flow schedule. The column 'STRIPS' contains the prices of the STRIPs. The column 'Swap Rates' contains the interpolated inflation swap rates. The other columns are calculated as described above.

The next table shows that the cash flows of the TBond are matched. In order to get numerical values, the random variables  are set constant at 150. The choice is obviously irrelevant.







The price of the synthetic TBond then is



Next, we calculate the yield to maturity of the synthetic TBond.

This is done in Excel and the results are shown below



Next, we calculate the price of the TBond if it had the same yield to maturity. The results are shown below.



In summary, the price of the synthetic TBond with timing adjustment of the cash flows is 95.4583 and the price of the TBond is 98.07337.