****

**Larry Schrenk, Instructor**

**Problem Set: Term Structure Problems**

**(Solutions Below)**

**Term Structure Problems**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Assume:     1) current date is February 1998,     2) annual discounting,     3) the following discount rates for risky cash flows                 corporate bonds:     rf + 5%                 other cash flows:    rf + 7%, and     4) the following data on U.S. Treasury Strips:   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  | U.S. Treasury Strips | | |  |  |  | | Mat. | Bid | Ask | Chg. | Ask Yld | Mat. | Bid | Ask | Chg. | Ask Yld | | Feb-98 | 97:22:00 | 97:22:00 | ….. | 5.58 | May-00 | 85:08:00 | 85:09:00 | -1 | 6.04 | | May-98 | 96:10:00 | 96:10:00 | ….. | 5.66 | Aug-00 | 83:27:00 | 83:29:00 | -1 | 6.09 | | Aug-98 | 94:29:00 | 94:29:00 | ….. | 5.74 | Nov-00 | 82:17:00 | 82:18:00 | -1 | 6.13 | | Nov-98 | 93:16:00 | 93:16:00 | -1 | 5.79 | Feb-01 | 81:06:00 | 81:07:00 | -2 | 6.16 | | Feb-99 | 92:01:00 | 92:02:00 | -1 | 5.90 | May-01 | 79:29:00 | 79:30:00 | -2 | 6.18 | | May-99 | 90:20:00 | 90:21:00 | -1 | 5.95 | Aug-01 | 78:20:00 | 78:22:00 | -2 | 6.20 | | Aug-99 | 89:09:00 | 89:10:00 | -1 | 5.95 | Nov-01 | 77:13:00 | 77:15:00 | -2 | 6.21 | | Nov-99 | 87:28:00 | 87:29:00 | -1 | 6.02 | Feb-02 | 76:05:00 | 76:08:00 | -2 | 6.23 | | Feb-00 | 86:16:00 | 86:17:00 | -1 | 6.05 | May-02 | 74:29:00 | 74:31:00 | -2 | 6.26 |   1. What are the implied forward rates for the next four years?  2. What would your total YTM be on a two-year Treasury note purchased in two years?  3. What would your total YTM be on a three-year Treasury note purchased today?  4. What would your total YTM be on a three-year Treasury note purchased next year?  5. What  is the present value of the following cash flows:                 0             1             2             3             (100)       150         (200)       500  6. What is the present value of a four-year annuity of $100.00 per year?  7. What is the price of a $1,000 zero-coupon corporate bond maturing in three years?  8. What is the price of the following corporate bond?                        face value:              $1,000                        maturity:                  4 years                        coupon rate:           8%  9. What is the price of the following corporate bond?                        face value:              $1,000                        maturity:                  3 years                        coupon rate:           10%  10. What is the YTM of the corporate bond in #9?    **Solutions**  1.  http://home.ubalt.edu/ntsbschr/images/term_s97.gif          http://home.ubalt.edu/ntsbschr/images/term_s98.gif  http://home.ubalt.edu/ntsbschr/images/term_s99.gif      http://home.ubalt.edu/ntsbschr/images/term_s1.gif  Þ   Discount Rates:   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | | Risk-Free Assets | 5.90% | 6.20% | 6.38% | 6.44% | | Corporate Bonds | 10.90% | 11.20% | 11.38% | 11.44% | | Other Cash Flows | 12.90% | 13.20% | 13.38% | 13.44% |   2.  http://home.ubalt.edu/ntsbschr/images/term_s2.gif  or  http://home.ubalt.edu/ntsbschr/images/term_s3.gif  3.  http://home.ubalt.edu/ntsbschr/images/term_s4.gif  4.  http://home.ubalt.edu/ntsbschr/images/term_s5.gifor  http://home.ubalt.edu/ntsbschr/images/term_s6.gif  5.  http://home.ubalt.edu/ntsbschr/images/term_s7.gif  6.  http://home.ubalt.edu/ntsbschr/images/term_s8.gif  7.  http://home.ubalt.edu/ntsbschr/images/term_s9.gif  8.  http://home.ubalt.edu/ntsbschr/images/term_s10.gif  9.  http://home.ubalt.edu/ntsbschr/images/term_s11.gif  10.  http://home.ubalt.edu/ntsbschr/images/term_s12.gif      http://home.ubalt.edu/ntsbschr/images/term_s13.gif  http://home.ubalt.edu/ntsbschr/images/term_s14.gif |