

**FUNDING INVESTMENTS**  
**FINANCE 238/738, Spring 2001, Prof. Musto**  
**Class 13 – FIRST TEST**  
**80 minutes – 80 points**

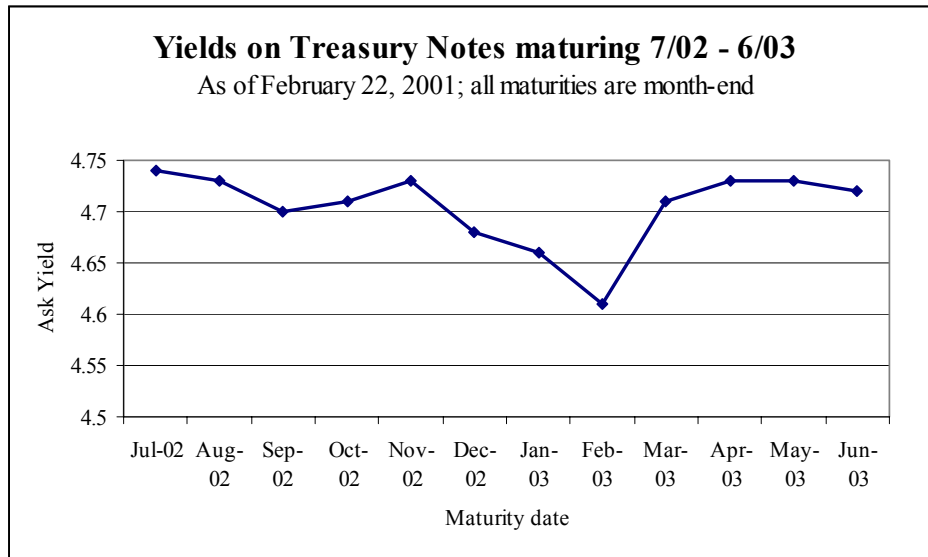
1. (10 points) Here are some prices from Thursday (2/22/01) (I might have altered them a bit):

<i>cpn</i>	<i>Maturity</i>	<i>Bid</i>	<i>Asked</i>	<i>Ask Yld</i>
7½	Feb 05n	109:06	109:08	4.91
6½	Feb 10n	108:24	108:26	5.26
11¾	Feb 05-10	123:12	123:18	5.13
0	Feb 05	82:09	82:12	4.94
0	Feb 10	62:09	62:14	5.32

Is the callable bond selling at a discount or a premium to the otherwise identical but non-callable synthetic bond (i.e. same final maturity date but not callable before)? If so, how much? (*Assume all payment dates are on the 15<sup>th</sup> of the month. 8/15/01 is 173 days after 2/23/01 and 181 days after 2/15/01.*)

***Synthetic: Buy [11.75/6.5] of the Feb 10n, costs [11.75/6.5]108.8125=196.70***  
***Sell [5.25/6.5] of the Feb 10 Zero, get [5.25/6.5]62.2813= 50.30***  
***Total Cost is 196.70-50.30=146.40>123.56 by 22.84***

2. Here are the yields of some Treasury notes on 2/22/2001. All maturities are month-end:



The yield on the 2/28/03 note, which was auctioned last Wednesday, seems out of line with the others.

- a. (6 points) To what might we attribute this misalignment?

*The 2/28/03 note is the on-the-run two-year note. On-the-run securities generally trade higher, and so with lower yields, because they are more valuable due to their higher liquidity*

- b. (6 points) Does it indicate a trading opportunity? If so, what is the trade and what are the costs and risks?

*The trading opportunity would be to sell the on-the-run and buy one of the nearby off-the-runs, the arbitrage that LTCM ran for a while. This position will be expensive because on-the-run securities tend to be on special, which makes them expensive to borrow in the repo market. There is also the risk that the price differential will go the wrong way in the short run, and that when you want to unwind the arbitrage, both securities will be off-the-run and therefore not very liquid.*

3. A Movie Star wants to make Mission Impossible 3 (MI3). There are two possible plots: plot A (Reservoir Dogs meets My Life as a Dog), and plot B (MI1 meets MI2, with a heart). The box office receipts of the movie depend on which plot is chosen, as follows (the probabilities of outcomes L, M and H are all 1/3):

Plot	L	M	H
A	0	125	250
B	125	150	175

With either plot, the movie costs 140 to make. The Movie Star wants to raise money by selling debt with face value 100, to be paid out of the box office. The Movie Star makes up the difference between 140 and what the debt sells for, and then gets all the box office that doesn't go to debt. Investors are risk-neutral and their discount rate is 0.

- a. (6 points) Will this work, if the Movie Star can not commit to which plot he will use?

**With 100 in debt, the movie star gets  $1/3(0+25+150) = 175/3$  from A, and  $1/3(25+50+75) = 150/3$  from B. So he chooses A. In that case, the debt is worth  $1/3(0+100+100) = 200/3$ , so the movie star has to pay in  $140-200/3 = 73.3$  for an expected payout of  $175/3=58.3$ . So he won't do it.**

- b. (6 points) Will this work, if the Movie Star can commit to which plot he will use?

**If the Movie Star can commit to plot B then the debt is worth 100, and the Movie Star pays in 40 for a net payout of 50.**

4. (All dollar values here are \$US) If a Canadian citizen borrows shares of a Canadian company from a non-Canadian citizen on a dividend record date, then the Canadian citizen makes an after-tax profit equal to 10% of the dividend, due to the Dividend Tax Credit in the Canadian tax code. That is, if a share pays a dividend of  $d$  then the Canadian's profit, net of reimbursing  $d$  to the lender, is  $0.1d$ . Tomorrow (Thursday) is the record date for a \$0.35/share dividend from the Canadian company Trizec Hahn, which currently trades at \$16/share. Suppose you (a non-Canadian) own 100,000 shares of Trizec Hahn, which Celine Dion wants to borrow just for tomorrow (a 1-day loan). The current overnight interest rate is 5%, and you require 102% cash collateral on equity loans.

- a. (4 points) With a rebate rate equal to the overnight rate, how much interest would you rebate to Ms. Dion?

**The cash collateral would be  $1.02(16)(100000)=1632000$ , so a day of interest at 5% would be  $(5/100)(1/360)(\$1,632,000) = \$227$**

- b. (2 points) What is Ms. Dion's profit due to the Dividend Tax Credit?

**The Dividend is  $(0.35)(100000)=\$35,000$ , 10% of that is  $\$3,500$**

- c. (4 points) What rebate rate gives you half the profit?

*We need the net interest payment to Ms. Dion to be  $\$227 - \$3500/2 = -\$1523$*

*So the rebate  $r$  has to solve*

$$(r/100)(1/360)(\$1,632,000) = -\$1523$$

*Implies  $r = -33.6\%$ .*

5. (12 points) Illustrate, with an example as simple as you like, how prepackaged bankruptcy can solve the holdout problem in a voluntary exchange offer.

*Suppose a company worth  $\$100\text{MM}$  has  $\$200\text{MM}$  face value of debt coming due soon, and suppose that the debt is held equally by five people. Suppose also that the firm is worth  $\$80\text{MM}$  in a regular (i.e. free-fall bankruptcy). The firm offers equity for debt; each creditor can exchange his  $\$40\text{MM}$  face value in debt for 1/5 of the firm's equity. Each creditor will want to be the one who does not exchange, and the result will be bankruptcy. Now suppose instead does the exchange as a pre-packaged bankruptcy, so if the vote for the plan is at least 2/3 then it will be approved in court, and everybody has to concede value, including anybody who didn't vote for the plan. Now there is no benefit to being the one creditor who does not participate, since the remaining 80% is enough to approve the plan.*

6. (12 points) IBM has 3 bonds paying annual coupons: a one-year bond with an 4% coupon and selling at par, a two-year bond paying a 5% coupon, also selling at par, and a two-year bond, callable at par in one year, with a 5% coupon. What should the callable bond sell for if IBM's one-year rate will be either 5%, with probability 1/3, or 6%, with probability 2/3, in a year? Explain your answer.

*The key here is that the callability of the bond is worthless, because the profit from calling the bond would be zero if rates go to 5%, and negative if they go to 6%. So the callable is worth the same as the non-callable.*

*Another way to see it is that if you buy the non-callable, then in one year you get*

*Rates go to 5%*

$$5 + 105/1.05$$

*Rates go to 6%*

$$5 + 105/1.06$$

*If you buy the callable you get*

$$5 + 105/1.05 \quad \text{if not called}$$

$$5 + 100 \quad \text{if called}$$

$$5 + 105/1.06 \quad (\text{won't be called})$$

*Since  $105/1.05 = 100$ , the two are equivalent*

7. (12 points) Rating agencies are often described as estimating default probabilities, and the ratings they assign to a given bond are considered to be their best estimates of the probability that the bond will default. Discuss (briefly) whether the evidence we've seen supports this view.

*The relevant points here are*

*Bond ratings do contain plenty of information about relative default probabilities  
They are not absolute default probabilities; ratings are not adjusted for  
macroeconomic conditions to keep the relation between ratings and probabilities  
constant*

*Ratings also capture recovery-rate variation; bonds with higher ratings are, on  
average, worth more conditional upon default than are other bonds.*