

First Test, Spring 2000
with answers

1. (10 pts). Using the attached prices from 2/24/00, what is the price difference between buying the 7 5/8% Feb 02-07 bond and buying an otherwise identical, *non-callable* bond (i.e. one you would construct from other securities)?

Synthetic 7 5/8% Feb 2007 bond:

Buy 7.625/6.25 of the 6¼% Feb 2007 bond, whose ask is 98:04

Sell (7.625-6.25)/6.25 of the Feb 2007 STRIP, whose bid is 63:28

Cost is $(7.625/6.25)(\$98.125) - (1.375/6.25)(\$63.875) = 105.66$

Cost of the Callable is 101:22 = \$101.6875, price difference = \$3.9725

2. (10 pts) The general Repo rate was 5.60% on 2/24/00, but the 6% August 2009 note had a specialness of 85bp. How, precisely, would that affect the economics of shorting \$1 million face value of that note (assuming no margin)?

Flat bid price of the 6% August 2009 bond was 96:17=96.53125

Accrued interest was $(9/182)(6/2) = 0.14835$, invoice price = 96.6796

For \$1M FV, $(1000000/100) * 96.6796 = \$966,796$

Reduced interest income on repo = $(0.85/100)(1/360)(966796) = \22.83 per day

3. (10 pts) Your investment bank is scheduled to alter a B-rated bond's 7½% coupon tomorrow so as to make the bond trade at par, but it is actually trading at par right now, before you've done anything. One colleague says that means that 7½% is the right coupon, but the other says that B bonds in that industry are trading at 8% yields now, so change it to 8%. What do you think?

If investors anticipate that the coupon will reset to make the bond trade at par tomorrow, then it will trade at (almost exactly) par today. So the fact that it trades at par tells you *nothing* about whether the right coupon is near the current coupon, it only tells you that the market expects you to succeed with the reset. So there is no significance to the 7½% coupon it currently has, and the 8% rate paid by other bonds with the same rating and in the same industry is a reasonable estimate of the coupon that would make it trade at par.

4. On 1/20/00, when its stock was at $16 \frac{1}{16}$, Mail.com issued a convertible bond, with a 7% coupon and a conversion ratio (per \$1000 par value) of 52.77. It matures in five years, and becomes callable in three.
- a. (5 pts) What is the conversion premium?

**The conversion price is $1000/52.77 = \$18.95$
 $(18.95-16.0625)/16.0625 = 18\%$**

- b. (5 pts) Evaluate the argument that Mail.com was right to issue a convertible because if the stock goes up they'll be happy they hadn't sold stock before, and if the stock goes down they'll be happy they hadn't sold straight bonds.

This argument is specious because it ignores the downside of the convertible in each scenario. If the stock goes up they'll be worse off than if they had issued straight debt before, because convertible investors claim new shares at \$18.95; if they had sold straight debt they would be able to sell those shares for the market price. If the stock goes down they'll be worse off than if they had issued stock before at the old, higher price.

5. (10 pts) A firm will be worth either 100 or 50 in a year, each with probability $\frac{1}{2}$, and has 80 in debt maturing then. The debt is a bond issue, and you are one of 80 investors who each hold face value 1. The bond has a covenant making it senior to all other debt, and this covenant can be changed with 100% approval from bondholders. Is there a coercive exchange offer that creates value for equity? If so, give an example.

A coercive offer is impossible because, with 100% participation required, each investor knows that the offer can't go through without his own participation. This ruins the prisoners' dilemma logic of coercive offers.

6. (10 pts) "An issuer will exercise a make-whole call option if and only if it is profitable, so the bondholders would be better off without that option in the bond contract." Agree or Disagree? Explain.

A make-whole call option allows the issuer to repurchase the bond for the PV of future payments discounted at the Treasury rate plus a few basis points, e.g. 25. Defeating the bond costs the PV of future payments discounted at the Treasury rate, so it costs a little more, and it leaves investors with a bond that is risk-free but potentially illiquid. Exercising the make-whole option makes both the issuer and investors better off if the defeased bond's illiquidity makes it trade more than 25bp above Treasuries.

7. (10 pts) A firm that is worth 100 has 90 in debt, split between senior bank debt and junior bonds. Business partners complain that the risk of bankruptcy is high, and firm value would be lower in bankruptcy. Management replies that the low value in bankruptcy ensures that it won't happen, because creditors will have such a large incentive to avoid it. How is management's argument sensitive to the split between bank debt and bonds? Illustrate your answer with an example, as simple as you want.

The problem with management's argument is that the creditors who want to avoid bankruptcy may not be the ones who can do anything about it. Suppose the company is worth 40 in bankruptcy, and has 30 in bank debt, and its value drops to 80 so it has to work out to avoid bankruptcy. The bank is paid in full in bankruptcy, so it is no help. Bondholders get only 10 in bankruptcy so they want to work out, but the free-rider problem with voluntary exchanges makes this difficult to accomplish. So the firm lands in bankruptcy and loses the value even though all creditors agreed that this would destroy value.

8. (10 pts) Illustrate with a graph how the junior bonds of a company can be viewed as a package of options on the value of the firm, and discuss briefly how and why the actual payments to such bonds depart from this simple model.

If the face value of senior debt is F_S and the face value of junior debt is F_J , then the junior debt is like a call on firm value with strike F_S minus a call on firm value with strike $F_S + F_J$. Implicit in this view is that if the firm is worth a little less than it owes to creditors, then creditors get that value and the payments to different creditors obeys absolute priority. This ignores the expense of bankruptcy, as well as the indeterminacy of who gets what in chapter 11. In particular, it ignores the weak position of junior creditors in bankruptcy. They can not propose a plan of their own for half a year, and they are only guaranteed to get what they would have gotten in liquidation. This is generally much lower, since firms are generally presumed to be worth less dead than alive. Empirically, we see that equity is paid out of priority relative to junior debt: junior debt does not get 100 cents on the dollar, but equity still gets something.