

FUNDING INVESTMENTS  
 FINANCE 238/738, Spring 2002, Prof. Musto  
**Class 13 – First Test**  
 80 Minutes / 80 Points

1. In the photocopy from the *WSJ* there is a bond listed as “13 7/8 May 11.” This bond matures 5/15/11 but is callable at par on any coupon date starting 5/15/06.
- a. (5 pts) Calculate the ask price of the synthetic bond with the same coupon, maturing on the *second* date the bond is callable, i.e. 11/15/06 (don’t worry about accrued interest).

**3 1/2 Nov 06 ask price 96:22**  
**strip Nov 06 ci bid price 81.27**

**long 3 1/2 Nov 06 (13 7/8)/(3 1/2)=3.964 units, 3.964\*(96 22/32)=383.269**  
**short strip Nov 06 ci 3.964-1=2.964 units, 2.964\*(81 27/32)=242.585**

**The ask price for the synthetic=383.269-242.585=140.684**

- b. (5 pts) Suppose the synthetic bond sold for less than the callable. Would there be an arbitrage? What considerations are important, and why?

**There are three scenarios:**

- **The callable is called on 11/15/06 (second date). The cash flow of the callable is exactly the same as that of the synthetic.**
- **The callable is called on 05/15/06 (first date). The issuer chose to pay 100 on 5/15/06 over paying the coupon that day and paying 100 on 11/15/06, which is the payoff on the synthetic. If the issuer is rational, this implies that the payoff on the synthetic is worth more than 100**
- **The callable is not called on either 05/11/06 or 11/15/06. If the bond issuer is rational, this only happens when the price (more exactly, the PV of the future cash flow) of the callable is less than 100, which is also the principal of the synthetic. We can get 100 from the synthetic and buy a callable at a price lower than 100, which gives us additional positive cash flow.**

2. (10 pts) How can capital structure discourage maximizing NPV? What factors make a company particularly susceptible to this problem?

**Since equity is effectively a call option on firm value with strike price equal to the face value of debt (equityholders have the residual claim after all debt is paid off), maximizing equity value does not necessarily mean maximizing firm value (NPV of future cash flows). From option pricing theory we know that the value of a call option increases if the value of the underlying (in our case, the firm value) goes up or if the volatility of the underlying goes up. The latter effect depends on the face value of debt (strike price): at-the-money options (firm value close to the face value**

of debt) are more sensitive to changes in the volatility than in-the-money or out-of-the-money options. Thus, equityholders of a financially distressed firm can benefit from choosing high-risk projects (projects with a high cash-flow variance) even though their NPV is low. The reason is that equityholder get all the upside, whereas debtholders bear the downside. This conflict of interest between debtholders and equityholders is especially severe for firms in or near insolvency. It also depends on the type of the firm's assets (can their risk be easily changed or not?), the structure of the debt (is bank debt junior or senior? does the bank have an incentive to monitor the firm?), the type of bond covenants, bankruptcy costs, etc.

3. (10 pts) Kmart has eight senior unsecured bonds outstanding, with maturities ranging from 12/1/04 to 2/1/23, and with principal amounts ranging from \$100MM to \$400MM. You want to exert some influence on Kmart by buying a substantial percentage of one of these bonds. What would be your source of influence, and how can Kmart limit this influence?

**Points to cover are**

- **You get a vote on plans of reorganization, where approval requires 2/3 by value and 1/2 by number of your class. If you own more than 1/3 of the class you can block approval.**
- **If approval is blocked the plan may be crammed down anyhow**
- **Your voting power may be diluted by the firm, depending on how they group your bond with other bonds in defining creditor classes**
- **The firm begins with the exclusive right to propose a plan, and this exclusivity can be extended**

4. (10 pts) A firm worth \$500MM has two debt issues outstanding: a junior bond with principal amount \$200MM and a senior bond with principal amount \$100MM, both paying no coupons and maturing in five years. What option contract represents the difference between the senior bond and a five-year Treasury STRIP? Be precise (but don't bother pricing it, which you obviously can't from the information given).

**The senior debt is equivalent to a risk-free bond with the same maturity, i.e. \$100MM face value of the STRIP, minus a (European) put on firm value with strike price \$100MM and expiration in five years. So this put represents the difference between the senior bond and the STRIP.**

5. (10 pts) You're taking a job at a risky firm; its shares now trade at \$10, but a year from now they'll be either \$100, with probability 0.1, or \$5, with probability 0.9. You are given the choice between two pay packages: package *A* pays \$50 in a year if the stock price goes to 100 (and 0 otherwise), and package *B* pays \$3 now, and nothing later. You can borrow or lend for the year at 2%. Which package is better?

**Package A's payoffs in a year can be replicated by buying  $x = 0.5263$  shares today and by borrowing  $y = 2.5800$ , since**

$$100x - 1.02y = 50, \quad \text{and}$$

$$5x - 1.02y = 0.$$

**Thus, today's value of package A is equal to  $10x - y = \$2.683$ , the cost of the replicating portfolio. Since this value is lower than \$3, package B is clearly the better choice (independent of your risk aversion!)**

6. (10 pts) Here's a quote from a 2/16/02 *Economist* article about rating agencies: "Their meticulous reports giving ratings for corporate bonds are designed to give an accurate picture of the bonds' riskiness and, ultimately, the probability of default." Relate this statement to the evidence.

**Bond ratings do contain information about relative probabilities of default. However, they are not absolute measures, but rather capture only relative risk of default. They are not adjusted for macroeconomic conditions to maintain constant default probabilities. Finally, ratings also capture variation in recovery rates, such that higher rated bonds are worth more conditional on default.**

7. This Friday is the record date for \$0.30/share dividend from Utilicorp, which is trading for \$20/share. Utilicorp has a Dividend Reinvestment Plan with a discount of 5%. You have an opportunity to borrow 10,000 shares of Utilicorp, with no margin (i.e. cash collateral = share value), from Friday to Monday (i.e. a 3-day loan), for a zero rebate. You would have to reimburse the cash value of the dividend. The current overnight interest rate is 2% (Assume the stock price is constant at \$20).
- a. (5 pts) What trade can you put on, and what is the profit, not counting the cost of the loan?

**Borrow the shares on Friday and return them on Monday. Doing so results in the opportunity to purchase 157.89 (=  $.3 \cdot 10,000 / 19$ ) shares at a discount. The discount results in a \$1 ( $5\% \cdot \$20$ ) profit per share. The total profit, not counting the cost of the loan is \$157.89 ( $157.89 \cdot \$1$ ).**

b. (5 pts) What is the profit, *net* of the cost of the loan?

**With a zero rebate, the cost of the loan is the forgone interest. With no margin, collateral is \$200,000 (=  $20 \times 10,000$ ), so forgone interest is \$33.33 (=  $200,000 \times .02 \times 3/360$ ). Total profit, net of the cost of the loan, is \$124.56 (=  $157.89 - 33.33$ ).**

8. (10 pts) What is the buoying-up problem with voluntary bond exchange offers, and how can prepackaged bankruptcy resolve it?

**The buoying-up problem is that if an exchange can keep the issuer out of default without the participation of a bondholder, then the bondholder is better off *not* participating. The participation of others “buoys up” the value of his own claim. This implies a prisoners’ dilemma in which the firm goes bankrupt even when everyone would have been better off with the exchange offer than in bankruptcy.**

**A firm needs only 2/3 approval by face value, and 1/2 approval by number, for a pre-packaged bankruptcy plan. If the plan goes through then *all* claimholders get the new, lower, claim. This eliminates the prisoners’ dilemma problem, resolving the debt problem with a token visit to the bankruptcy court.**