

FUNDING INVESTMENTS
 FINANCE 238/738, Spring 2002, Prof. Musto
Class 25 – Second Test
 80 Minutes / 80 Points

1. (10 pts) There is no established bankruptcy procedure for distressed sovereign debt (i.e. debt issued by national governments) and workouts have generally attempted voluntary exchanges. Here's a quote from an article in the latest *Economist* about distressed sovereign debt.

Ms. Krueger [#2 at the IMF] wants to amend international law (by changing the IMF's articles of agreement) in a way that allows a supermajority (60-75%) of creditors to make the terms of a restructuring binding on all the rest.

What sort of problem does this solve, and what problem could it create?

The above proposal solves the potential holdout problem. Ordinarily investors have the potential to “buoy-up” the value of their investments by not cooperating, but making the changed terms binding this problem is solved. However, this proposal creates problems. Investors lose their bargaining power with respect to bankruptcy. The most important problem this creates is that it makes it easier for the sovereign state to not pay.

2. (10 pts) Here are the discount rates for A2/P2-rated commercial paper on Monday and Tuesday of last week, by days to maturity:

<i>date</i>	<i>Days to Maturity</i>					
<i>1-day</i>	<i>7-day</i>	<i>15-day</i>	<i>30-day</i>	<i>60-day</i>	<i>90-day</i>	
4/1	2.21	2.16	2.25	2.25	2.30	2.34
4/2	2.12	2.16	2.16	2.22	2.30	2.35

Which maturity experienced the largest price increase from Monday to Tuesday?

The 15-day CP experienced the largest price increase. You can show this by brute force by calculating all the prices on both days, or instead you could observe that 1) only the 1, 15 and 30-day maturities had price increases, 2) the increase must be bigger for 15-day than 1-day because they had the same *annualized* discount-rate drop, meaning the price increase was 15 times larger for the 15-day, and 3) the increase must be bigger for 15-day than 30-day because the *annualized* 15-day rate dropped 3 times more than the 30-day, but 15 days is more than 1/3 of 30 days.

3. (10 pts) “Investment banks underwriting IPOs can prepare to support the aftermarket price by overselling initially, and later buying the shares back. The downside to this strategy is that they lose money if the price goes up.” Comment on this statement carefully.

In almost all IPOs, Investment Banks have what is known as a Green-Shoe option. When an issue is oversold by 15% two things will happen. If the issue goes down the investment bank will buy up the oversold portion in the market (below the IPO price); however if the issue is strong the investment bank will just exercise its Green-Shoe option and buy an addition 15% of the issue from the issuing company at the original IPO price for no loss.

4. Here’s a quote from the February 12 issue of *The Bond Buyer*:

As of this month, single-family bonds backed by 8.0% loans have a so-called PSA speed of 493, up from 243 in February 2001. Single-family bonds backed by 6.0% loans have PSA speeds of 160, up from 111 one year ago...The huge prepayment surge is generally positive for holders of outstanding planned amortization-class bonds.

- a. (5 pts) What could account for the difference between the PSA of 6% and 8% bonds?

If interest rates go down, people are going to refinance their mortgages. Given the refinancing cost, it is more profitable to refinance the 8% than the 6%. Actually if the interest rates fall between 6% and 8%, only the 8% might get refinanced. That is why PSA is larger for the 8% and the increase in prepayment speed is larger for the 8%.

- b. (5 pts) How could the prepayment surge have different implications for investors in planned amortization-class bonds?

The PAC bond is not affected so long as the prepayment stays within the range. If the prepayment goes beyond the band, the PAC will receive the prepayment once the companion bond is paid off.

5. (10 pts) Collateralized Loan Obligations (CLOs) are securitizations like all the others we've seen, the only difference being that the trust owns a portfolio of commercial loans, rather than of mortgages, car loans or credit-card receivables. The portfolio is actively managed by the securitization's equity-holder (i.e. the one who gets the residual payments not made to the securitization's bond-holders). The CLO's prospectus states that if the loan portfolio becomes sufficiently undiversified, then it goes into early amortization. What economic purpose could this rule serve?

Since the owner of the equity piece has control over the securitization, he has an incentive to add risk to the portfolio when the equity value is low. This is because the equityholder receives the residual claim, he can be better off by increasing the volatility of the portfolio, and an easy way to do that is to undiversify. Ex ante, the bondholders would anticipate this agency problem and ask for a higher return. The rating agency would also anticipate this problem and lower the bond rating, so the owner increases the value of the securities by committing not to engage in this abusive strategy.

6. (10 pts) There are 3 bonds outstanding: a one-year bond with a 5% coupon and selling at par, a two-year bond with a 5% coupon, also selling at par, and a two-year mortgage-backed bond with a 6% coupon. If the one-year rate is below 6% one year from now, half of the mortgage-backed bond will prepay. In one year, the one-year rate will be either 4.5%, with probability $\frac{1}{4}$, or 5.5% with probability $\frac{3}{4}$. What should the mortgage-backed bond sell for today?

The mortgage-backed bond's payoffs can be replicated with the one- and two-year bonds. Note that, in one year, the one-year rate will definitely be below 6% so we know that half the mortgage-backed bond will prepay in one year, and the rest will pay at maturity.

**year 1 payoff 56 (6 is the coupon payment, 50 is half the principal)
year 2 payoff 53 (3 is the coupon payment for half of the principal)**

So we long 0.5048 (53/105) of 2-year bond and long x 1-year bond such that $(53/105)*5+x*105=56$. Solving for x, we get $x=0.5093$.

Since the one- and two-year bonds both sell at par, the price of this portfolio, and therefore the price of the mortgage-backed bond, is $100*(0.5048+0.5093)=101.41$.

7. GE has an earnings announcement coming out shortly, and $\frac{2}{3}$ of trades come from investors who already know what it says. Other investors know only that it is either good news, in which case GE would be worth 37.8, or bad news, in which case GE would be worth 36.6, each with probability $\frac{1}{2}$. You are the market maker, setting your bid and ask at which you will take the next trade (for 1 share) that comes in. What are the bid and ask at which you break even?

The expected value to an uninformed buyer/seller is $.5 \cdot 36.6 + .5 \cdot 37.8 = 37.2$. For a price between 36.6 and 37.8, an informed buyer gives the market maker an expected value of 37.8, and an informed seller gives the market maker an expected value of 36.6. With zero expected profits, the bid and ask prices solve

$$\left(\frac{2}{3}\right)(Ask - 37.8) + \left(\frac{1}{3}\right)(Ask - 37.2) = 0$$

$$\left(\frac{2}{3}\right)(36.6 - Bid) + \left(\frac{1}{3}\right)(37.2 - Bid) = 0$$

Solving these equations yields $Ask = 37.6$ and $Bid = 36.8$.

8. Here's a quote from Bloomberg News, dated last Friday (4/5/02):
IMPERIAL TOBACCO Group Plc is seeking to raise 1 Billion points (\$1.4 Billion) from shareholders to help pay for the \$4.6 billion acquisition of a controlling stake in Germany's Reemtsma Cigarettenfabriken GmbH ... The company is selling 208.3 million new shares at 480 pence each, or 47 percent lower than yesterday's closing price. Shareholders will be able to buy two new shares for every five they own, provided they are shareholders on April 8. Hoare Govett, Morgan Stanley Dean Witter & Co. and Deutsche Bank AG have underwritten the rights offering.

- a. (5 pts) Show that the offering should succeed as long as the share price remains above 480 pence.

The number of shares outstanding is $208.3 \left(\frac{5}{2}\right) = 520.75M$. Let the current price

per share be p , where p is currently $4.80 \left(\frac{1}{1-.47}\right) = 9.06$. The current value of

the firm is $520.75 \cdot 9.06 = 4.72B$. If n new shares are issued, the new value per share becomes

$$\begin{aligned} \frac{4.72p + 4.8n}{520.75M + n} &= 4.8 \left(\frac{108.49p + n}{520.75M + n} \right) \\ &= 4.8 \left(\frac{520.75M + n}{520.75M + n} \right) + (p - 4.8) \left(\frac{108.49}{520.75M + n} \right) \end{aligned}$$

which is strictly greater than 4.8 if $p > 4.8$.

- b. (5 pts) Characterize the exposure of Hoare Govett, MSDW and Deutsche Bank to Imperial Tobacco.

The underwriters of the issue have written a put option on the *IMPERIAL TOBACCO* share price with a strike price equal to the exercise price of the right.