First Test – Answer Key
Funding Investments
Finance 238/738 – D. Musto

Q1.

Payoffs for the Bondholder are as follows:

Show	10 Studios	20 Studios	30 Studios	Expected Payoff
Jane Millionaire	$1.0 M	$0.9 M	$0.4M	$0.7667
Joe Billionaire	$1.0	$1.0	$0.6	$0.8667

The bondholders will choose *Joe Billionaire*. They require a 5% return so the amount that the bondholders would be willing to finance is $0.8254.

$.8667 / (1 + 5%) = $.8254

The studios expected payoffs are as follows:

Show	10 Studios	20 Studios	30 Studios	Expected Payoff
Jane Millionaire	$.5 M	$0.0	$0.0	$0.1667
Joe Billionaire	$0.4	$0.2	$0.0	$0.2000

Therefore, the studio will also choose *Joe Billionaire*. The studios also require an expected return of 5% which means they would be willing to finance up to $0.1905.

$0.2000 / (1 + 5%) = $0.1905

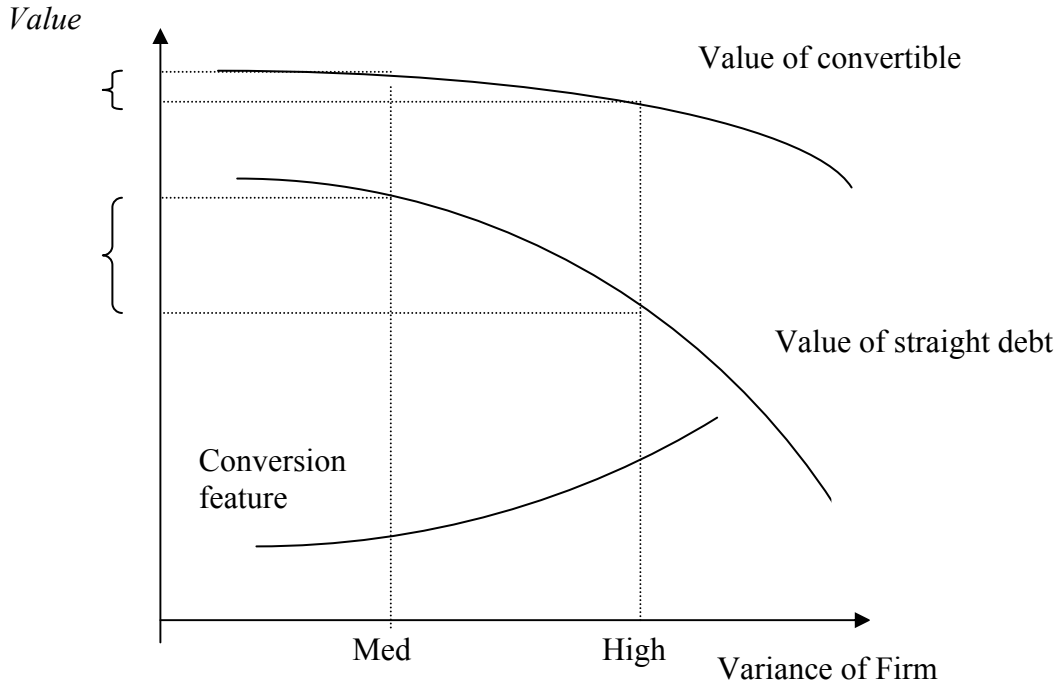
The studios must pay in the difference between $1 MM and what the bonds sell for which is $.8254. This is $0.1746.

Hence, you make money if you finance by selling the bonds with a face value of $1M because you have a positive NPV on *Joe Billionaire*. Your expected payoff is $0.1905, which is greater than the amount you have to put into the transaction, $0.1746.

Q2.

a) a synthetic portfolio with (5.625/9.275 =) 0.6 of the 9 3/8 and 0.4 of the 0 coupon bond could be bought for 121.34375*.6 + 94.40625*.4 = 110.56875<110.59375 hence the synthetic is (marginally) cheaper
b) ASSUMING the price indicated already contained the specialness premium then the synthetic would be even more attractive as our position was a long one and we could repo out the bond at a premium

Q3.



Straight debt is equal to riskfree debt plus being short a put on the firm value, and a convertible bond is equal to straight debt plus a call on the firm value. From option pricing, we know that the values of a call and of a put increase with an increase in the volatility of the underlying asset. Therefore the value of a straight bond will decrease as the volatility (risk) increases, since the value of the put increases with volatility. A convertible bond, on the on the other hand, is less sensitive to the underlying risk, since it is short a put and long a call. From the above graph, we see that the differential in the value of the convertible is much less than that for the straight debt for two different levels of variance (med and high). Therefore the market and the issuer can agree on the value of a convertible even if they have a large disagreement in the underlying variance of the firm value.

Q4.

Buy $30M FV of on 1/29/03
Price: P
P=F-(d/100)*(n/360)*F
n=60 days
d=1.24%

Price = 30 – (.0124)*(60/360)*30
P= 29.938M

The price of this CP on 2/28/03
n= 30 days
d=1.25%
P=F-(d/100)*(n/360)*F
Price = 30 – (.0125)*(30/360)*30
P= 29.96875M

Difference = money made = .03075M
= $30,750

Q5.

Value of option to buy Amazon in 2003, with exercise price X = 20

Current Price	Price after 1 yr	Price after 2 yrs	Value of option
		40	**20** (40-20)
	30	Or	
		25	**5** (25-20)
23	or		
		25	**5** (25-20)
	20	Or	
		18	**0**(not exercised)

In 2004, if price = 30
Sup = 40
Sdown = 25
Cup = 20
Cdown = 5

The payoff can be replicated by:
'n' of stock and 'B' of borrowing at 2%
such that,
40*n + 1.02*B = 20
25*n + 1.02 B = 5
Solving for 'n' and 'B':
'n' = 1
B = (19.61)
Value of option in 2004 if price = 30 is equivalent to = 1*30-19.61 = **10.39**

In 2004, if price = 20
Sup = 25
Sdown =18

Cup = 5
Cdown = 0

The payoff can be replicated by:
'n' of stock and 'B' of borrowing at 2%
such that,
25*n + 1.02*B = 5
18*n + 1.02 B = 0

Solving for 'n' and 'B':
'n' = 0.714
B = (12.61)
Value of option in 2004 if price = 30 is equivalent to = .714*20-12.61 = **1.68**

In 2003, price = 23
Sup = 30
Sdown =20
Cup = 10.39
Cdown = 1.68

The payoff can be replicated by:
'n' of stock and 'B' of borrowing at 2%
such that,
30*n + 1.02*B = 10.39
20*n + 1.02 B = 1.68

Solving for 'n' and 'B':
'n' = 0.871
B = (15.43)
Value of option in 2003 is equivalent to = .871*23-15.43 = **4.603**

Q6.

The most effective ways to reduce the problem are:
1) prepackaged bankruptcy
2) coercive exchange offers (replacement of covenants)
3) high minimum participation constraints
DEFEASING was NOT considered an acceptable solution as it requires more money than the original value of the bonds

Q7.

From the put-call parity, we have

$$C + PV(X) = S + P$$

Rearranging we get

$$-S = P - C - PV(X)$$

So to short the stock, we would need to long a put, short a call (with strike price of today's stock price), and short a STRIP with PV of today's stock price. All securities should have the same maturity date.

Q8.

The same bond rating is shown to have different default rates depending on the year, according to the graph. This tells us that bond ratings measure the relative probability of default between different ratings, rather than an absolute default rate. Referring again to the graph, we see that default rates spiked in the early 80's and 90's and have been trending higher in the most recent years, suggesting that default rates will go up when the economy is in a recession. This is again consistent with bond rating not reflecting an absolute default risk.