Name: _____

Finance II (441) Professors Matsa

Corporate Finance Final: Practice Exam A

1. Time limit: you have two hours to complete the exam.

2. The exam is closed book/closed note. You may not use any outside materials, including a computer. I highly recommend using a calculator. Potentially useful formulas have been included on the last page of the exam.

3. Point totals for each question are specified in parentheses. There are 240 total points.

4. Circle your numerical answers. This makes it easier for me to find them. If you get stuck on the math, tell me what the correct answer should be based on your intuition.

5. Unless the question specifies otherwise, there are no taxes or transaction costs.

6. As always, I expect you to abide by the honor code. I trust that no one will give or receive assistance which gives them an unfair advantage over other students.

7. Concise answers will be rewarded.

Good Luck!

Return my exam to my mailbox: First year Second year PT

Permission to Return Exam in Mailbox

The Family Educational Rights and Privacy Act (FERPA) is intended to protect students from the unauthorized disclosure of their personal information. One aspect of the law would require that graded assignments be either handed out directly to students or be placed in sealed envelopes before placing in mailboxes.

In order to facilitate a quicker turnaround, this release gives permission for this exam to be returned directly to my student mailbox.

_____

(signature)

Final Exam

Question (max)	Score
1 (35)	
2 (45)	
3 (90)	
4 (70)	
Final exam (240)	

Course Grade Overall

Assignment	Score
Final exam	
Midterm exam	
Homework	
Course total	

1) Red 5 Studio produces video games. Their CEO, Mark Kern, was the team leader for the game World of Warcraft when he worked at Blizzard. As with most companies, their revenues rise and fall with the economy. Red 5 Studio's asset β is 0.65 and they have no debt. Their equity is currently worth $25M.

A) Last year the stock market fell by 42 percent. Would you expect the value of Red 5 Studios's assets to have fallen by more or less than 42% over the last year? Explain completely. (10)

B) Red 5 Studios is considering buying Blizzard, another producer of multi-player networked video games. Unlike Red 5 Studios, Blizzard is partially financed with debt. Their debt has a five year maturity, is rated BB, and their debt to asset ratio is 25%. Red 5 Studios will pay each shareholder of Blizzard one share of Red 5 Studios for each share of Blizzard which they own. Red 5 Studios' shareholders will end up owning 25% of the combined firm's equity. The new firm will assume (be responsible for paying) Blizzards debt. Will the purchase of Blizzard by Red 5 Studios raise or lower the expected return on Red 5 Studios equity? Explain completely. (15)

C) Will the purchase of Blizzard by Red 5 Studios raise or lower the total risk of Red 5 Studios's equity? Explain completely. (10)

2) Short Discussion Questions

A) Issuing debt which includes strong covenants reduces the value of equity. True, False, or Uncertain? Explain completely (15).

B) Microsoft's cost of capital (e.g. r_{Asset}) is fourteen percent. Thus when Microsoft invests in a project with an expected return of less than fourteen percent, they are destroying value for shareholders. True, False, or Uncertain? Explain. (15)

C) Historically the futures price for the NASDAQ equity index (small stocks) has been a biased estimate of the future value of the index. The estimate isn't just wrong sometimes, it is wrong on average. If you short the NASDAQ futures, do you expect to make money or lose money on average? Explain completely. By shorting you will receive the futures price in a year and have to deliver the NASDAQ index. You can assume the futures market is efficient. (15)

3) Marshall & lshler Corporation is a diversified financial service firm which takes deposits, makes loans, and provides a full array of financial services to their individual and business customers. According to their CFO, Arthur Dent, their portfolio has performed poorly due to loans in Arizona and Florida where they were "too optimistic in terms of the sustainability of housing growth." As a result, the value of both their debt and equity has fallen. The potential value of their assets at the end of next year (2010) in millions are listed in the following table, and is a function of the local real estate markets Assume that the asset β (and the equity β and the debt β) are zero and the current one year risk-free rate is 5%.[1] Until told otherwise, assume the managers do not know the state of the world. Assume the four states are equally likely, managers maximize the wealth of current common shareholders, and absolute priority is followed.

Values in 2010	Really Bad	Bad	Good	Really Good	
Asset Value	500	800	1,200	1,500	
Debt					
Equity					

A) All of M&I Corp's debt is short term and expires at the end of next year. The debt has a face value of 1,000, a coupon rate of 8%, and was sold for par last year. What is the firm's debt to asset ratio today? Show your work & explain your numbers. (15)

[1] This assumption is made for mathematical simplicity, not realism.

B) Given the real estate market, many of M&I's borrowers are at risk of defaulting on their loans. M&I is considering putting together a restructuring team. This would require hiring additional staff to evaluate loans, negotiate with borrowers, and in the case of default, maintain the properties. As part of the program, M&I would lower the monthly payments for some borrowers. All of this is expensive and will cost M&I $200M today. However, the expenditures today will raise the value of M&I's loan portfolio and thus the value of their assets next year. The incremental increase in value and the new potential asset value next year are reported in the table. Is the expenditure of $200M today on restructuring M&I's loan portfolio a positive NPV investment? Explain completely. (15)

Values in 2010	Really Bad	Bad	Good	Really Good	
Orig Assets	500	800	1,200	1,500	
Restruct Proj	500	400	300	200	
Total Assets	1,000	1,200	1,500	1,700	

C) If M&I Corp sold shares of common equity to new investors to finance the 200M investment, what fraction of the common equity would the new investors own? Explain completely. Assume the equity value is correctly priced based on public information and remember total equity plus debt equals total assets. (15)

D) Would the current common equity shareholders want to sell $200M of common equity to new outside equity investors (at the terms you calculated in C) and launch the restructuring project? If the decision to issue common equity and invest changes the wealth of old shareholders, describe the source of this wealth creation or destruction completely. Remember M&I's managers do not know the true state of the world. (20)

E) Would the current common equity shareholders want to invest $200M of their own cash in M&I common equity as a way to fund the restructuring project? Explain completely. Try to calculate as few additional numbers as possible. (10)

F) How could M&I Corp. raise capital to fund the restructuring project in a way that would make equity holders better off than they would be in either D) or E)? Do not calculate any additional numbers. Instead, carefully describe what characteristics the alternative capital source should have. (15)

4) TransDigm Group Inc. is a leading manufacturer of highly engineered, proprietary aircraft components that are used on nearly all modern commercial and military aircraft platforms. They have financed themselves with both debt and private equity. They have €40M of senior bank debt outstanding. This is the aggregate face value of the bank debt. The bank loans have 3 years of remaining maturity. The original maturity (maturity at issue) was five years. No principal payments are due until maturity and no interest payments are ever due (i.e. the coupon rate on the debt is zero). The firm also issued €30M of subordinated (junior) bonds (debt). This is the aggregate face value of the junior debt. The rest of the capital structure consists of 2M shares of equity. The current risk-free rate is 5% for all maturities and the asset β is 0.82.

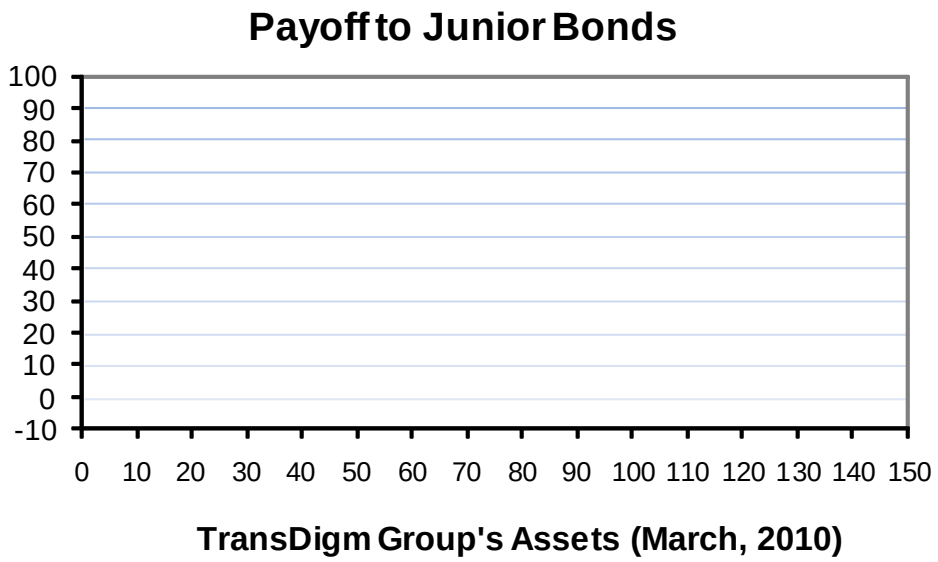
A) The bank loan is currently selling for €32.9M. Bank debt like bonds can be sold, but only among "sophisticated" investors.[2] What rate of return will the investors receive on the bank loan if they hold to maturity and the bank loan does not default? Explain briefly. (10)

B) The junior debt has one year of remaining maturity (it matures in March of 2010). The coupon rate on the junior debt is 16.8%. Since the junior debt has a lower priority than the senior debt, it must have a higher coupon rate than your answer to A). True, False, or Uncertain? Explain completely. (15)

[2] The definition of sophisticated financial investor is currently being re-considered.

C) The senior bank loan has a cross default clause in its contract (it is not a covenant lite loan). The cross default clause says that if the junior debt is in default (i.e. doesn't make a required interest or principal payment or a junior debt covenant is violated) the senior debt becomes due immediately. Why is this clause in the bank loan (senior debt) contract? Explain completely. Hint: Think about what in the capital structure makes this clause desirable from the senior bank loan's perspective. (10)

D) Draw the payoff diagram for the entire €30M junior bond issue as a function of the value of TransDigm's assets one year from today. Assume that absolute priority is adhered to i.e. junior debt is only paid after senior debt. Draw the payoff to the entire junior bond issue – not just one bond. Label all critical points on the graph. (20).



E) Would the incentives for equity holders to increase the risks of the underlying assets be greater if the firm had only one class of debt? You can assume that the total promised payment would be the same. Explain. (15)

Equations and Facts

Risk premiums:

$$E\left[r_{Market} - r_{risk-free}\right] = 8.0\%$$
$$E\left[r_{Long\ government\ bond} - r_{risk-free}\right] = 1.1\%$$

Return on an asset:

$$r_{asset} = r_{risk-free} + \beta_{asset}\left(r_{market} - r_{risk-free}\right) + \varepsilon$$

Expected rate of return on equity:

$$r_{equity} = r_{asset} + \frac{D}{E}\left(r_{asset} - r_{debt}\right)$$

Annuity formula:

$$PV = \sum_{t=1}^{N} \frac{C}{(1+r)^t} = \frac{C}{r} - \frac{1}{(1+r)^N}\frac{C}{r} = \frac{C}{r}\left[1 - \frac{1}{(1+r)^N}\right]$$

Payoff to options:

$$Call\ Payoff = Max\left[S_t - X, 0\right]$$
$$Put\ Payoff = Max\left[X - S_t, 0\right]$$

NPV of a project:

$$\text{NPV[Project]} = \text{NPV[Project | Capital Structure is Irrelevant]} + \text{NPV[Financing]}$$

Weighted Average Cost of Capital:

$$\text{WACC} = \text{r}_\text{E}\,\frac{\text{E}}{\text{E}+\text{D}} + (1-\tau)\text{r}_\text{D}\,\frac{\text{D}}{\text{E}+\text{D}}$$

1-Year Forward or Futures Price:

$$\text{Futures Price}_0 = \text{E}_0\left[\text{Commodity Value}_1\right]\left(\frac{1+\text{r}_{\text{risk-free}}}{1+\text{r}_{\text{commodity value}}}\right)$$

Solutions to Corporate Finance Final: Practice Exam A

1) Merger of Red 5 Studios and Blizzard

A) The value of Red 5 Studios' assets is expected to have fallen over the last year when the stock market fell (because its asset β is positive) but by less than the 42% fall in the stock market (because its asset β is less than 1). The actual returns may have differed from the expected return due to firm specific (idiosyncratic) news.

B) The expected return on Red 5 Studios' equity will rise, because the equity β will rise. In general, equity βs will change due to changes in the systematic risk of the firm's assets (the asset β) or changes in the firm's leverage. The merger will combine the assets of Red 5 Studio and Blizzard. Because they are in the same industry, they most likely have the same asset β. The asset β of the new (combined) firm should be the same as the asset β of Red 5 Studios. However, the new Red 5 Studios (the combined firm) will have more leverage than old Red 5 Studios. The old Red 5 Studios had no leverage (debt); the new Red 5 Studio has a positive amount of leverage. This increase in leverage means the equity β of Red 5 Studios and the expected return on Red 5 Studios' equity has increased.

The question did not require that you would calculate any numbers, but you could have calculated the new leverage ratio (debt to asset ratio). Red 5 Studios' shareholders will own 25% of the equity of the combined firm. Thus for every 25 of Red 5 Studios equity there is 75 of Blizzard equity (i.e., 25/100 = 25%). Blizzard is 25 percent debt prior to the acquisition. So for every 75 of Blizzard equity, there is 25 of Blizzard debt (i.e., 25/100 = 25%). When Red 5 Studios buys Blizzard equity with Red 5 Studios' equity, the combined firm will have 100 of equity (i.e., 25 + 75) and 25 of debt. The combined firm will be 20% debt, which is higher than the original leverage of Red 5 Studios (zero).

C) The change in the total risk of Red 5 Studios' equity is uncertain. On one hand, merging the two firms will reduce the idiosyncratic risk of the assets. This will reduce the idiosyncratic risk of the equity. On the other hand, the increased leverage associated with the acquisition will raise the idiosyncratic and systematic risk of the equity (as we saw above). Because we do not know which of these two effects will dominate, it is uncertain whether the total (systematic and idiosyncratic) risk will rise or fall.

2) Short discussion questions

A) Uncertain. If the stronger covenants prevent the firm from taking negative NPV projects when the firm ends up in a distressed situation (see Lecture 9), then they will lower the costs of financial distress. Because equity holders pay the expected costs of financial distress, this will raise the value of equity. Alternatively, covenants can prevent the firm from taking positive NPV projects or force the firm to take negative NPV projects (e.g. sell assets for less than they are worth; see Lecture 9). In this case, the covenants can destroy value and thus lower the value of equity.

B) Uncertain. The projects are value destroying only when the expected return on the project is less than the required (risk-adjusted) return. The 14 percent cost of capital at Microsoft is based on the riskiness of its current projects. If it invests in a project with less systematic risk (such as Treasury bills), its investors will require a lower required rate of return. Thus projects with an expected return of less than 14 percent can create

value as long as the required rate of return (the return we calculate with CAPM) is even lower.

C) You will expect to lose money on average, even though the futures contract is a zero NPV investment. Because the futures price is a biased estimate of the future value of the index, we know that the stock market risk is at least partially systematic. The expected profit on the futures contract is not zero. Are the profits expected to be positive or negative? You will receive the futures price and pay the index at the end of the year. When the economy booms, the stock market is high and you lose money. When the economy goes into a recession, the stock market is low and you make money. Since you make money in recessions and lose money in booms, your investment has a negative β. You are buying insurance for systematic risk (i.e., laying off systematic risk) and thus you must pay a risk premium to do so. You will expect to lose money on average.

Using equations, you could calculate your expected loss by using the formula for the futures price given on the formula sheet.

$$\begin{aligned}
&\mathrm{E}[\text{Profit}] = \mathrm{FP}_{0,1} - \mathrm{E}_0[CV_1] \\
&= \mathrm{E}_0[CV_1]\left(\frac{1+\mathrm{r}_{\text{risk-free}}}{1+\mathrm{r}_{\text{risk-free}}+1(0.08)}\right) - \mathrm{E}_0[CV_1] \\
&= \mathrm{E}_0[CV_1]\left[\left(\frac{1+\mathrm{r}_{\text{risk-free}}}{1+\mathrm{r}_{\text{risk-free}}+0.08}\right)-1\right] \\
&= \mathrm{E}_0[CV_1]\left[\frac{\mathrm{r}_{\text{risk-free}}-\mathrm{r}_{\text{risk-free}}-0.08}{1+\mathrm{r}_{\text{risk-free}}+0.08}\right] = \mathrm{E}_0[CV_1]\left[\frac{-0.08}{1+\mathrm{r}_{\text{risk-free}}+0.08}\right] < 0
\end{aligned}$$

I have assumed that the β of the NASDAQ index is one for the purpose of the illustration, but profits would be negative as long as the NASDAQ β is positive (which it is).

3) Capital Raising and Restructuring at M&I Corporation

A) M&I's current debt to asset ratio is 87%. To calculate this number, we need to calculate the current value of M&I's debt and assets. The fact that the debt was worth 1,000 last year is not relevant. M&I's debt has fallen in value, because their assets have fallen in value. The promised payment on M&I's debt is 1000 * (1 + 0.08) = 1,080. Thus the payment to debt holders is the minimum of the asset value and the promised payment of 1,080. Based on the future asset values in the table, the expected cash flow to assets is 1,000, and the expected value of the debt is 865.

Values in 2010	Really Bad	Bad	Good	Really Good	Expected (in 2010)	Value (in 2009)
Asset Value	500	800	1,200	1,500	1,000	952.4
Debt	500	800	1,080	1,080	865	823.8
Equity	0	0	120	420	135	128.6

The next step is to discount the expected values next year at the correct risk adjusted rate.[1] Because the asset β, the debt β, and the equity β are zero, the correct discount rates for the assets, the debt, and the equity are the risk-free rate of 5%. This means the assets are worth 1000 / (1 + 0.05) = 952.4, and the debt is worth 865 / (1 + 0.05) = 823.8.[2] This means the ratio of debt to assets is 823.8 / 952.4 = 87%.

The value of the equity can be calculated in one of two ways. The simplest way is to subtract the debt value from the asset value. In this case, the equity is worth 952.4 − 823.8 = 128.6. Alternatively, you can discount the expected equity cash flow at the equity discount rate: 135 / (1 + 0.05) = 128.6.

B) The project to restructure the loans has a positive NPV of 133.3. To calculate the NPV, we discount the expected incremental asset cash flows (350) at the risk adjusted discount rate (5%) and subtract off the initial investment (200).

$$NPV\left[\text{Restructring Project}\right] = -200 + \frac{350}{(1+0.05)} = 133.3$$

Values in 2010	Really Bad	Bad	Good	Really Good	Expected (in 2010)	Value (in 2009)
Orig Assets	500	800	1200	1,500	1,000	952.4
Restruct Proj	500	400	300	200	350	333.3
Total Assets	1,000	1,200	1500	1,700	1,350	1285.7
Debt	1,000	1,080	1,080	1,080	1,060	1009.5
Equity	0	120	420	620	290	276.2

C) The new equity holders will demand and accept 72.4% of the equity in exchange for 200. The first step is to calculate the total value of the equity conditional on taking the project. We calculated the total asset cash flows if M&I invests the 200 in the restructuring project as 1,350. From this, we can then calculate the cash flow to debt holders. This is still the minimum of the asset value and the promised payment. However, because the asset value is now higher (partially because of the 200 which was invested and partially because of the NPV of the project), the cash flow to debt holders rises in some states and the expected cash flow is higher (1,060 versus 865). The cash flow to total equity is the total asset cash flow minus the debt cash flow: 1,350 – 1,060 = 290. To value the total equity, we discount the expected equity cash flow at the risk adjusted rate. Thus, the total

[1] This is a very special case where the asset β is zero. If you calculated the debt to assets ratio as the ratio of next year's debt cash flow to next year's asset cash flow, you would have gotten the correct numerical answers (87%), but this is conceptually wrong and almost always numerically wrong. This works only because the debt discount rate is equal to the asset discount rate. This is true only when the asset β is zero, which is of course rare outside of a corporate finance final.

[2] The debt was issued for 1,000 and has fallen 17.6% to 824 due to the decline in the value of M&I's assets. The promised yield has risen from 8% to the current 31%, because the probability of default has risen and the return in default may have fallen as well.

equity is worth 290 / (1 + 0.05) = 276.2. For 200, the new equity holders will require 72.4% of the equity, and the old shareholders will keep 27.6%.[3]

$$Equity_0 = \frac{E\left[CFE_1\right]}{\left(1+r_E\right)} = \frac{290}{\left(1+0.05\right)} = 276.2$$

$$NewCash = k\left[Equity_0\right]$$

$$k = \frac{NewCash}{Equity_0} = \frac{200}{276.2} = 72.4\%$$

D) The current common shareholders will be unwilling to sell equity to new investors and invest in the restructuring project, because this would lower their wealth. Their current wealth is 126.8 (100% of the equity). If M&I raises 200 in new equity and invests in the restructuring project, current common equity investors wealth will fall to 76.2 (27.6% of 276.2), a loss of 52.3 (or 41%).

You were asked to explain the source of the value creation or destruction if the wealth of current shareholders changes. The decrease in shareholder wealth in this case is striking, because we know from part B) that the project itself has a positive NPV. To calculate the wealth change of current shareholders, we go back to our standard APV expression. In this case, the NPV of financing has two terms: (1) we raise capital from new equity holders; and (2) by raising new capital and investing in a positive NPV project, we make the debt safer. Taking the project thus transfers wealth from current shareholders to debt holders. To know how much wealth is transferred to the debt holders, we need to see how much the value of the debt rises when the 200 is invested and the restructuring project is taken. We know from part A) that the debt was initially worth 823.8. With the higher asset value, the expected cash flow to debt is now 1,060, and the value of the debt has risen to 1,060 / (1 + 0.05) = 1,009.5. Thus debt holders wealth has risen by 185.7.

$$\begin{aligned} NPV\left[\text{Project}\right] &= NPV\left[\text{Project}|\text{CSI}\right] + NPV\left[Financing\right] \\ &= NPV\left[\text{Project}|\text{CSI}\right] + NPV\left[Equity\ Issue\right] + NPV\left[\Delta\, Debt\ Wealth\right] \\ &= 133.3 + \left[200 - 0.724\left(276.2\right)\right] - \left[1{,}009.5 - 823.8\right] \\ &= 133.3 + 0 - 185.7 = -52.3 \end{aligned}$$

Issuing equity to new shareholders is a zero NPV. Remember that the managers do not know the true state of the world, so there is no information asymmetry in this example. Raising external equity raises the current equity holders wealth (and the value of the firm by 133.3) due to the NPV of the restructuring project. None of this value goes to the new shareholders (the equity issue is a zero NPV), and 185.7 of the value goes to the debt holders (their debt is safer). Thus the current shareholder's wealth falls by 52.3, exactly what we initially calculated.

E) Current shareholders would not be interested in investing 200 of their own money in M&I to fund the restructuring projects, even though the project has a positive NPV. The financing friction in part D) was not from the new common equity issue. The issue was correctly priced (a zero NPV). Thus raising equity from the current shareholders, which

[3] In the papers recently, banks have often expressed a concern with issuing new equity as it will dilute old shareholders. To know whether this is true, we first need to figure out what they think is being diluted. If they mean ownership percentage, this is absolutely true. The old equity holder's fractional ownership will fall from 100% to 27.6% in our example. Whether they mean dilution of value is more complicated. In this example, the new equity is sold for the correct price. The equity issue is a zero NPV.

would also be correctly priced (a zero NPV) will not solve the problem. The equity contribution and investment in the positive NPV project will create 133.3 of value and 185.7 of this wealth (more than 100%) will be transferred to debt holders. The equity holders are better off not investing and letting the firm default half the time.

We can also see this using numbers. Prior to issuing and investing, the wealth of the current shareholders is 128.6; they own 100% of the common equity. After contributing 200 and investing, the value of their wealth (still 100% of the common equity) rises to 276.2. However, they had to contribute 200 to generate this increase of 147.6. Contributing 200 to raise the value of their equity by 147.6 is a bad idea, because it will lower their wealth by 147.6 − 200.0 = 52.4. This is the same number as we found above (within rounding error).

F) A source of capital which has higher priority than the current debt will solve the problem. The issue in both parts D) and E) is that the common equity has a lower priority than (i.e., is paid after) the debt. Thus when the equity holders (new or old) contribute the 200, the value of the new cash and the value of the project (the NPV) flow first to the debt holders. Not enough flows to the common equity investors to justify the 200 investment.

The solution therefore is to issue a security which has a higher priority than current debt, e.g., super senior debt. This would reduce the amount of value which is transferred to the current debt holders, make the NPV of financing less negative, and make it more likely that the current equity holders (who make the decision) would be willing to raise the additional capital and invest in the positive NPV project.

I did not expect you to calculate any numbers. However, to illustrate my answer, assume that the firm did sell 200 of super senior debt. The debt would sell for 200 only if the coupon (and promised) rate on the debt was 5%. The promised payment is thus 210. Because 210 is less than the assets in the worst case scenario (i.e., 210 < 1,000), the debt is risk free and a 5% promised and coupon rates are correct.

Values in 2010	Really Bad	Bad	Good	Really Good	Expected (in 2010)	Value (in 2009)
Total Assets	1,000	1,200	1500	1700	1,350	1285.7
Super Senior Debt	210	210	210	210	210	200.0
Debt	790	990	1,080	1,080	985	938.1
Equity	0	0	210	410	155	147.6

Once the new capital is put into the firm and the project is taken, we can figure out what payment the current (now junior) debt holders receive and what is left over for the equity holders. We need to verify that the current equity holders (and possibly the current debt holders) will accept this transaction. The payoffs to the three classes of capital are:

$$CF_{SSD} = Min\left[Asset\,Value, 200\left(1+0.05\right)\right]$$
$$CF_{Orig\,D} = Min\left[Asset\,Value - CF_{SSD}, 1000\left(1+0.08\right)\right]$$
$$CF_{E} = Max\left[Asset\,Value - CF_{SSD} CF_{Orig\,D}, 0\right]$$

The value of the junior debt will rise by 114.3, from the original value of 823.8 (see part A) to the new value of 938.1. The equity value will rise by 19.0 from the original 128.6 (see part A) to the new value of 147.6. Both the debt and equity holders would agree to this form of financing in this case. In general for all parties to agree to this form of financing, they must agree on both the expected value of the assets before and after the investment project as well as the distribution of future asset values.

$$\begin{aligned} NPV\left[\text{Project}\right] &= NPV\left[\text{Project}|\text{CSI}\right] + NPV\left[Financing\right] \\ &= NPV\left[\text{Project}|\text{CSI}\right] + NPV\left[Super\ Senior Debt\right] + NPV\left[\Delta\, Current\ Debt\ Wealth\right] \\ &= 133.3 + \left[200 - \frac{200(1+0.05)}{(1+0.05)}\right] - \left[938.1 - 823.8\right] \\ &= 133.3 + 0 - 114.3 = 19.0 \end{aligned}$$

This is a challenge in the current financial environment. Banks need more capital to invest. Part of the problem with putting in capital at the bottom of the capital structure (e.g., equity) is that the value flows to the debt holders at the top. Thus the ability to put capital in at the top of the capital structure may help. Because there is currently wide disagreement on both the mean of the future asset values as well as the distribution of possible values (the variance of the future asset values), calculating how much value is created and who gets how much has been a stumbling block.

4) Capital Structure at TransDigm

A) The rate bank loan owners receive if the bank loan does not default is the promised rate. The price of the loan is equal to the promised payments discounted at the promised rate of return. Since the loan repays only principal at maturity and there are no interest payments (the coupon rate is zero), the only promised payment is the face value of €40M due in 3 years. Given that the bank loan has a current price of €32.9M, the promised rate of return is 6.7%.

$$P_{Loan} = 32.9 = \frac{\text{Promised Principle Payment}}{\left(1 + r_{promised}\right)^3} = \frac{40.0}{\left(1 + r_{promised}\right)^3}$$

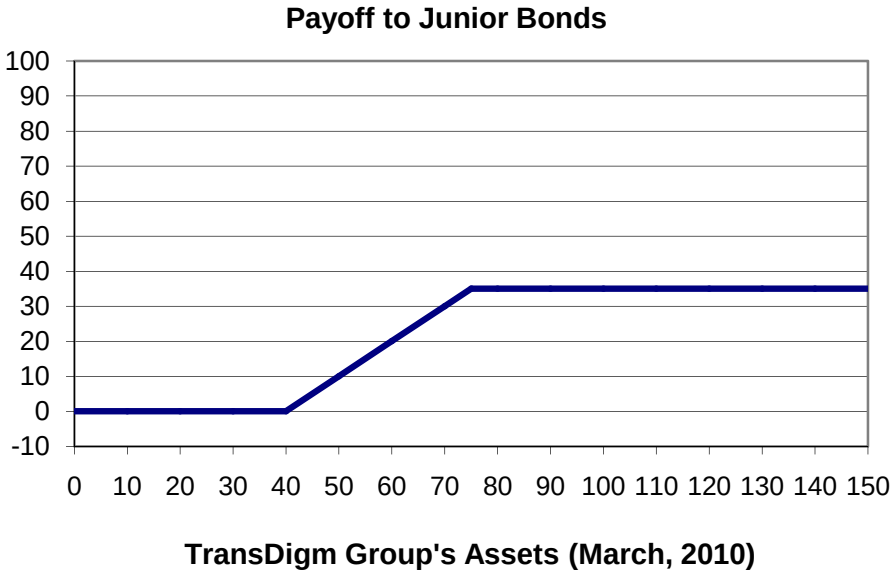
$$r_{promised} = 6.7\%$$

B) False. The junior debt has a lower priority so its probability of default must be greater (or at least no less) than the probability of default on the senior bank loan. Thus the promised rate on the junior debt must be greater than the promised rate on the senior debt. The coupon rate on the junior debt can be greater than, equal to, or less than the promised return on the senior debt. The coupon rate can be any number which the issuing firm chooses. The market will then decide what it is willing to pay for the promised payments and set the promised rate accordingly.

C) The cross default clause protects the loan's senior (higher) priority relative to the junior bond. Remember the junior debt is due in one year, but the senior debt is not due for three years. In addition, the bank loan requires no interest or principal payments for three years. Without the cross default clause if the junior debt went into default, the bond holders could force repayment of their claims ahead of the bank loan, effectively elevating their priority. The cross default clause makes sure that the senior debt gets paid first, even if there is no default (missed payments) on the senior debt.

Cross default clauses are common when there are multiple classes of debt with different priorities and maturities that are not perfectly correlated.

D) The junior debt is paid after the senior debt and before the equity. The promised payment on the senior debt is €40M. This is the face value plus zero interest, because the coupon rate is zero. Until the assets are sufficient to pay off the senior debt (€40M), the junior debt gets nothing. This is true because of the cross default clause. The promised payment to the junior debt holders (at the end of the first year) is the aggregate face (€30M) plus interest. Because the coupon rate is 16.8%, the total promised payment to the junior debt holders is 30 * (1 + .168) = €35M. Thus for asset values between €40M and €75M, the junior bonds are in default but receive something (asset value minus €40M). Once the asset value is above €75M, the junior debt receives its promised payment of €35M. Notice that the payoff diagram looks like the bull spread (this shape just keeps appearing).



E) The payoff to equity holders looks like a call option on the assets. Equity holders receive nothing until the assets are above €75M. After this, they receive all additional increases in the asset value. If instead there was one class of debt which had a promised payment of €75M, the payoff to the equity holders would be exactly the same. Since the payoff to equity holders are the same in the two situations, the incentives to increase risk are identical.