

Name \_\_\_\_\_

Finance II (441)

Professor Faulkender/Petersen/Sapienza

Corporate Finance Final: Spring 2002

- 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. I highly recommend you use 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. These are an indication of how hard I believe the question is. 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) Stereotypic economist answers (completely accurate but totally irrelevant) will not raise your score. Statements which are false will lower your score.

| Question               | Points |
|------------------------|--------|
| 1 (60)                 |        |
| 2 (30)                 |        |
| 3 (85)                 |        |
| 4 (65)                 |        |
| Final Exam             |        |
| Midterm Exam           |        |
| Face card and homework |        |
| Total                  |        |

Please put my exam in my mailbox (circle one):

First year

Second year

Exchange student

Downtown

- 1) Dell Computer Corp. (DELL) markets its hardware worldwide, supported by manufacturing operations in Texas, England, and China. Since European customers are supplied from England, Dell uses foreign currency forward contracts to lock in their €/£ exchange rate 12 months in advance. On average, their €-denominated revenue is €40M per month, so they enter €/£ forward contracts of €40M per month. Assume that the current 1-year risk free rate is 4.2%.
- A) The current 1-year forward rate is €1.56 per £1. If the market believes the €/£ exchange rate to be independent of the return on the market, what is the expected €/£ exchange rate in 1 year. Explain. (15)
- B) If the spot €-£ exchange rate in one year were €1.68 per £, what would Dell's profit or loss on the forward contract be for that month? Show all calculations. (10)

C) Dell is considering opening another manufacturing center in Germany (a country that uses the € as its currency) which would service their European Union customers. How would this change Dell's use of currency forwards to hedge their €-denominated revenue? Explain. (20)

D) Dell is considering the best way to finance the new manufacturing center. How would their use of €-£ forward contracts differ if they financed the new center with debt from a German bank relative to financing from a British bank? Explain. (15)

- 2) Short Discussion Questions.
- A) The introduction of the € forced countries participating in the common currency to adopt higher fiscal prudence. Recently, German Chancellor Gerhard Schröder rejected suggestions that the government will continue with its past practice of subsidizing ailing industries. Ben Broadbent, an economist at Goldman Sachs, has argued this change will affect the capital structure decisions of large firms in continental Europe. What does he mean? Explain. (10)
- B) You are the manager of a DJ Eleven, Inc. a publicly traded firm. The firm is currently financed only with equity and has a market capitalization (value) of \$1M. The assets are entirely invested in T-bills. If you sell the T-bills and invest the money in a grain elevator (which buys and sells corn) will the value of the firm's equity rise or fall? Explain. The grain elevator is a risky investment; part of the risk is idiosyncratic and part is systematic. (10)
- C) Instead of investing in the grain elevator, a consultant recommends that DJ Eleven liquidate a portion of your T-bill portfolio in order to repurchase a portion of DJ's equity. She points out that when publicly traded firms in the US announce an equity repurchase, their stock price rises on the announcement. This happens, she says, because the same amount of earnings is now spread among fewer shares. Thus earnings per share and stock price rise. Would you expect the stock price of DJ Eleven Inc. to rise on the announcement of the repurchase? Explain. (10)

- 3) AdvancePCS, the nation's leading health improvement company, is considering spending 100K to expand their ability to accept prescription orders through the web. The value of the expansion project and the firm's assets in place depend critically upon whether their competitors react aggressively or passively. Neither AdvancePCS nor the market know how competitors will react until next year. The cash flows to both the assets as well as their web expansion also depend upon the efficiency of AdvancePCS's current computer system. The managers know whether the systems have a high or low efficiency, but the market does not. The market is assuming high and low efficiency are equally likely and uncorrelated with the competitor's response. The numbers in the table are next year's cash flows (not today's) in thousands. Thus if we invest 100 today the value of the project is worth 140 next year in the High Efficiency-Passive state. Assume the asset  $\beta$  is zero, the risk free rate is 5%, and Advance PCS is currently an all equity firm.

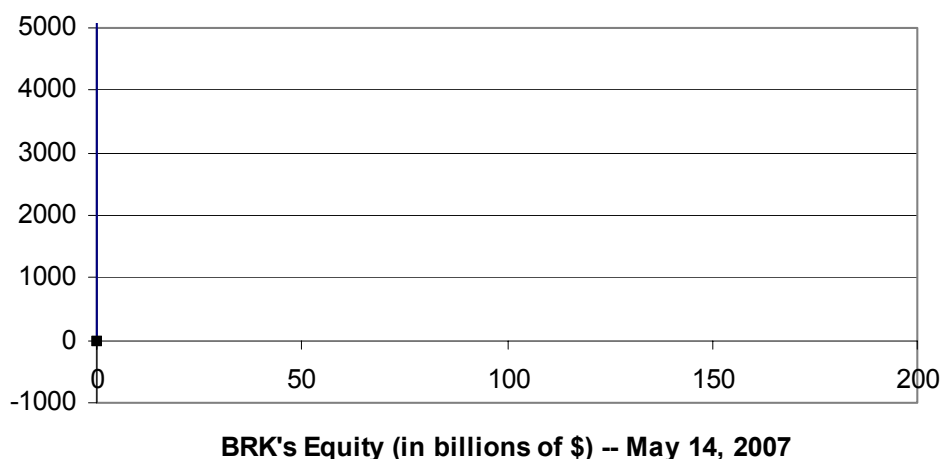
| Cash flow <sub>2003</sub><br>(\$1000s) | High Efficiency |            | Low Efficiency |            | Average |
|----------------------------------------|-----------------|------------|----------------|------------|---------|
|                                        | Passive         | Aggressive | Passive        | Aggressive |         |
| Probability                            | 25%             | 25%        | 25%            | 25%        |         |
| Assets in place                        | 240             | 60         | 200            | 0          | 125     |
| Expansion Project                      | 140             | 80         | 160            | 60         |         |
| Total Firm Value                       |                 |            |                |            |         |

- A) AdvancePCS has not yet raised the capital needed to fund the web expansion project (\$100K). In an M&M world, what would the market value of AdvancePCS be today? Explain completely. Hint: Think about when the firm will invest in the project and when it won't. (15)
- B) AdvancePCS has decided to raise debt to fund the project. What must the promised rate on the one year bond be to have the market be willing to pay \$100 for the debt? Assume that AdvancePCS follows the investment strategy you described in A). (Note: Ignore the tax deductibility of interest until part D). (20)

- C) Since the managers know the state of the market (High or Low Efficiency), but not the competitor's response (Passive or Aggressive), they can use this information to make their investment decision. If they issue a bond with the promised rate of return you found in B), how would their investment decision differ from the decisions made in an M&M world? Explain completely. (20)
- D) What is the value of the tax shield if the corporate tax rate is 30% on all income and AdvancePCS issues the debt in all four states? Explain completely. Assume that the firm has been profitable in the past so that any losses can be carried back for a full refund. (15)
- E) How would the presence of a tax shield change the promised return on the debt? Explain completely. (15)

- 4) On May 15, 2002 Berkshire Hathaway (BRK.A) issued a new security called SQUARZ to institutional investors through a private placement. Each SQUARZ has a 5 year maturity, a face value of \$10,000, and pays an annual coupon of only 3%, which is less than the current yield on 5 year government bonds of 4.6%. Each security also comes with an attached warrant to purchase 0.1116 shares of Berkshire Hathaway's common stock for \$10,000 any time between now and May 15, 2007. Purchasers of the SQUARZ are required to pay 3.75% interest at the end of each year during the life of the warrant. Thus SQUARZ investors actually pay a net interest rate of 0.75% (3.75-3.00) per year. 40,000 SQUARZ were sold for \$10,340 each, raising just over \$400M.
- A) Berkshire Hathaway's common stock was trading at \$77,900 when the SQUARZ were issued. Was the warrant in the money when the SQUARZ were issued? Explain. (10)
- B) Draw the payoff diagram for the warrant component of the SQUARZ as a function of Berkshire Hathaway's total equity value on May 14, 2007 (the day before maturity). The payoff is in thousands of dollars and there are 1,530,000 shares currently outstanding. Make sure your diagram is clearly and completely labeled. (25)

### Payoff to SQUARZ Warrant



- C) Regular five-years bonds of Hathaway Berkshire are rated triple A and have a promised return of 4.8%. What is the value of the warrant portion of the SQUARZ? (15)
- D) Warren Buffett, Chairman of Berkshire Hathaway, claims that he found the idea of issuing a security with a negative coupon appealing, as it will provide additional cash flow to the company for the next five years. Berkshire will only receive that annual cash flow if purchasers of the SQUARZ do not exercise their warrants early. Would the purchasers ever want to exercise the warrant early? Exercise means giving up the bond part of the SQUARZ in exchange for 0.1116 shares of stock. Explain completely. I don't want a numerical answer. (15)

## Equations and Facts

Risk premiums:

$$\begin{aligned} E[ r_{\text{market}} - r_{\text{riskfree}} ] &= 8.5\% \\ E[ r_{\text{long government bond}} - r_{\text{riskfree}} ] &= 1.1\% \end{aligned}$$

Payoff to a Call Option:

$$\text{Payoff} = \text{Max}\{ 0, \text{Stock price} - \text{Strike price} \}$$

Payoff to a Put Option:

$$\text{Payoff} = \text{Max}\{ \text{Strike price} - \text{Stock price}, 0 \}$$

Expected rate of return on equity:

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

NPV of a project:

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

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

Annuity Formula

NPV of a Futures Contract:

$$\frac{\text{Futures Price}_0 - E_0 [ \text{Commodity Value}_1 ] \left( \frac{1 + r_{\text{riskfree}}}{1 + r_{\text{commodity value}}} \right)}{1 + r_{\text{risk free}}} = 0$$

## Corporate Finance Final Exam Answers – Spring 2002

## 1) Dell's Hedging Strategy.

- A) Because the €-£ exchange rate is independent of the market return, there is no systematic risk exchanged by the buyer and seller of the forward contract. In this case, the commodity value discount rate is the riskfree, and the forward price is unbiased (correct on average). This implies that the forward rate is equal to the expected spot exchange rate in one year: €1.56 per £.

$$\text{Futures Price}_0 = E_0 [ \text{Commodity Value}_1 ] \left( \frac{1 + r_{\text{riskfree}}}{1 + r_{\text{riskfree}} + 0 (8.5)} \right) = 1.56 \text{ €/£}$$

- B) Dell has locked in the amount they will receive for their €40, at €1.56 per £. They have sold Euros as a fixed exchange rate (€1.56/£), opposed to the realized exchange rate (€1.68/£). Thus they will receive £ 25.64M. If they had not entered the forward contract, they would have received £23.81M. Dell made £1.83M on the forward contract.<sup>1</sup>

$$\begin{aligned} \text{Profit/Loss[ Sell € forward ]} &= \frac{€40M}{1.56 \text{ €/£}} - \frac{€40M}{1.68 \text{ €/£}} \\ &= €40M (0.641 \text{ £/€}) - €40M (0.595 \text{ £/€}) \\ &= £25.64M - £23.81M = £1.83M \end{aligned} \quad (9)$$

Dell profited on the hedge, because they sold each € for £0.641 when they locked in the exchange rate opposed to waiting in which case they could have sold each € for the spot (current market) price of £ 0.595.

- C) This will reduce, but not eliminate, Dell's use of forward contracts because it will reduce their exposure to the exchange rate. When Dell's revenues were in Euros and their costs in Pounds, Dell was exposed to the fluctuations in the €/£ exchange rate. They were using forwards to hedge their entire revenue (€40M). If Dell moves its manufacturing center to Germany (where the currency is the €), their labor and materials costs as well as their revenues will now be in the same currency. Dell is

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<sup>1</sup> If you had inverted the exchange rate you would have calculated a loss of 4.8M.

$$\begin{aligned} \text{Profit/Loss[ Sell € forward ]} &= €40M (1.56 \text{ €/£}) - €40M (1.68 \text{ €/£}) \\ &= €^2 £62.40M - €^2 £67.20M = -€^2 £4.80 \end{aligned} \quad (9)$$

The problem is the units. This is a loss of 4.8M €s squared £s. I was once told by a physics student that the way to get through physics classes as well as figure out currency problems is watch the units. Since you had €s and you wanted £s, you needed to divided by the €/£ ratio. Thus you wanted to use 1.56 €/£ for the forward exchange rate.

still exposed to exchange rate risk, which is why they will still use forward contract. Now only their profits, not their full revenues, are exposed. This will significantly reduce their exchange rate exposure and thus their need to hedge.

- D) Matching the currency of financing costs to the currency of the revenues has the same impact of matching the currency of the costs to the currency of the revenues. If Dell is hedging in an effort to avoid financial distress costs, then by having all of the cash flows in Euros, they would completely eliminate their need to use currency forwards for the purpose of hedging their financial distress risk. Thus, borrowing in Germany would eliminate their need to use €-£ forwards as opposed to borrowing in England which would necessitate continuing their use of forwards to eliminate the currency risk that may lead to financial distress.

2) Short Discussion Questions.

- A) If the government steps in with subsidies, cash, relaxed regulations, or anything else of value when the firm experiences financial difficulties, then financial difficulties are less costly. There are fewer costs of financial distress. If large firms in continental Europe anticipate that the practice of subsidization is fading out because of budget constraints, will choose lower levels of debt that they did in the past. Cost of financial distress for large European firms is likely to become higher and thus leverage should decrease.

- B) It depends upon whether the investment in the grain elevator is a positive NPV or not. If the grain elevator investment is a positive NPV, the value of the firm and its equity value will rise by the amount of the positive NPV. If the grain elevator investment is a negative NPV, then the value of the firm will fall by the size of the negative NPV. Investments in financial securities are zero NPV investments unless you have inside information about the value of the security. The sale of the T-bills does not change the value of the firm.

The sale of the T-bills and the investment in the grain elevator investment will also increase the riskiness of the assets and the equity. You are exchanging a risk-free asset for a risky asset. Some of the risk is idiosyncratic and doesn't affect the expected return; some of the risk is systematic and raises the expected return. The risk of the investment is already factored into the NPV of the project.

- C) No. Manager' who maximize the wealth of current shareholders are more likely to issue equity when the equity is overvalued than when it is undervalued. Since the market can figure this out, equity issues will be a signal to the market that the equity is overvalued and the stock price will consequently rise on the announcement of a repurchase. In this case, however, there is no asymmetric information. T-bills are traded assets whose value is easily observed. Therefore, we should not expect the firm's stock price to rise.

In this example, last year's earnings divided by the new number of shares will rise. However, when we sold some of the T-bills to repurchase stock, this will lower

future earnings by the same amount as it reduces the number of shares. So future earnings relative to the number of shares won't change in this example.

### 3) AdvancePCS's Capital Structure

- A) The value of the firm in an M&M world would be the expected present value of the assets in place plus the value of the projects they are expected to take. Thus to value the firm we have to first figure out when the manager's will invest in the expansion project. The managers know whether the computer systems are high or low efficiency, but not whether the competitors will react passively or aggressively.<sup>2</sup> Thus if the managers know that the computers are high efficiency, the NPV of the project is 4.8.

$$\text{NPV[ Expansion | High ]} = -100 + \frac{0.5 (140) + 0.5 (80)}{1 + 0.05} = 4.8 \quad (10)$$

If the managers know that the computers are low efficiency, the NPV of the project is also 4.8.

$$\text{NPV[ Expansion | Low ]} = -100 + \frac{0.5 (160) + 0.5 (60)}{1 + 0.05} = 4.8 \quad (11)$$

Thus the value of the firms is the value of the assets in place (the present value of next year's cash flow to the assets in place) plus the NPV of the project.

$$\begin{aligned} V_{\text{AdvancePCS pre-equity issue}} &= \frac{0.25 (240 + 60 + 200 + 0)}{1 + 0.05} + 4.8 \\ &= 119.0 + 4.8 = 123.8 \end{aligned} \quad (12)$$

If you had taken the average of the asset in place cash flow plus the average of the project expansion cash flows and discounted both at 5% and subtracted 100, you would also have gotten 123.8. This is the value of the firm if they always invest. However, without checking whether the projects had positive NPVs based on the manager's (AdvancePCS's) information, you wouldn't have known whether AdvancePCS would have invested in the expansion project.

- B) To calculate the promised return, we need to figure out what promised payment the debt holders will require to make the debt worth \$100 today. Since the asset  $\beta$  is assumed to be zero, the debt  $\beta$  is zero, and the expected return on the debt is 5%.

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<sup>2</sup> If the manager's also knew how competitors would react today they would invest only in the Passive-High Efficiency and Passive-Low Efficiency states. The managers, however, don't know the competitor's reaction (passive or aggressive) today when they invest, and thus they can't use this information in their investment decision.

This means if the bond holders pay \$100 for the debt, the expected cash flow to debt next year must be 105 ( $100 * 1.05$ ) next year. The expected cash flow to debt is a function of the cash flow to debt in default states and the promised payment on the debt.

$$E[CF_D] = (1-p) \text{ Promised payment} + p \text{ Payment in default} = 105 \quad (13)$$

Since the firm always invests in the web expansion (whether the computers system has high or low efficiency), the cash flows to the firm in the four states is reported in the table below. Since the value of the firm's assets are less than the expected cash flow in Low-Aggressive state, we know the bond will default then. When the competitors have a passive response, the debt won't default as the assets are worth significantly more than the expected return on the debt (we will need to check this, but it is probably correct). In the High Efficiency-Aggressive state, it isn't obvious if the bond will default. As a first pass, we can assume the bond will not default, solve for the promised payment, and then check if our assumption is correct. If the bond only defaults in Low-Aggressive, then the expected cash flow to debt is:

$$\begin{aligned} E[CF_D] &= (1-p) \text{ Promised payment} + p \text{ Payment in default} = 105 \\ &= 0.75 \text{ Promised payment} + 0.25 (60) \\ \text{Promised payment} &= \frac{105 - 0.25 (60)}{0.75} = 120 \end{aligned} \quad (14)$$

Thus the promised payment must be 120 for the bond to be worth \$100. Since this is less than the value of the assets in the Low-Aggressive state, our assumption that the bond does not default then is correct. The promised return on the bond must be 20% ( $(120/100 - 1)$ ) for the debt to sell for \$100.

|                   | High Efficiency |            | Low Efficiency |            | Average |
|-------------------|-----------------|------------|----------------|------------|---------|
|                   | Passive         | Aggressive | Passive        | Aggressive |         |
| Probability       | 25%             | 25%        | 25%            | 25%        |         |
| Assets in place   | 240             | 60         | 200            | 0          | 125     |
| Expansion Project | 140             | 80         | 160            | 60         | 110     |
| Total Firm Value  | 380             | 140        | 360            | 60         | 235     |
| Debt Payment      | 120             | 120        | 120            | 60         | 105     |

- C) Since the project is a positive NPV in both High and Low Efficiency states, the cost of financing (the underpricing the debt) will only change our decision when it is negative and larger in absolute value than the NPV of the project. The NPV of financing will be the most negative (least positive) when we give away the most value to the debt holders. This is more likely to happen when the bond doesn't default (High Efficiency), so we should check this state first. The NPV of the debt issue is what we sell the bond for (price) minus what the bond is worth (value). The NPV of the bond issue when the computer system is High Efficiency is:

$$\begin{aligned}
 \text{NPV[ Debt issue | HE ]} &= P_{\text{Bond}} - V_{\text{Bond}} \\
 &= 100 - \frac{0.5 (120) + 0.5 (120)}{1 + 0.05} \\
 &= 100 - 114.3 = -14.3
 \end{aligned} \tag{15}$$

Since this is negative and larger in absolute value than the NPV of the project, investing and funding the project with debt lowers the wealth of shareholders by 9.5. AdvancePCS will choose not to invest in the project and finance it with debt.

$$\begin{aligned}
 \text{NPV[ Project | HE ]} &= \text{NPV[ Project | CSI ]} + \text{NPV[ Debt issue ]} \\
 &= 4.8 - 14.3 = -9.5 < 0
 \end{aligned} \tag{16}$$

In the Low Efficiency state, the NPV of the debt issue must be positive, so it won't change your decision to invest. As a check, I calculated the numbers for the Low Efficiency state anyway. The NPV of the bond issue in state 2 is 14.3.

$$\begin{aligned}
 \text{NPV[ Debt issue | LE ]} &= P_{\text{Bond}} - V_{\text{Bond}} \\
 &= 100 - \frac{0.5 (120) + 0.5 (60)}{1 + 0.05} \\
 &= 100 - 85.7 = 14.3
 \end{aligned} \tag{17}$$

and the NPV of the project is positive, with or without the NPV of financing.

$$\begin{aligned}
 \text{NPV[ Project | LE ]} &= \text{NPV[ Project | CSI ]} + \text{NPV[ Debt issue ]} \\
 &= 4.8 + 14.3 = 19.1 > 0
 \end{aligned} \tag{18}$$

- D) The value of the tax shield is the present value of the expected tax savings. When the firm pays off the debt, its interest expense is 20 (120-100). When the firm defaults on its debt, its interest payment is negative (-40). It writes down the value of the debt and this generates income. Discounting the expected tax savings at the correct discount rate (5%) gives us a value of the tax shield of 1.4.

$$\begin{aligned}
\text{NPV[ Tax shield ]} &= \frac{\tau (1-p) r_p D + \tau p r_{\text{default}} D}{1 + 0.05} \\
&= \frac{0.30 (0.75) 0.20 (100) + 0.30 (0.25) (-0.40) 100}{1 + 0.05} = 1.4 \\
&= \frac{\tau r_D D}{1 + r_D} \\
&= \frac{0.30 (0.05) 100}{1 + 0.05} = 1.4
\end{aligned} \tag{19}$$

Notice we also could have valued the tax shield by taking the expected interest payment (the value of the debt times the expected return on the debt) times the tax rate, and then discounting back by the expected return on the debt.

- E) The tax shield will raise the promised return on the debt. Your first intuition may have been that the tax shield raises the assets of the firm, which makes the debt safer, and thus lowers the promised return on the debt. It is true that the tax shield raises the value of the firm's assets (by 1.4), but this increase in value comes only in states where the firm pays off the debt, lowers its taxes, and raises the cash available for stakeholders. Since the firm already has enough cash to pay the debt holders in these states, this doesn't add to the security of the debt. Instead in states where the assets of the firm are insufficient to pay off the debt (Low-Aggressive), the firm must write down the value of the debt. This increases AdvancePCS's taxable income, raises its taxes, and thus lowers the cash available to debt holders in these states. Since the debt holders receive less in default states, they must receive more in non-default states. This must raise the promised return on the debt.

4) Berkshire Hathaway's SQUARZ.

- A) No. The warrant was out-of-the money when the SQUARZ was issued, which means the value of the underlying was less than the strike price. To see this multiply the stock price (77,900) by the number of shares you receive if you exercise (0.1116). This is equal to \$8,694. Since this is less than the strike price of \$10,000, the warrant is out of the money and it would not make sense to exercise the warrant.

Exercise of the warrant only makes sense if the value of the underlying is equal to 10,000. This is true when the stock price is equal to \$89,606 (10,000/0.1116).

- B) For stock prices below 89,606 (10,000/0.1116), it doesn't make sense to exercise the warrant and the value of the warrant is thus zero. Since there are 1.53M shares outstanding, the value of the warrant is zero when the equity values is 137M (1.53M \* 89,606) or below.

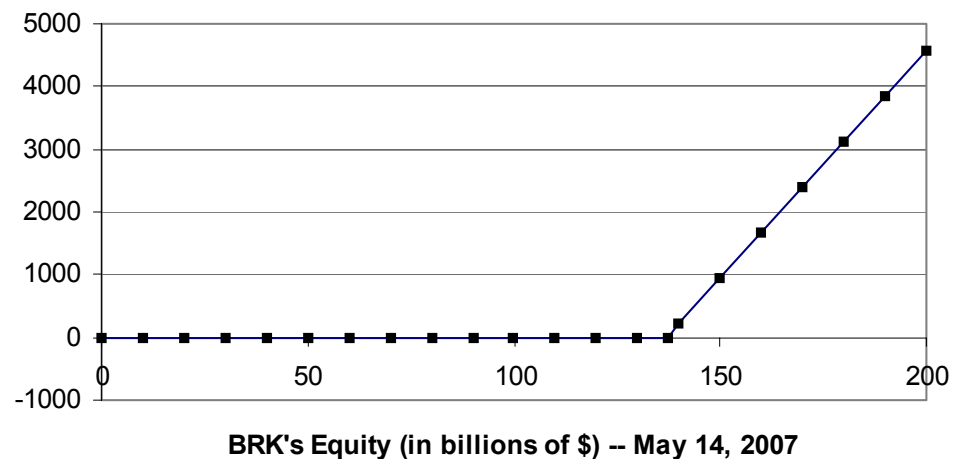
When the value of the equity rises above 137M (the stock price rises above the 89,606) the payoff to the warrant is positive. To figure out the value of the warrant when the equity is worth more than \$137M, we need to factor in the dilution. By exercising the warrant, the warrant holders will increase the value of the equity by \$400M. This is the 10,000 strike price times the 40K SQUARZ (10K \* 40K =400M). The number of shares will also increase by 4,464 (40,000 \* 0.1116), so the new number of shares outstanding will be 1.534M (i.e. there is effectively no change in the number of shares).

The payoff to the warrant, as a function of the equity value the day before the warrant expires is thus:

$$P_{\text{Warrant}} = P_{\text{Stock}} - 10K = \frac{\text{Equity} + 400M}{1.534M} - 10K \quad (20)$$

Thus when the equity value is \$200B, the stock price (including dilution) would be 130,599 and the payoff to the warrant would be 4,575 (0.116 \* 130,599 - 10,000). (If you forgot the dilution, you would have calculated a stock price of 130,719 and a warrant payoff of 4,588). In this case the dilution adjustment is trivial since the size of the SQUARZ issue is very tiny (\$400M) relative to the market value of Berkshire Hathaway's equity (approximately \$119B).

### Payoff to SQUARZ Warrant



- C) In order to calculate the value of the warrant, you have to calculate the value of the bond component. The SQUARZ holders receive an annual interest payment of \$300 (3% of 10,000) and are required to make an annual interest payment of \$375 (3.75% of 10,000) for an effective interest rate of minus 0.75%. The owner must pay, not

receive, \$75 per year. In addition, the SQUARZ holder receives their 10,000 principal back in the fifth year. The value of the SQUARZ is thus the bond component plus the warrant.

$$\begin{aligned}
 P_{\text{SQUARZ}} &= \sum_{t=1}^5 \frac{300}{(1 + 0.048)^t} - \sum_{t=1}^5 \frac{-375}{(1 + 0.048)^t} + \frac{10,000}{(1 + 0.048)^5} + \text{Warrant} \\
 &= \frac{-75}{0.048} \left( 1 - \frac{1}{(1 + 0.048)^5} \right) + \frac{10,000}{(1 + 0.048)^5} + \text{Warrant} \quad (21) \\
 &= 7,584 + \text{Warrant} = 10,340 \\
 \text{Warrant} &= 2,756
 \end{aligned}$$

Since the SQUARZ sold for 10,340. The value of the warrant must equal \$2,756 (10,340-7,584).

- D) In this case, the owner of the SQUARZ may want to exercise their option early. Normally it makes sense to defer the exercise decision because you can learn by waiting. The only exception is if the dividends you lose by not exercising (remember you only receive these if you exercise the option and buy the stock) are sufficiently large. In this case, when you exercising the option early, you not only receive the dividends on Berkshire Hathaway stock you also quit paying the 75 interest each year. This will make early exercise more likely than with traditional convertible bonds where you quit receiving (oppose to quit paying) interest when you exercise early.