11. Equity Financing and Stock Valuation. Dividends. Real options

Problem 54

The Myears Oil Co. pays an annual dividend of $2,00 and is expected to continue at this level indefinitely. If an investor's required rate of return is 10%, how much is he willing to pay for a share?

Solution

P_0 = Div : R_E is the model, if the dividend continues forever; therefore,

Po = 20

Problem 55

The annual dividend paid at the end-of-the-year is expected to be $2,00. An investor requires an 10% return to buy the shares. How much is she willing to pay for a share if she expects dividends to grow indefinitely at 5%?

Solution

The valuation model is $P_o = Div_1:(R_E - g)$, therefore, P_0 = 40,00

Problem 56

Myears Oil Co. has common shares outstanding that are currently trading for $40 each. The end-of-year dividend is expected to be $2,00 and dividends will grow indefinitely at a rate of 5%. What rate of return is anticipated on the stock ?

Solution

The rate anticipated is $Div_1/P_0 + g$

R_E = 10,00%

Problem 57

Myears Computer Co. expects to earn $100,000 this year. Earnings will grow 5% if the firm makes no new investments. The company has the opportunity to add a new line of computer accessories to the business. The investment outlay for this new line is $80,000, and the new line will generate $50,000 in additional earnings. These earnings will also grow at 5%.
The cost of capital is 10%, and 10 000 shares are outstanding.
(a) What is the price per share of stock without the new line, assuming that all of the earnings are paid out as dividends ?
(b) What is the value of the growth opportunities that the new line offers ?
(c) If the computer accessories line is added, what is the new price per share?
(d) With this new line, what is the new P-E ratio?

Solution

(a)	EPS	10,00	
	P = EPS /(r-g)	200,00	
(b)	PVGO		
	additional earnings per share	5,00	
	total cash inflows (to infinity)	100,00	additional earnings /(r-g)
	investment per share	-8,00	
	PVGO per share	92,00	

(c) P+PVGO=EPS /(r-g) + PVGO 292,00
(d) Earnings per share is currently 10,00, so the price earnings ratio is

$$P - E \text{ ratio} = \frac{S_0}{EPS} = \frac{1}{k_s} + \frac{\text{PVGO per share}}{EPS}$$

P-E = 292,00 : 10,00 = 29,2

Problem 58

Consider a company that has two claims outstanding: common equity and an issue of zero-coupon bonds with a face value of $100 million. The market value of assets is $98 million. The bonds mature in one year, and the riskless interest rate is 5%. If the firm's variance of ROA is 0,10, find the market value of the equity and debt using BSM model.

Solution

V = Market value of assets	98,000
E = Debt (book value)	100,000
T = period (number of days)	360
r = riskless rate	5%
standard deviation	32%
variance	0,100
C = Equity	13,623
D = Debt (market value)	84,377

$$C = SN(d_1) - Ee^{-rT}N(d_2)$$

$$d_1 = \frac{\ln(S/E) + (r + \sigma_s^2/2)T}{\sigma_s\sqrt{T}}$$

$$d_2 = d_1 - \sigma_s\sqrt{T}$$

period	1,00
d1	0,25
d2	-0,06
N(d1)	0,5996
N(d2)	0,4745
e^(-rt)	0,95
Be^(-rt)	95,123

Problem 59

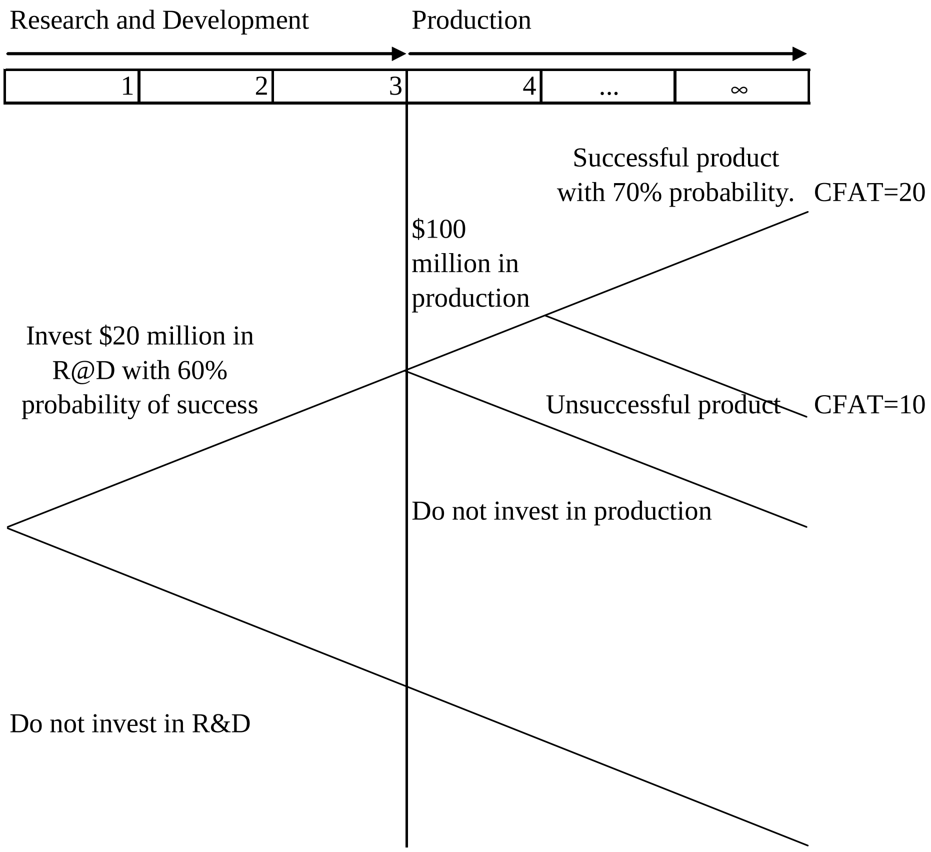
The Myears Oil Co. is raising new capital through a rights offering.
Myears Oil Co. currently has outstanding 100,000 shares and wants to raise $1 million by selling new shares for $20 each. The share price is currently $26 per share.

(a) What is the market value of Myears Oil Co.?
(b) How many new shares will be issued?
(c) How many rights will be issued?
(d) How many rights will be required to buy one share?
(e) What is the value of one right ?
(f) What will the share price be after the offering ?
(g) Susan Smith owns 100 shares of Myears Oil Co. and has $2000 in the bank, for a total of 100 * $26 + $2000 = $4600. If she exercises her rights, what will be the value of all her shares ? Her new bank balance ? Her total wealth ?
(h) If Susan Smith sells her rights, what will be the value of all her shares ? Her new bank balance ? Her total wealth ?
(i) What will Susan Smith's wealth be if she lets her rights expire without exercising or selling them? Who gains in such a situation?

Solution

(a)	The market value of shares is 100 000 x 26 =	2 600 000
(b)	The number of new shares is 1 000 000 : 20 =	50 000
(c)	Number of old shares = number of rights =	100 000
(d)	Number of old shares / number of new shares	
	100 000 : 50 000 =	2
	2 rights will be required to buy a new share	
(e)	R = (Po - S) /(N + 1)	
	R = (26 - 20) / (2 + 1) =	2
(f)	The value of one share will be	
	26 - 2 =	24
(g)	Old bank balance	2 000 +
	Amount paid for new shares (150-100)x20	1 000 -
	New bank balance	1 000 +
	New share price	24
	Number of shares	150
	Value of new shares	3 600 +
	New total wealth	4 600
(h)	Old bank balance	2 000
	Proceeds from rights sale 100 x 2	200
	New bank balance	2 200 +
	New value of shares 100 x 24	2 400 +
	New total wealth	4 600
(i)	Old bank balance	2 000 +
	New value of shares 100 x 24	2 400 +
	New total wealth	4 400

Problem 60



(a) DCF method

E(CF)	17,0	=0,7x20+0,3x10	Expected cash flow
NPV3	46,20	=-100+17/12%.	
NPV0	-0,071	=-20+0,6*46,20/(1+12%)^3)+(1-0,6)*0	

(b) Option

BS Model

$$C = S_0 N(d_1) - Ee^{-rT} N(d_2)$$

$$d_1 = \frac{\ln(S_0/E) + (r + \sigma_s^2/2)T}{\sigma_s \sqrt{T}} \qquad d_2 = d_1 - \sigma_s \sqrt{T}$$

S = spot price	63,06	=60%x17,0/12%/(1+12%^3).	
E = strike price	100,00		
T = maturity	1080	3	
r = riskless rate	4%		
s = volatility	80,0%		

T	3,0000		
d1	0,4467	d2	-0,9389
N(d1)	0,6725	N(d2)	0,1739
e^(-rT)			0,89
Ee^(-rT)			88,692044
C = call option			26,99

(c)

Value added

R&D costs	-20,00
Value of option	26,99
Project NPV	6,99
Strategic NPV	6,99
Static NPV	-0,07
Value added	7,06

Problem 61

The Pepper Company bought a salt mine with an estimated salt deposit of 1 000 000 tonnes.
The purchase price was $10 000 000. The salt will be extracted for the next 10 years.
The current price of salt is $200 per tonne and is expected to grow 1,0% a year.
The expected volatility of salt prices is 20,0%.
The current production cost is $100 per tonne and is expected to grow 1,0% a year.
The riskless rate is 5%.
(a) Calculate the present value od sales (spot price of the option).
(b) Calculate the present value of investment and operating cost (excercise price).
(c) Calculate the value of the mine.
(d) Calculate and interpret probability and risk premium.

Solution

(a)

Present value of sales (spot price in BSM model)

100 000*200/(5%-1%)*(1-(1+1%)^10/(1+5%)^10)/1 000 000 = 160,9

(b)

Future value of cost (exercise price in BSM model)

(10 000 000+100 000*100/(5%-1%)*(1-(1+1%)^10/(1+5%)^10)/1 000 000)*(1+5%)^10= 147,4

(c)

$T =$ 10,00

$e^{-R_B{}^*T} =$ 0,6065

$Ee^{-R_B{}^*T} =$ 89,4

$$d = \frac{Ee^{-R_B{}^*T}}{S} = 0{,}56$$

$$d_1 = -\frac{\ln(d) - \frac{1}{2}\sigma_s^2 T}{\sigma_s\sqrt{T}} = 1{,}2461 \qquad d_2 = -\frac{\ln(d) + \frac{1}{2}\sigma_s^2 T}{\sigma_s\sqrt{T}} = 0{,}6136$$

$N(-d_1) =$ 0,1064 $N(d_2) =$ 0,7303

$C =$ 78,5

$$S - C = Ee^{-R_B{}^*T}\left[\frac{1}{d}N(-d_1) + N(d_2)\right] = 82{,}4$$

(d)

Probability

$$\left(\frac{1}{d}N(-d_1) + N(d_2)\right) = 0{,}9218$$

Risk premium

$$q^* = -\frac{1}{T}\ln\left[\frac{1}{d}N(-d_1) + N(d_2)\right] = q^* = 0{,}81\%$$

d	Risk Premium			Probabability		
0,81%	1800	3600	7200	1800	3600	7200
0,30	0,02%	0,12%	0,32%	0,9991	0,9878	0,9372
0,40	0,10%	0,32%	0,56%	0,9948	0,9683	0,8945
0,56	0,53%	0,81%	0,96%	0,9740	0,9218	0,8257
0,60	0,73%	0,99%	1,08%	0,9642	0,9060	0,8064
0,70	1,31%	1,41%	1,34%	0,9364	0,8684	0,7647

Problem 62

Russel Air Co. has bid on a major contract to build a space ship.
The contract award decision will be announced 12 months from now and Russel estimates that it has 40% probability of being awarded the contract. In anticipation of this potential project, Russel must commit to the engine manufacturer now to purchase the engines next year at a cost of $520,000. If Russel gets the contract, the project will produce expected cash flows of $120,000 per year for eight years, with RRR of 5%. The engines will not be needed if Russel does not receive the contract. What is the maximum that Russel should be willing to pay to the manufacturer today for an option to purchase the engines only if he gets the contract?

Solution

The NPV of the project if the contract is awarded is the difference between the present value of revenues stream and the outlay for the trucks.

0	1	2	3	4	5	6	7	8
-520,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000

NPV= 255,6 Excel function =NPV(5%;B23:J23)*(1+5%)

This amount is evaluated one year hence, and will be realized only if the contract is awarded.

The expected return at the end of t=0 is 0.40 * 255,6= 102,2

Today, beginning of t=0, 102,2/(1+5%)= 97,4

He would therefore be willing to pay up to 97,4 to acquire an option on the truck fleet.