Pin: 87985

Q18.

a)

The payoff of a put option on the third asset with a strike price of 2 can only be positive or 0. The payoff of the put option will be positive if the payoff in the different states is lower then the strike price of 2. If the payoff is higher then the strike price, the payoff will be 0.

$$Payoff\ state\ 1: 2 - 1 = 1$$

$$Payoff\ state\ 2: 2 - 3 = -1 \rightarrow 0$$

$$Payoff\ state\ 3: 2 - 6 = -4 \rightarrow 0$$

Strike Price	*2,000*		
Asset #	*3*		
Put Payoff 3	1,000	0,000	0,000

b)

The value of this put option is **0,473.**

It is found by first finding the state prices, and finding the total of them multiplied with the payoffs. The solution will be shoed in the excel below.

	A	B	C	D	E	F	G
19			Strike Price	2			
20				MATRIX			
21				1,05	2	1	
22				1,05	4	3	
23				1,05	3	6	
24							
25			Payoff				
26					1		
27					0		
28					0		
29							
30			*Prices*				
31			Asset 1		1		
32			Asset 2		2,5		
33			Asset 3		3		
34							
35			State Price		0,473	=MMULT(MINVERSE(TRANSPOSE(C21:E23));D31:D33)	
36					0,116		
37					0,363		
38							
39			**Value of Option**		**0,473**	=SUMPRODUCT(D35#;D26:D28)	

c)

The risk-free rate is 0,050. Asset one shows the risk-free rate. The calculation is done by taking the average of the 3 states in the first asset, divided by the price of the asset, and -1 to get the percentage.

$$Risk\ free\ rate: \frac{\frac{1{,}05 + 1{,}05 + 1{,}05}{3}}{1} - 1$$

$$Risk\ free\ rate = 0{,}050$$

Q19.

a)

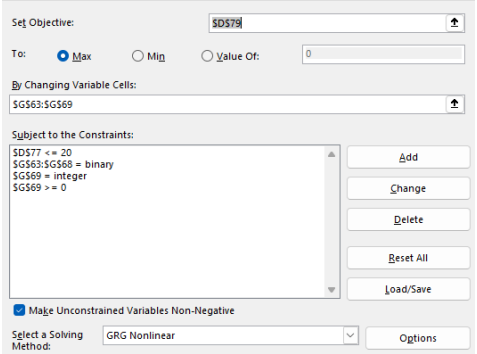
Given the constrints of projects, other then Cow, only being undertaken once, and the total of 20 able to invest – the following projects will be chosen in order to maximize the firm value.

Project Caro-Kann collective, Project, Ruy Lopez research, project Nimzo Innovation, project Sicilian Venture and Project Alekhine Echo. These projects was found by using solver in excel, adding the given constraints.

	Name	Cost	Tonnes CO2 emission	NPV	Number of Times
63	Project Queen's Gambit Lab	8	5	9	0
64	Project Caro-Kann collective	6	8	7	1
65	Project Ruy Lopez research	4	3	4	1
66	Project Nimzo Innovation	5	4	5	1
67	Project Sicilian Venture	2	7	5	1
68	Project Alekhine Echo	3	2	8	1
69	Proejct Cow	2	-1	-2	0

	Constraints	
73	Cost	20
74	Cow can be reapeted	
75	Other only once	

77	Cost	20	=SUMPRODUCT(D63:D69;G63:G69)
78	Co2 Emitted	24	=SUMPRODUCT(E63:E69;G63:G69)
79	**NPV**	**29**	=SUMPRODUCT(F63:F69;G63:G69)



b)

The combined NPV of investing the chosen project was found by multiplying the NPV of the project with the number of times doen. Adding all these together made the combined NPV be 29.

Cost	20	=SUMPRODUCT(D63:D69;G63:G69)
Co2 Emitted	24	=SUMPRODUCT(E63:E69;G63:G69)
NPV	**29**	=SUMPRODUCT(F63:F69;G63:G69)

c)

Given the additional constraints of a 20 tonnes CO2 limit, another constrain of $C02\ Emitted \leq 20$ must be added. The new projects to choose if I wanted to maximize the firms value would be:

Project Queen's Gambit Lab, Project Nimzo Innovation, Project Sicilian Venture and Project Alekhine Echo.

Name	Cost	Tonnes CO2 emission	NPV	Number of Times
Project Queen's Gambit Lab	8	5	9	1
Project Caro-Kann collective	6	8	7	0
Project Ruy Lopez research	4	3	4	0
Project Nimzo Innovation	5	4	5	1
Project Sicilian Venture	2	7	5	1
Project Alekhine Echo	3	2	8	1
Proejct Cow	2	-1	-2	0

d)

The combined NPV of investing in the projects chosen in the previous question would be 27. The cost of undertaking these projects would be 18, and the Co2 Emitted would also be 18.

Cost	18	=SUMPRODUCT(D94:D100;G94:G100)
Co2 Emitted	18	=SUMPRODUCT(E94:E100;G94:G100)
NPV	**27**	=SUMPRODUCT(F94:F100;G94:G100)

e)

The share price will be effected by the investment, and it will be different with and without the emission regulation. The NPV can be added directly into the Value of the firm as it already takes on the cost.

$$Share\ Price = \frac{Value + NPV_{projects}}{Number\ of\ Shares}$$

The share price without the emission regulation will be 13,58. On the other hand, including the emission regulation, the share price would be 13,54.

	A	B	C	D	E	F
120		**e. What is the share price after investment before and after the introduction of**				
121		**the regulation?**				
122						
123			Shares	50		
124			Value of firm	650		
125			NPV without emission limitatio	29		
126			**Share Price**	**13,58**	=(D125+D124)/D123	
127						
128			Shares	50		
129			Value of firm	650		
130			NPV with emission limitation	27		
131			**Share Price**	**13,54**	=(D130+D129)/D128	

Q20.

a) Higher **beta** projects have higher required returns.

Beta is the systematic risk exposure, it measures a projects or assets sensitivity to the market's excess return.

Higher beta projects doesn't always have higher required returns, as it also depends on other factors such as the market risk, risk free rate etc. So a project with a high beta, can have lower required return then a project where the betas is a little bit lower but the risk free rate, or excess return is higher.

b) Lower **duration** assets are more sensitive to interest rate changes.

Duration is a first-order (linear) approximation of price sensitivity to interest rate changes. The lower the duration assets are is the more sensitive it is to interest rates. When you have shorter durations, the interest rates changes more.

c) It is always beneficial to reduce **dividends** in order to invest in projects with a higher growth rate than current projects.

Dividends is money that a firm a pays out to their shareholders, it is cash outflow from the firm. Dividends is often paid to satisfy, and give back to the shareholder.

All things alike, holding the dividends stable is beneficial for the shareholders. So it is always beneficial to reduce dividends in order to invest in projects with higher growth rate then current projects. The project does only depend on growth rate either. So it is not safe to say that the projects with higher growth rate will be more beneficial.

d) The **freerider problem** in mergers & acquisitions is larger when there is only 1 target shareholder.

The free rider problem is a problem that occurs when exisisitng shareholder do not have to invest time and effort but still participates in all the gains form the takeover. The target shareholders can benefit by keeping their shares, while letting other shareholders sell at allow price. When everyone has the incentive to keep shares, no one will sell.

However, when there is only 1 target shareholder the free rider problem is lower then if there was many. That is because there won't be any upside for the 1 shareholder if the shares is not sold. The upside will only come once the shares are sold. With many shareholders, you can hope that someone else will sell their shares – meaning you can free ride to a higher share price. Therefore, the statement is false.