Business NPV

The NPV is £56700 for the project given the best estimate cash flows. Therefore under the assumption that the firm is operating to maximise the market value of their common stock, and under the assumed conditions of certainty of prices of all assets, the firm should accept the project, as the NPV is positive. This will increase the value of the firm as long as no other groups of projects can be found which will increase the value of the firm.

B)

The project has 2 internal rates of return (multiple IRR's) that are 4.8% and 13.45%. Affects of multiple IRR's are shown in **graph 1.** The discount rate exceeds 4.8% the proposal becomes positive and at 13.45% the present value of all the cash flows is 0. Therefore when the cost of capital is between 4.8% and 13.45% the NPV is positive, and following the NPV rule the project should be accepted. However if the IRR calculation of 4.8% is used the project maybe incorrectly rejected as the cost of capital is in excess of 4.8%. Graph 1 however indicates this is an incorrect decision when the cost of capital is between 4.8% and 13.45%.

C)

Both the IRR and the NPV take account of time value of money, but situations arise where the IRR method leads to different decisions being made from those that would implement the NPV method.

Mutually exclusive projects exist when there is acceptance of one project excludes the acceptance of another. The following example will illustrate how the NPV and the IRR lead to different decisions.

Initial Investment Outlay Net Inflow End Of Year (£)

1 2 3

Project A £7000 3430 3430 3430

Project B £12000 5520 5520 5520

Cost of Capital = 10%

The NPV and IRR calculations are as follows:

IRR (%) NPV (£)

Project A 22 1530

Project B 18 1728

Source: Principles of Corporate

Finance, 6th edition

Brealy and Myers

The IRR ranks **A** first and **NPV** ranks **B** first. If the projects were independent this would be irrelevant, since both would be accepted. However the case is mutually exclusive, therefore raking is crucial. **Graph 2 illustrates this.**

A discount rate greater than 12% no contradictions arise, below 12% project **B** has higher NPV and project **A** has a higher IRR. The IRR gives incorrect ranking proved by considering the increments of cash flows of project B over A.

Years

0 1 2 3

(£) (£) (£) (£)

Project A 120005520 5520 5520

Project B 7000 3430 3430 3430

Incremental Cash Flow 5000 2090 2090 2090

If the firm did use the IRR method and chose product A, we can establish if it is worthwhile to the incremental investment (B-A). The acceptance of this investment + incremental investment = A + (B-A), this is = to accepting project B. Firm therefore accepts the incremental investment. Using the IRR rule is the same as moving from A to B. The IRR of the incremental investment is (B-A) 12%. The cost of capital is 10%, the incremental project should be accepted, as the IRR rule indicated a move from A to B. The superiority of the NPV method has been established, using the IRR analysis to contradict the IRR rule.

The IRR expresses results as a percentage. This is misleading; for example, compare an investment of £100 that yields 50% return, with an investment of £1000 that yields 25%. If one project can be accepted, the first will yield £50 and the second £250. If the cost of capital is 10%, surplus fund will be invested at the cost of capital. The first investment will be £90 + the £50 return from the £100 = £140. Clearly the second investment, which yields a return of £250, is preferred, as the objective of the firm is to maximise the firm's wealth, so the NPV provides the correct measure.

Where there are **unconventional cashflows** the IRR has a shortcoming. If the signs of net cash flows changes over successive periods, calculations could produce as many IRR's as there sign changes. Only one rate is economically significant in determining whether the investment is profitable.

D1)

Considerations of uncertainties are:

· **50% probability of Standard Price oil**

· **40% probability of Higher Price oil**

· **10% probability of Lower Price oil**

And · 80% probability of Standard Reclamation cost

· 20% probability of high Reclamation cost

· 0% probability of low Reclamation costs

Using the above scenarios the probability of:

· **Standard Price / Standard Reclamation costs = 40% NPV = £5607**

· **Standard Price / High Reclamation costs = 10% NPV = -£50841**

· **Low Price / Standard Reclamation costs = 8% NPV = -£210541**

· **Low Price / High Reclamation costs = 2% NPV = -£266988**

· **High Price / Standard Reclamation costs = 32% NPV = £113680**

· **High Price / High Reclamation costs = 8% NPV = £57233**

It can be noted that the most likely outcome will be **standard price oil / standard reclamation costs** which has a **40%** chance.

However further calculations need to be done to make a more informed decision. The calculations of which are done in excel and are referenced in the appendices.

The **ENPV = £15930**

The **Standard deviation = £96880**

The **Variance = 9368.58**

The **Expected Return = 2.343%**

D2)

Using the information, most likely outcome will be: **standard price oil / standard reclamation costs** which has a 40% chance.

The ENPV of £15 930 is the outcome expected if a project similar to this is undertaken again. But risk needs to be accounted for, which is both positive and negative from the mean (£15 930). The standard deviation of

£96 880, is very high which reflects a large dispersion around the ENPV of £15930, hence greater risk. Therefore there is a possibility that the final result being under £15

930. It could be £10 930, £5 930 or -£4 030. On the other hand there are similar chances of obtaining £30 930, £35 930 or even higher.

As this is a large project, there is a chance that the firm will incur an economic loss. Therefore we have a 43.62% probability of the NPV for the project will be negative. That is a 1 in 2 chance of losing money!

D3)

Probability analysis however involves juggling with a lot of numbers; therefore decision makers could find it hard to interpret them.

The ENPV gives incomplete information about project risk by itself because it measures central tendency, whereas the management maybe concerned with the dispersion of possible outcomes around the mean.

Degree of uncertainty to the various alternative is viewed in isolation, whereas it is important to take into account the amount of risk, that each alternative will contribute to the overall risk of the firm; such portfolio analysis.

E)

The WACC is useful for investment appraisal as it used in capital budgeting decisions as a percentage discount rate, which incorporates the effect of tax shields, to find the NPV of projects that would not change the risk of the firm, by acting as a handle rate for capital investments, which give the minimum required return on an investment, on its discount cashflow calculations. If the risk is not similar, a firm that invests in projects like the one being considered is found and the equity cost of capital of that firm is compared to ours. The difference being the firm's beta compared to ours. To be able to use the firms WACC to discount the project, we assume that the company will continue to home the same capital structure, which can be classified into two types: (i) all equity and (ii) mixed with where debt and equity are held in varying proportions.

The traditional WACC can be calculated by:

Kd D + Ke E

D+E D+E

Where Kd = cost of debt

Ke = cost of equity

D = proportion of debt

E = proportion of equity

Source : J Wyld

WACC is calculated using actual balance sheet data of companies and industries and all

the variables in the formula refers to the whole firm, therefore, when considering investment appraisal using WACC, the company must be aware that industry costs might be better than individual firms cost when used for investment appraisal. Therefore the WACC can be adjusted for changes in debt ratios according to WACC, debt is constantly rebalanced or business risk by applying changes to the equation, which can also be used for beta.

Different investments have different levels of risk, therefore the higher the risk the higher the rate of return and vice versa. Therefore the WACC of 10% to be appropriate for any investment appraisal depends if the project is of similar risk. If the level of risk is higher, then a risk premium should be added. The CAPM approach provides a starting point. The risk premium depends on the firms risk level. The higher the risk, the greater the required rate of return or equity. The risk level of business and the financial coverage will have an affect on the risk premium.

The CAPM model, states that the risk premium varies in direct proportion to beta which means all investments slope along the security market line.

See graph 3

The expected risk on an investment with a beta of 0.5 is half the expected risk premium on the market.

The firms risk using the CAPM approach is measured by its systematic risk, the beta and not by its variance alone, therefore the required rate on an investment is given by:

kei = r + (Exm - r)

Where

· r = risk free rate

· Exm = the expected return of the market portfolio

· = the ***i***th firms systematic risk

· kei = the required rate of return on an investment of the ***i***th firm.

TOTAL WORD COUNT = 1646

APPENDICES

Calculations for Question A

NPV = A projects net contribution to wealth ; present value minus initial investment.

YEAR	CASH FLOW	DISC FACT.	DISC'TED CASH

		(10%)	FLOW
0	-680	1.000	-680.000
1	400	0.909	363.636
2	400	0.826	330.579
3	250	0.751	187.829
4	200	0.683	136.603
5	100	0.621	62.092
6	-700	0.564	-395.132

NET PRESENT VALUE	5.607

Definitions for Question B

Internal rate of return = Discount rate at which investment has zero NPV.

Calculations for Question D

Probability; Standard Price Oil / Standard Reclamation Costs =

(5/10) * (8/10) = 40%

Standard Price Oil / High Reclamation Costs =

(5/10) * (2/10) = 10%

Low Price Oil / Standard Reclamation Costs =

(1/10) * (8/10) = 8%

Low Price Oil / High Reclamation Costs =

(1/10) * (2/10) = 2%

High Price Oil / Standard Reclamation Costs =

(4/10) * (8/10) = 32%

High Price Oil / High Reclamation Costs =

(4/10) * (2/10) = 8%

The Expected Return = 15933 / 680000 = 2.343%

Calculation for D2

A negative NPV means a value less than zero hence we can say that the probability that an NPV will be negative is given by the formula;

z = (0 - ENPV) / sd = sd units

The equation is measuring how far from the expected mean value an NPV might be in the left hand direction of the normal curve.

The ENPV = £15930 and the standard deviation associated with this = £96880. By using the above equation we can find the number of standard deviation units by which this varies from the mean relative to zero. This gives:

z = (0 - 15930) / 96880 = -0.16 standard deviation (sd) units. We need to know now the probability associated with this number of sd units from the normal distribution function. Using the normal distribution table read down to 0.1 then across to 0.06 to give us 0.16. The value in the table is 0.0638. This is not the probability of a negative NPV, because we are interested in the left hand side of the normal curve. To do this we need to subtract our table value from 0.5 (ie we are only concerned with the left hand tail of the distribution) so that the probability the NPV will be negative is given in the table as:

(0.5 - table z) = (0.5 - 0.0638) = 0.4362 which is 43.6%.

100 / 43.6 = 2.2.