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ACCA F9

Financial Management (FM)

财务管理

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Part D: Investment Appraisal

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Risk and Uncertainty

Risk:

- Several possible outcomes
- On basis of past relevant experience, assign probabilities to outcomes
- Increases as the variability of returns increases

Uncertainty:

- Several possible outcomes
- Little past experience, thus difficult to assign probabilities to outcomes
- Increases as project life increases



Sensitivity Analysis

Sensitivity analysis is one method of analyzing the uncertainty surrounding a capital expenditure project, and it enables an assessment to be made of how responsive the project's NPV is to changes in the variables that are used to calculate that NPV. The NPV could depend on a number of uncertain independent variables.

- Selling price
- Sales volume
- Cost of capital
- Initial cost
- Operating costs
- Benefits

$$\text{Sensitivity} = \frac{\text{NPV}}{\text{Present value of project variable}} \%$$



Sensitivity Analysis

One Example for Sensitivity Analysis:

Kenney Co is considering a project with the following cash flows.

<i>Year</i>	<i>Initial investment</i>	<i>Variable costs</i>	<i>Cash inflows</i>	<i>Net cash flows</i>
	\$'000	\$'000	\$'000	\$'000
0	7,000			
1		(2,000)	6,500	4,500
2		(2,000)	6,500	4,500

Cash flows arise from selling 650,000 units at \$10 per unit. Kenney Co has a cost of capital of 8%.

Required

Measure the sensitivity of the project to changes in variables.



Sensitivity Analysis

Solutions:

The PVs of the cash flow are as follows:

Year	Discount Factor@ 8%	Initial Investment	Variable Cost	PV
0	1.000	(7000)		(7000)
1	0.926		4500	4167
2	0.857		4500	3857

Sensitivity analysis:

1) Initial investment

$$\text{Sensitivity} = 1024 / 7000 = 14.6\%$$



Sensitivity Analysis

2) Sales volume:

$$\text{Sensitivity} = 1024 / (11590 - 3566) = 12.8\%$$

3) Selling price:

$$\text{Sensitivity} = 1024 / 11590 = 8.8\%$$

4) Variable costs:

$$\text{Sensitivity} = 1024 / 3566 = 28.7\%$$



Sensitivity Analysis

Weaknesses of this approach for performing sensitivity analysis

- (a) The method requires that changes in each key variable are isolated, assuming that all other values in the estimated cash flows are unchanged.
- (b) Looking at factors in isolation is unrealistic since they are often interdependent.
- (c) Sensitivity analysis is analysis when there is uncertainty. It does not examine the probability that any particular variation in costs or revenues might occur.
- (d) Critical factors may be those over which managers have no control.
- (e) In itself it does not provide a decision rule.



Probability Analysis

A probability distribution of expected cash flows can often be estimated, recognizing there are several possible outcomes, not just one.

Step 1: Calculate an expected value of the NPV.

Step 2: Measure risk, for example, in the following ways.

- (a) By calculating the worst possible outcome and its probability
- (b) By calculating the probability that the project will fail to achieve a positive NPV
- (c) By calculating the standard deviation of the NPV



Problems with expected values:

- An investment may be one-off, and 'expected' NPV may never actually occur.
- Assigning probabilities to future events and outcomes is usually highly subjective.
- Expected values do not evaluate the range of possible NPV outcomes.



Sensitivity Analysis

Example:

Which of the following statements are correct?

(1) The sensitivity of a project variable can be calculated by dividing the project net present value by the present value of the cash flows relating to that project variable.

(2) The expected net present value is the value expected to occur if an investment project with several possible outcomes is undertaken once.

(3) The discounted payback period is the time taken for the cumulative net present value to change from negative to positive.

A. (1) and (2) only

B. (1) and (3) only

C. (2) and (3) only

D. (1), (2) and (3)



Thank You!

