

③ Risk Analysis in Capital Budgeting

- ① Statistical Techniques
- ② Conventional Techniques
- ③ Other Techniques

1 Statistical Techniques

In this Technique, we Calculate standard deviation & Co-efficient of Variation to find out Risk

Following steps are applied

Step 1 Calculate Expected NPV

$$\bar{x} = \sum P(x)$$

Step 2 Calculate standard deviation

$$\sigma x = \sqrt{\sum (x - \bar{x})^2 P}$$

Step 3 = Calculate coefficient of Variation

$$C.V. = \frac{\sigma}{\bar{x}} \quad [\text{High C.V. means High Risk}]$$

Eg

<u>Economy</u>	<u>prob.</u>	<u>NPV</u>
----------------	--------------	------------

Boom	0.7	400
------	-----	-----

Normal	0.2	100
--------	-----	-----

Recession	0.1	20
-----------	-----	----

① Expected NPV

② Variance in NPV

③ standard deviation in NPV

Calculation of Expected NPV & S.D.

P	x	$P(x)$	$(x - \bar{x})$	$(x - \bar{x})^2 P$
0.7	400	280	98	6422.80
0.2	100	20	-202	8160.80
0.1	20	2	-282	7952.40

$$\bar{x} = \underline{\underline{302}}$$

$$\text{Variance} = \underline{\underline{22836}}$$

$$\text{Expected NPV} = 302$$

$$\text{Standard deviation} = \sqrt{22836} = 151$$

Question: 13

TYKG

Shivam Ltd. is considering two mutually exclusive projects A and B. Project A costs ₹ 36,000 and project B ₹ 30,000. You have been given below the net present value probability distribution for each project.

Project A		Project B	
NPV Estimates (₹)	Probability	NPV Estimates (₹)	Probability
15,000 ✓	0.2	15,000 ✓	0.1
12,000 ✓	0.3	12,000 ✓	0.4
6,000 ✓	0.3	6,000 ✓	0.4
3,000 ✓	0.2	3,000	0.1

- (i) Compute the expected net present values of projects A and B.
- (ii) Compute the risk attached to each project i.e. standard deviation of each probability distribution.
- (iii) Compute the profitability index of each project.
- (iv) Which project do you recommend? State with reasons.

	A	B
Expected NPV	9000	9000
S.D.	4450	3795

(iii) Calculation of PI

$$PI = \frac{PVCI}{PVCO}$$

$$A = \frac{36000 + 9000}{36000} = 1.25$$

$$B = \frac{30000 + 9000}{30000} = 1.30$$

(iv) Calculation of Coefficient of Variation

$$C.V. = \frac{S.D.}{\bar{X}}$$

$$A = \frac{4450}{9000} = 0.494$$

$$B = \frac{3795}{9000} = 0.422$$

Since C.V. of project B is lower (Less Risky), hence project B should be accepted.

Calculation of Expected NPV & S.D.

P	x	P(x)	(x - $\bar{x}$)	(x - $\bar{x}$) ² P	P	y	P(y)	(y - $\bar{y}$)	(y - $\bar{y}$) ² P
0.2	15000	3000	6000	7200000	0.1	15000	1500	6000	3600000
0.3	12000	3600	3000	2700000	0.4	12000	4800	3000	3600000
0.3	6000	1800	-3000	2700000	0.4	6000	2400	-3000	3600000
0.2	3000	600	-6000	7200000	0.1	3000	300	-6000	3600000
		<u>9000</u>		<u>Varianco = 19800000</u>			<u>9000</u>		<u>14400000</u>
		$\bar{x} = 9000$							

$$\sigma_x = \sqrt{19800000}$$

$$= ₹ 4450$$

Expected NPV = 9000

$$\sigma_y = \sqrt{14400000}$$

$$= 3795$$

Eg Cost of project = ₹ 1000
life = 5 years
probability Cash Flows (p.q.)

0.3 300

0.5 400

0.2 100

Cost of capital = 10% p.a.

① Calculate Expected NPV

② standard deviation

① Expected NPV

Expected CF

$$(300 \times 0.3) + (400 \times 0.5) + (100 \times 0.2) = ₹ 310 \text{ p.a.}$$

$$\text{Expected NPV} = \text{PVC I} - \text{PVC O}$$

$$= (310 \times \text{PVAF}, 10\%, 5)$$

$$= (310 \times 3.791) - 1000$$

$$= 175.143$$