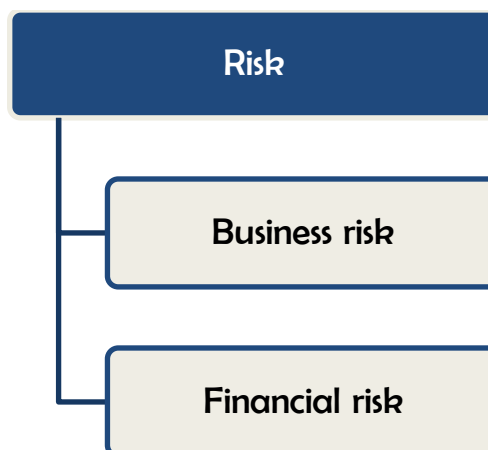# RISK ANALYSIS IN CAPITAL BUDGETING

SUMMARY

Types of decision making

- When CF's are certain
- CF involve risk but, probability can be assigned
- CF are uncertain probability-cannot be assigned

Probability Distribution of CF

- Known
- Unknown

Known → Risk

Unknown → Uncertainty

Risk
- Business risk
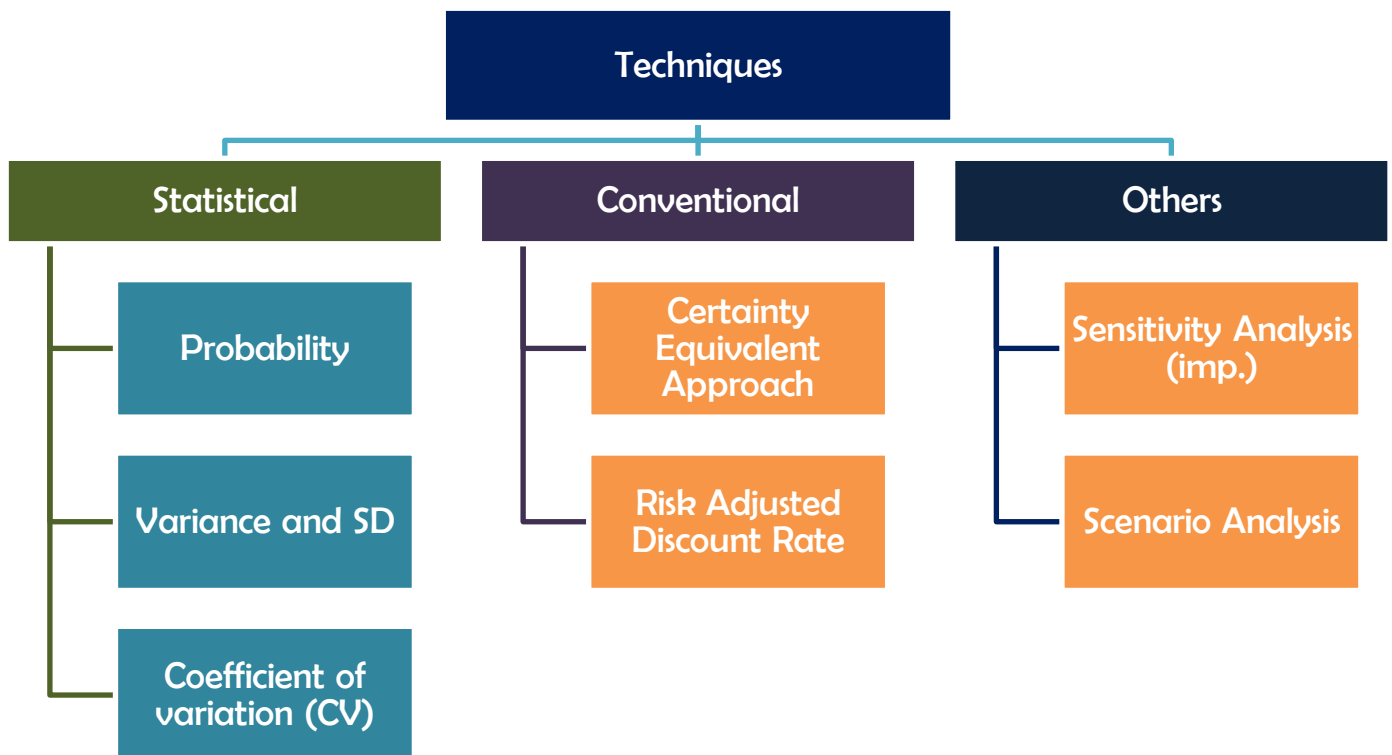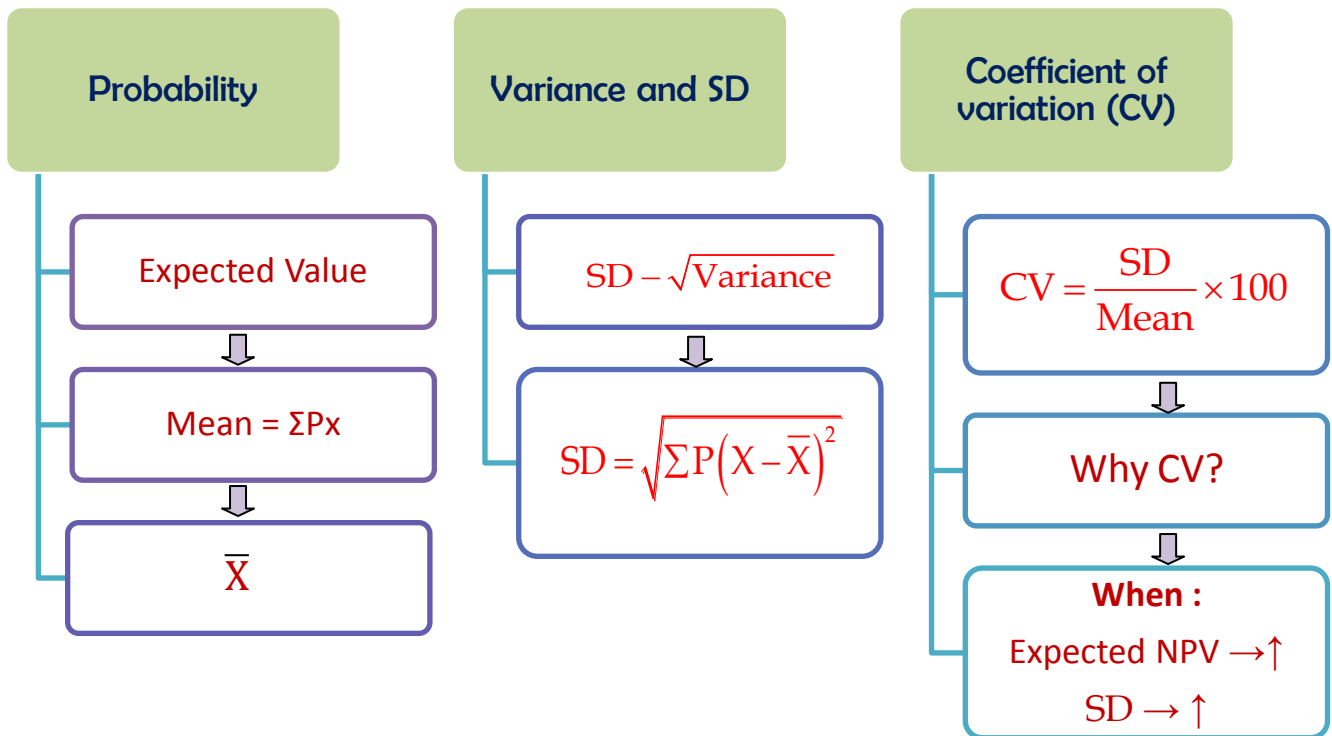- Financial risk

SANJAY SARAF SIR
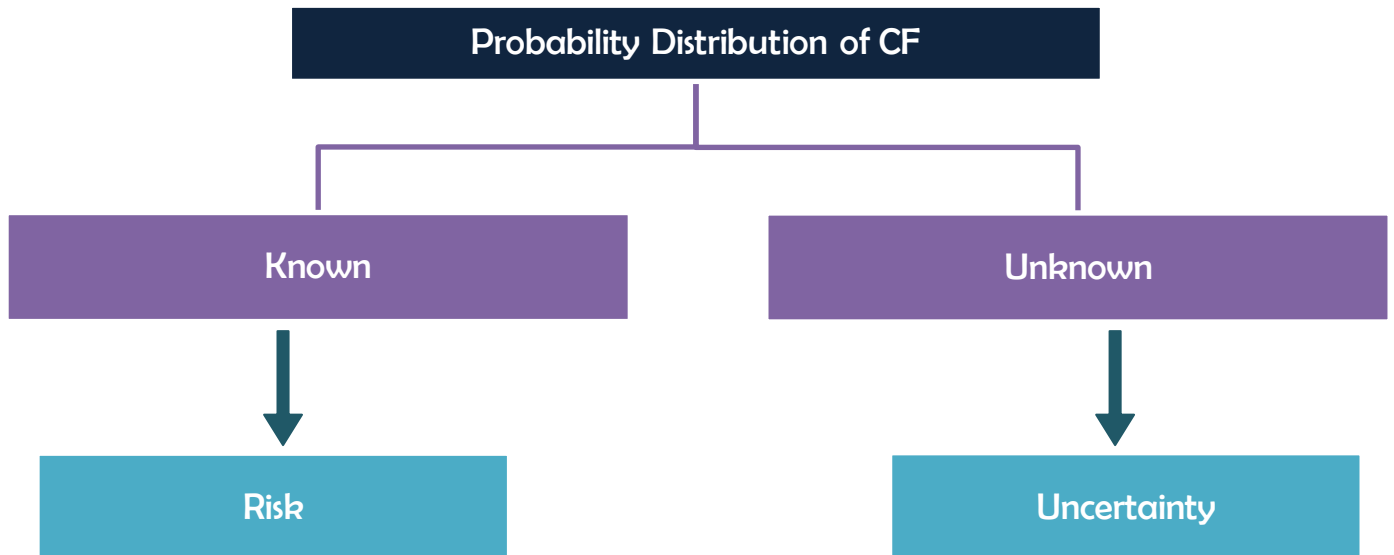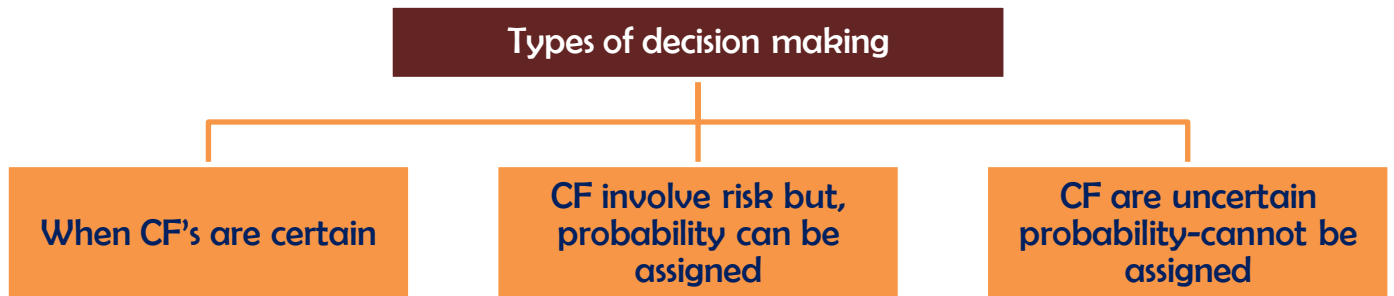
➢ **Why Risk Analysis in Capital Budgeting**
- Opportunity cost involved
- To know the real value of CFs

➢ **Sources of risk**
- Project specific risk — *(Affects a particular project)*
- Company specific risk — *(Factors affecting CF of an entity and its access to Funds for capital Investment)*
- Industry specific risk — *(Affects the whole industry in which the company operates in)*
- Market risk — *(Market related condition like demand etc.)*
- Competition risk — *(Entry, Exit, Dynamism)*
- Risk due to economic conditions — *(Macro factors)*
- International risk — *(Global economic conditions)*

Techniques		
Statistical	**Conventional**	**Others**
Probability	Certainty Equivalent Approach	Sensitivity Analysis (imp.)
Variance and SD	Risk Adjusted Discount Rate	Scenario Analysis
Coefficient of variation (CV)		

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Probability	Variance and SD	Coefficient of variation (CV)

Expected Value	$SD - \sqrt{Variance}$	$CV = \dfrac{SD}{Mean} \times 100$
Mean = ΣPx	$SD = \sqrt{\sum P\left(X - \overline{X}\right)^2}$	Why CV?
$\overline{X}$		**When :** Expected NPV →↑ $SD \rightarrow \uparrow$

Certainty Equivalent Approach :

Step 1 : Expected CF of each year $\left[\overline{CF}\right]$

Given   Calculate ΣPx
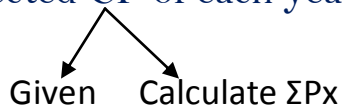
Step 2 : Certainty equivalent = $\infty \times \overline{CF}$

Where,

∞ = Certainty equivalent coefficient

Step 3 : Use R_f to derive NPV

Note :

✎ *Higher the risk – lower the ∞*

✎ *Higher the level of risk aversion – lower the ∞*

RADR

Step 1 : Expected CF

Step 2 : Use RADR to discount

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                    Use RADR to discount
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Case 01 RADR	Case 02 RADR	Case 03 RADR	Case 04 RADR	Case 05 RADR
gives	K_C + Differential risk premium	R_f + Risk Premium	Based on COV	$R_f + (K_c - R_f) R_I$ Where R_I = Risk Index
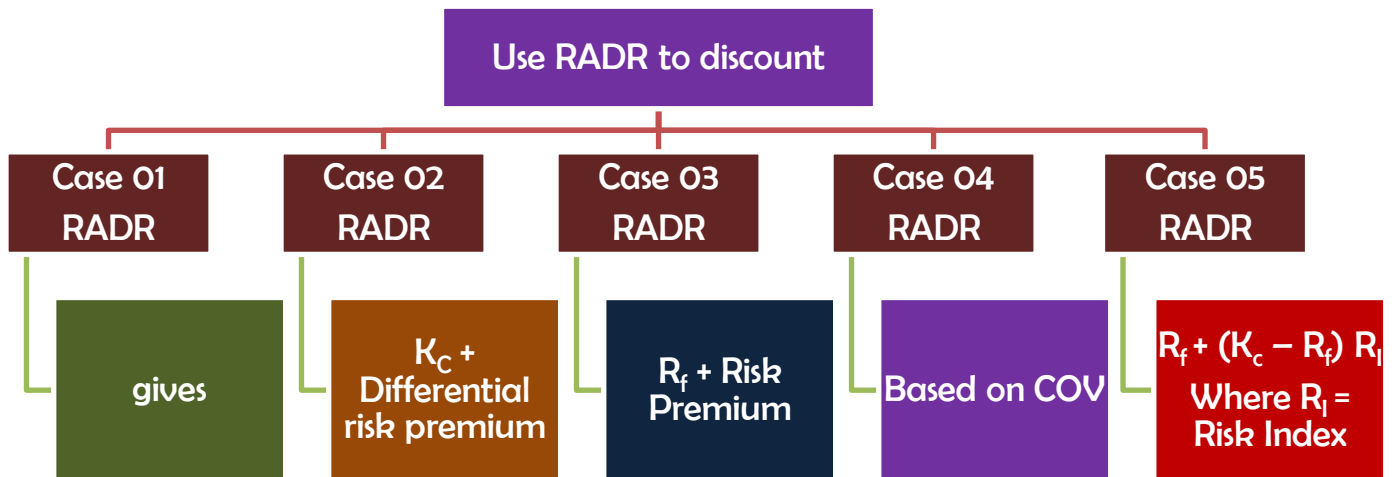
Note :

✍ *Lower the ∞ , higher RADR should be used*

Other Technique

Sensitivity Analysis : Find out sensitivity of NPV wrt each risk factors
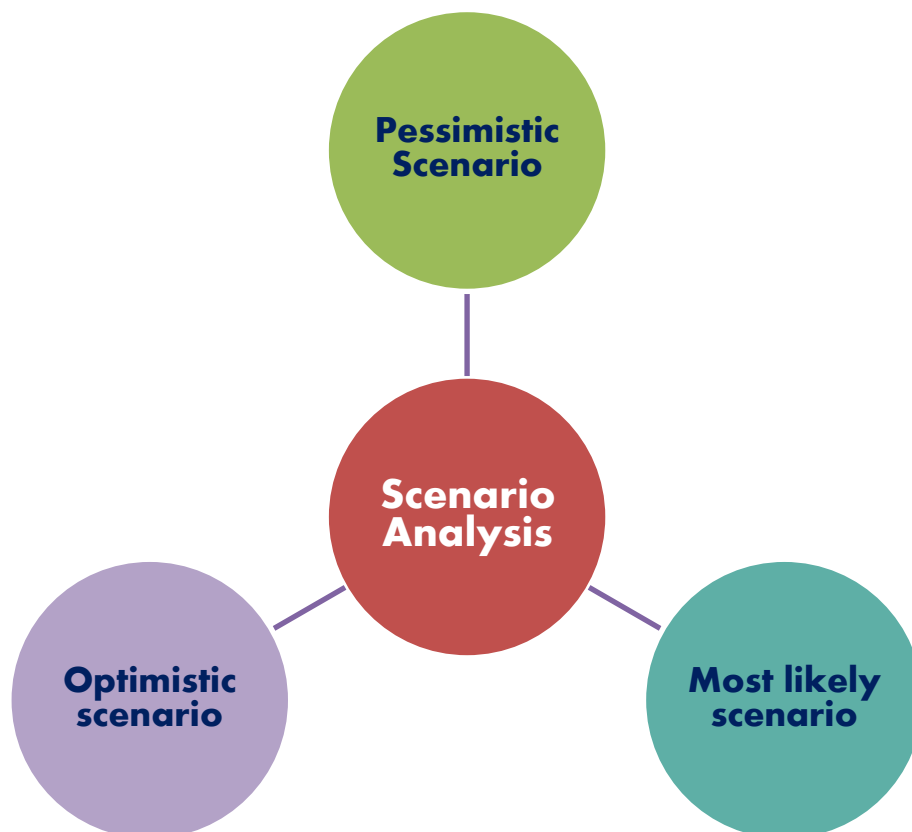
STEPS

Step 1 : Calculate Expected NPV

Step 2 : Shock each risk factor in the adverse direction in a certain percentage and find percentage fall in NPV

Step 3 : Conclusion :
Maximum percentage fall in NPV → Critical factor

Certain Factors – Shock in the direction :

☞   Annual CF   →   ↓

☞ K_c →   ↑

☞   Initial Investment   →   ↑

☞   Number of unit sold/produced   →   ↓

☞   Selling price   →   ↓

☞   VC p.u.   →   ↑

☞   FC p.a.   →   ↑

☞   Discounting Rate   →   ↑

☞   Life(n)   →   No shock

Pessimistic Scenario

Scenario Analysis

Optimistic scenario

Most likely scenario

▪   **Find NPV in each Scenario.**

▪   **Management can suggest different combinations of CF, life, Kc and initial investment from different Scenario**