Capital Budgeting:
Cash Flow Estimation

PGC - AFM

MODULE – 2: CORPORATE FINANCE FUNDAMENTALS

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Estimation of cash flow for capital budgeting exercise

- **Regency Integrated Chips**
- What is the case all about? , what's the managerial dilemma?

Do we get the cash flows (on a platter) for real life projects?

- No, someone needs to estimate them…
- Can we do it ourselves?

A snapshot of the Problem…

Input Data			
Building Cost	12000	Market Value of building at Salvage	7500
Equipment Cost	8000	Market Value of Equipment at Salvage	2000
Net Operating Working Capital/Sales	10%	Tax rate	40%
First Year Sales (units)	20000	WACC	12%
Growth rate in units sold	0%	Inflation: Growth in sales price	2%
Sales Price per unit	3	Inflation: Growth in VC	2%
Variable Cost per unit	2	Inflation: Growth in fixed cost	1%
Fixed Cost	8000		

Free Cash Flow =

Investment Outlay

+ Net Operating cash Flow (NOPAT)

+ Net change in Operating Working Capital

+ Salvage cash Flow (if any)

Projected Net Cash Flows in our case for the year 2009-2012?

		2008	2009	2010	2011	2012
Investment Outlay - Long Term investments						
	Bulding	12000				
	Equipment	8000				
Operating Cash Flow of the Project						
	Units Sold					
	Sales Price					
	Sales Revenue					
	Variable Cost					
	Fixed Operating cost					
	Dep. (Building)					
	Dep. (Equipment)					
	Operating Income before taxes (EBIT)					
	Tax on operating Income (40%)					
	NOPAT					
	Add back the Dep.					
	Operating Cash Flow					
Cash Flow due to net operating working capital change						
	Net Operating working capital (based on sales)					
	Cash flow due to investments in NOWC					
Salvage cash Flow- long term assets						
	Net Salvage cash Flow (Building)					
	Net Salvage cash Flow (Equipement)					
Project Net cash Flow						

Lets start by computing the depreciation schedule

Depreciation Schedule	2009	2010	2011	2012
Building Dep. Rate	1.30%	2.60%	2.60%	2.60%
Annual Building Dep.				
Book Value of Building (cost - comm. Dep.)				
Equipment Dep. Rate	20%	32%	19%	12%
Annual Equipment. Dep				
Book Value of Equipment (cost-comm. Dep)				

Net Salvage Value?

Net Salvage Value @ end of project		
	Building	**Equipment**
Market Value when Salvaged (2010)		
Book value when salvaged		
Expected Gain/Loss		
Taxes liability or credit		
Net Cash flow from Salvage		

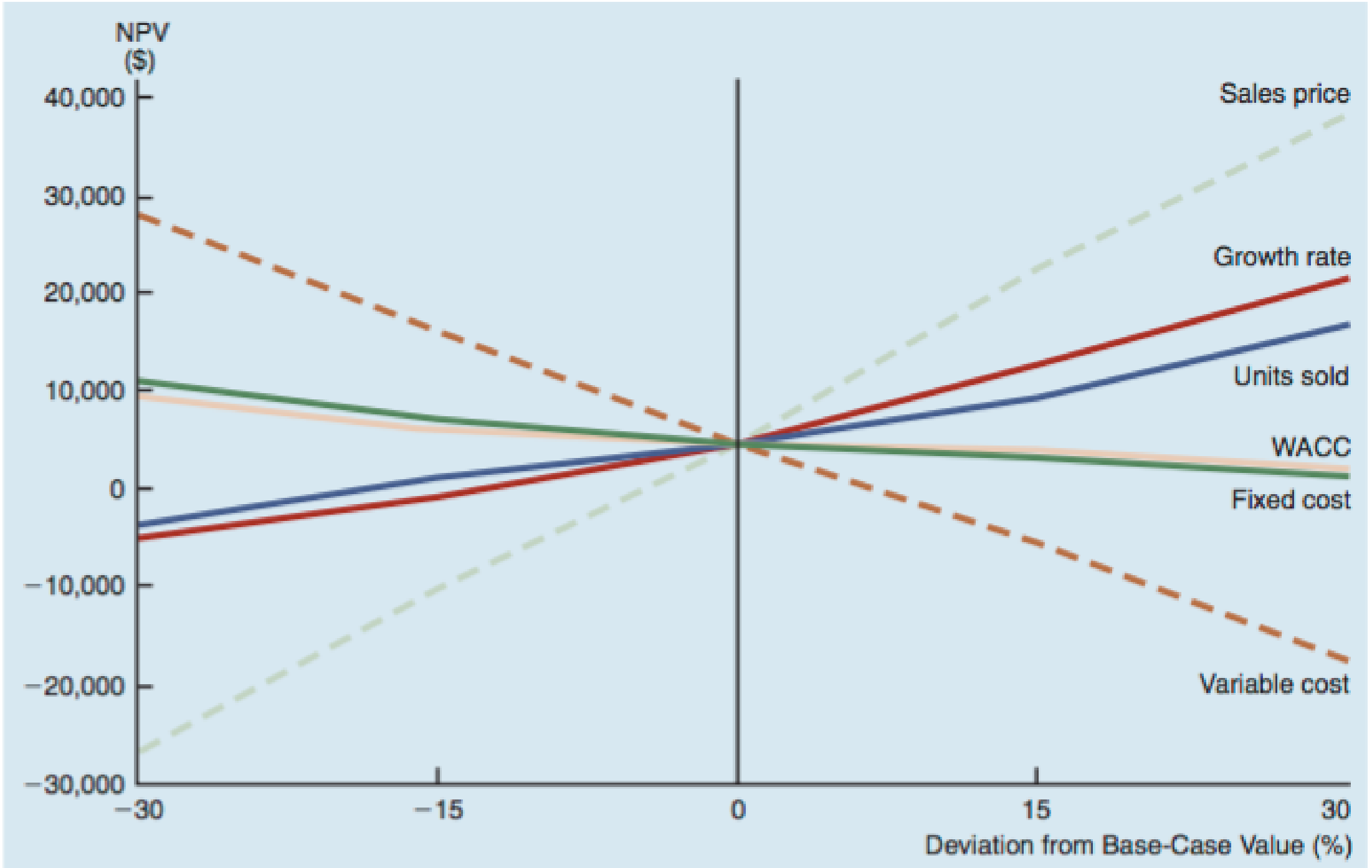
How to measure Project Risk?

Commonly used techniques of analyzing Standalone Project's risk:

- Sensitivity Analysis
- Scenario Analysis
- Monte Carlo Simulation

Sensitivity Analysis

	NPV At Different Deviations From Base					
Deviation from Base Case	Sales Price	Variable Cost/Unit	Growth Rate	Year 1 Units Sold	Fixed Cost	WACC
−30%	($27,223)	$29,404	($ 4,923)	($ 3,628)	$10,243	$9,030
−15	(10,707)	17,607	(115)	1,091	8,026	7,362
0	5,809	5,809	5,809	5,809	5,809	5,809
15	22,326	(5,988)	12,987	10,528	3,593	4,363
30	38,842	(17,785)	21,556	15,247	1,376	3,014
Range	$66,064	$47,189	$26,479	$18,875	$ 8,867	$6,016


NPV
($)
40,000
30,000
20,000
10,000
0
−10,000
−20,000
−30,000
−30
−15
0
15
30
Deviation from Base-Case Value (%)
Sales price
Growth rate
Units sold
WACC
Fixed cost
Variable cost

Scenario Analysis

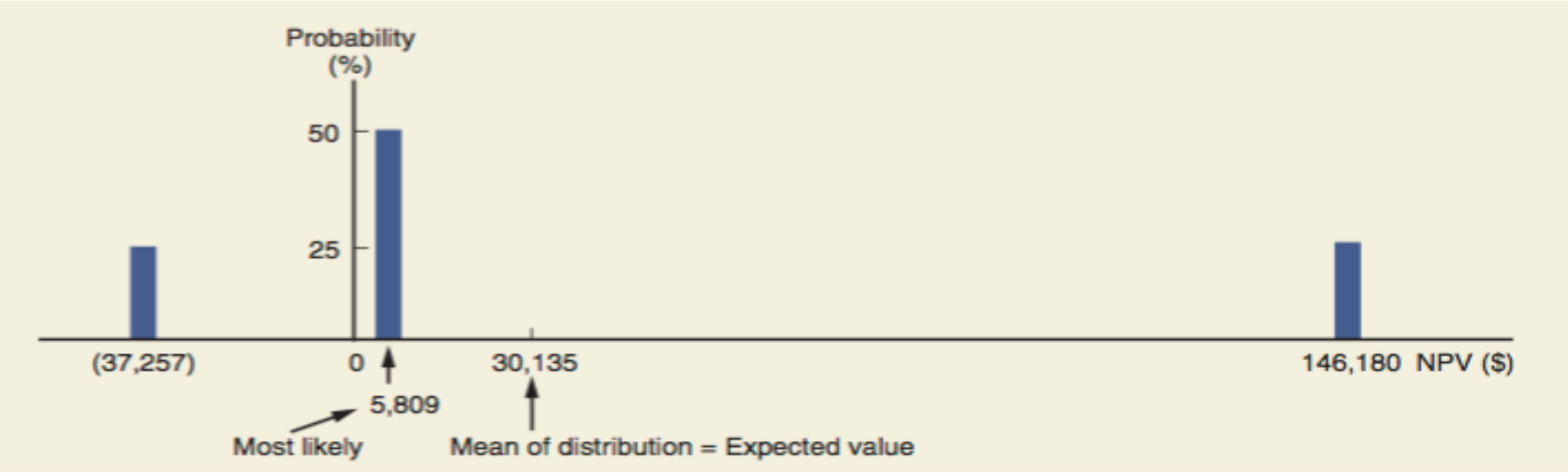
Scenario	Probability	Sales Price	Unit Sales	Variable Costs	Growth Rate	NPV
Best case	25%	$3.90	26,000	$1.47	30%	$146,180
Base case	50	3.00	20,000	2.10	0	5,809
Worst case	25	2.10	14,000	2.73	−30	(37,257)
					Expected NPV =	$30,135
					Standard deviation =	$69,267
				Coefficient of variation = Standard deviation/Expected NPV =		2.30

$$\text{Expected NPV} = \sum_{i=1}^{n} P_i(\text{NPV}_i)$$

$$= 0.25(\$146{,}180) + 0.50(\$5{,}809) + 0.25(-\$37{,}257)$$

$$= \$30{,}135.$$

Scenario Analysis



Project's Coefficient of Variation

Calculate

$$\sigma_{NPV} = \sqrt{\sum_{i=1}^{n} P_i(NPV_i - \text{Expected NPV})^2}$$

$$= \sqrt{\begin{array}{l} 0.25(\$146{,}180 - \$30{,}135)^2 + 0.50(\$5{,}809 - \$30{,}135)^2 \\ \quad + 0.25(-\$37{,}257 - \$30{,}135)^2 \end{array}}$$

$$= \$69.267.$$

Divide the SD with mean NPV to get the Project's CV/CoV.

$$CV_{NPV} = \frac{\sigma_{NPV}}{E(NPV)} = \frac{\$69{,}267}{\$30{,}135} = 2.30.$$

Monte-Carlo Simulation

	Risky Inputs				Output
	Sales Price	Variable Costs	Unit Sales	Growth	NPV
Mean	$3.01	$2.00	21,662	−0.4%	$13,867
Standard deviation	0.35	0.23	3,201	14.8	22,643
Maximum	4.00	2.47	29,741	42.7	124,091
Minimum	1.92	1.40	15,149	−51.5	−49,550
Median					10,607
Probability of NPV > 0					72.8%
Coefficient of variation					1.63

Risk Assessment Technique	Australia	Hong Kong	Indonesia	Malaysia	Philippines	Singapore
Scenario analysis	96%	100%	94%	80%	97%	90%
Sensitivity analysis	100	100	88	83	94	79
Decision tree analysis	44	58	50	37	33	46
Monte Carlo simulation	38	35	25	9	24	35

Source: Adapted from George W. Kester et al., "Capital Budgeting Practices in the Asia-Pacific Region: Australia, Hong Kong, Indonesia, Malaysia, Philippines, and Singapore," *Financial Practice and Education*, Spring/Summer 1999, pp. 25–33.

Thank you