

Introduction to Financing

Prepared by Dr. Sara Ahmed

Lecture 5





مجموعة جامعة
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Making Capital Investments Decisions

Lecture 5

Prepared by
Dr. Sara Ahmed

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Topic
05

OUTLINE

- 1 Project Cash Flows: A First Look
- 2 Incremental Cash Flows
- 3 Pro Forma Financial Statements and Project Cash Flows
- 4 More on Project Cash Flows
- 5 Evaluating NPV Estimates
- 6 Scenario and Other What-If Analyses
- 7 Additional Considerations in Capital Budgeting

Topic
05

Key Concepts and Skills

- Understand how to:
 - Determine the relevant cash flows for a proposed investment
 - Analyze a project's projected cash flows
 - Evaluate an estimated NPV

Relevant Cash Flows

- Include only cash flows that will only occur if the project is accepted
- *Incremental cash flows*
- The *stand-alone principle* allows us to analyze each project in isolation from the firm simply by focusing on incremental cash flows

Relevant Cash Flows:

Incremental Cash Flow for a Project

Corporate cash flow **with** the project

Minus

Corporate cash flow **without** the project

Relevant Cash Flows

- “Sunk” Costs N
- Opportunity Costs Y
- Side Effects/Erosion..... Y
- Net Working Capital..... Y
- Financing Costs..... N
- Tax Effects Y

Pro Forma Statements and Cash Flow

- Pro Forma Financial Statements

- Projects future operations

- Operating Cash Flow:

$$\text{OCF} = \text{EBIT} + \text{Depr} - \text{Taxes}$$

$$\text{OCF} = \text{NI} + \text{Depr} \text{ if no interest expense}$$

- Cash Flow From Assets:

$$\text{CFFA} = \text{OCF} - \text{NCS} - \Delta\text{NWC}$$

$$\text{NCS} = \text{Net capital spending}$$

Shark Attractant Project

- Estimated sales 50,000 cans
- Sales Price per can \$4.00
- Cost per can \$2.50
- Estimated life 3 years
- Fixed costs \$12,000/year
- Initial equipment cost \$90,000
 - 100% depreciated over 3 year life
- Investment in NWC \$20,000
- Tax rate 34%
- Cost of capital 20%

Pro Forma Income Statement

Table 9.1

Sales (50,000 units at \$4.00/unit)	\$200,000
Variable Costs (\$2.50/unit)	125,000
Gross profit	\$ 75,000
Fixed costs	12,000
Depreciation (\$90,000 / 3)	30,000
EBIT	\$ 33,000
Taxes (34%)	11,220
Net Income	\$ 21,780

Projected Capital Requirements

Table 9.2

	Year			
	0	1	2	3
NWC	\$20,000	\$20,000	\$20,000	\$20,000
Net Fixed Assets	<u>90,000</u>	<u>60,000</u>	<u>30,000</u>	<u>0</u>
Total Investment	\$110,000	\$80,000	\$50,000	\$20,000

NFA declines by the amount of depreciation each year

Investment = book or accounting value, not market value

Projected Total Cash Flows

Table 9.5

	Year				
	0	1	2	3	
OCF		\$51,780	\$51,780	\$51,780	
△ NWC	-\$20,000				20,000
Capital Spending	-\$90,000				
CFFA	-\$110,00	\$51,780	\$51,780	\$71,780	

Note: Investment in NWC is recovered in final year

Equipment cost is a cash outflow in year 0

Shark Attractant Project

Pro Forma Income Statement				
Year	0	1	2	3
Sales		200,000	200,000	200,000
Variable Costs		125,000	125,000	125,000
Gross Profit		75,000	75,000	75,000
Fixed Costs		12,000	12,000	12,000
Depreciation		30,000	30,000	30,000
EBIT		33,000	33,000	33,000
Taxes		11,220	11,220	11,220
Net Income		21,780	21,780	21,780

Cash Flows				
Operating Cash Flow		51,780	51,780	51,780
Changes in NWC	-20,000			20,000
Net Capital Spending	-90,000			
Cash Flow From Assets	-110,000	51,780	51,780	71,780

Net Present Value	\$10,647.69
IRR	25.76%

$$\text{OCF} = \text{EBIT} + \text{Depreciation} - \text{Taxes}$$

$$\text{OCF} = \text{Net Income} + \text{Depreciation (if no interest)}$$

Computing NPV for the Project

Using the TI BAII+ CF Worksheet

Cash Flows:

CF0 = -110000

CF1 = 51780

CF2 = 51780

CF3 = 71780

Display

You Enter

“

C00

110000 S!#

C01

51780 !#

F01

2 !#

C02

71780 !#

F02

1 !#(

I

20 !#

NPV

%

10647.69

) %

25.76

Making The Decision

Cash Flows				
Operating Cash Flow		51,780	51,780	51,780
Changes in NWC	-20,000			20,000
Net Capital Spending	-90,000			
Cash Flow From Assets	-110,000	51,780	51,780	71,780

Net Present Value	\$10,647.69
IRR	25.76%

- *Should we accept or reject the project?*

The Tax Shield Approach to OCF

- $OCF = (Sales - costs)(1 - T) + Deprec * T$
 $OCF = (200,000 - 137,000) \times 66\% + (30,000 \times .34)$
 $OCF = 51,780$
- Particularly useful when the major incremental cash flows are the purchase of equipment and the associated depreciation tax shield
 - i.e., choosing between two different machines

Changes in NWC

- GAAP requirements:
 - Sales recorded when made, not when cash is received
 - $\text{Cash in} = \text{Sales} - \Delta \text{AR}$
 - Cost of goods sold recorded when the corresponding sales are made, whether suppliers paid yet or not
 - $\text{Cash out} = \text{COGS} - \Delta \text{AP}$
- Buy inventory/materials to support sales before any cash collected

Depreciation & Capital Budgeting

- Use the schedule required by the IRS for tax purposes
- Depreciation = non-cash expense
 - Only relevant due to tax affects
- Depreciation tax shield = DT
 - D = depreciation expense
 - T = marginal tax rate

Computing Depreciation

- Straight-line depreciation

$D = (\text{Initial cost} - \text{salvage}) / \text{number of years}$

Straight Line $\rightarrow$ Salvage Value

- MACRS (Accelerated Cost Recovery System)

Depreciate $\rightarrow 0$

Recovery Period = Class Life

1/2 Year Convention

Multiply percentage in table by the initial cost

After-Tax Salvage

- If the salvage value is different from the book value of the asset, then there is a tax effect
- Book value = initial cost – accumulated depreciation
- After-tax salvage = salvage – $T(\text{salvage} - \text{book value})$

Tax Effect on Salvage

$$\begin{aligned} \text{Net Salvage Cash Flow} \\ = SP - (SP - BV)(T) \end{aligned}$$

Where:

SP = Selling Price

BV = Book Value

T = Corporate tax rate

Example:

Depreciation and After-tax Salvage

- Car purchased for \$12,000
- 5-year property
- Marginal tax rate = 34%.

Depreciation		5-year Asset		
Year	Beq BV	Depr %	Deprec	End BV
1	\$ 12,000.00	20.00%	\$ 2,400.00	\$ 9,600.00
2	\$ 9,600.00	32.00%	\$ 3,840.00	\$ 5,760.00
3	\$ 5,760.00	19.20%	\$ 2,304.00	\$ 3,456.00
4	\$ 3,456.00	11.52%	\$ 1,382.40	\$ 2,073.60
5	\$ 2,073.60	11.52%	\$ 1,382.40	\$ 691.20
6	\$ 691.20	5.76%	\$ 691.20	\$ -
		100.00%	\$ 12,000.00	

Salvage Value & Tax Effects

Depreciation		5-year Asset		
Year	Beg BV	Depr %	Deprec	End BV
1	\$ 12,000.00	20.00%	\$ 2,400.00	\$ 9,600.00
2	\$ 9,600.00	32.00%	\$ 3,840.00	\$ 5,760.00
3	\$ 5,760.00	19.20%	\$ 2,304.00	\$ 3,456.00
4	\$ 3,456.00	11.52%	\$ 1,382.40	\$ 2,073.60
5	\$ 2,073.60	11.52%	\$ 1,382.40	\$ 691.20
6	\$ 691.20	5.76%	\$ 691.20	\$ -
		100.00%	\$ 12,000.00	



$$\text{Net Salvage Cash Flow} = \text{SP} - (\text{SP} - \text{BV})(\text{T})$$

If sold at EOY 5 for \$3,000:

$$\begin{aligned} \text{NSCF} &= 3,000 - (3,000 - 691.20)(.34) = \$2,215.01 \\ &= \$3,000 - 784.99 = \$2,215.01 \end{aligned}$$

If sold at EOY 2 for \$4,000:

$$\begin{aligned} \text{NSCF} &= 4,000 - (4,000 - 5,760)(.34) = \$4,598.40 \\ &= \$4,000 - (-598.40) = \$4,598.40 \end{aligned}$$

Majestic Mulch & Compost Co

Majestic Mulch and Compost Company (MMCC)											
	YEAR		0	1	2	3	4	5	6	7	8
Background Data:											
	Unit Sales Estimates			3,000	5,000	6,000	6,500	6,000	5,000	4,000	3,000
	Variable Cost /unit	\$ 60.00									
	Fixed Costs per year	\$ 25,000.00									
	Sale Price per unit	\$ 120.00	\$ 120.00	\$ 120.00	\$ 120.00	\$ 110.00	\$ 110.00	\$ 110.00	\$ 110.00	\$ 110.00	\$ 110.00
	Tax Rate	34.0%									
	Required Return on Project	15.0%									
	Yr 0 NWC	\$ 20,000.00									
	NWC % of sales	15%									
	Equipment cost - installed	\$ 800,000									
	Salvage Value in year 8	20%	of equipment cost								
Depreciation Calculations:											
	Equipment Depreciable Base	800,000									
	MACRS % (Eqpt-7 yr)		14.29%	24.49%	17.49%	12.49%	8.92%	8.93%	8.93%	4.46%	
	Recovery Allowance		114,320	195,920	139,920	99,920	71,360	71,440	71,440	35,680	
	Book Value		685,680	489,760	349,840	249,920	178,560	107,120	35,680	0	
After-Tax Salvage Value											
	Salvage Value	20%	160,000								
	Book Value (Year 8)		0								
	Capital Gain/Loss		160,000								
	Taxes		54,400								
	Net SV (SV-Taxes)		105,600								
Required Net Working Capital Investment											
			20,000	54,000	90,000	108,000	107,250	99,000	82,500	66,000	49,500

Given Data and Projected Revenues - Table 9.9

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Majestic Mulch & Compost Co

Majestic Mulch and Compost Company (MMCC)											
	YEAR		0	1	2	3	4	5	6	7	8
Background Data:											
	Unit Sales Estimates			3,000	5,000	6,000	6,500	6,000	5,000	4,000	3,000
	Variable Cost /unit	\$ 60.00									
	Fixed Costs per year	\$ 25,000.00									
	Sale Price per unit	\$ 120.00	\$ 120.00	\$ 120.00	\$ 120.00	\$ 110.00	\$ 110.00	\$ 110.00	\$ 110.00	\$ 110.00	\$ 110.00
	Tax Rate	34.0%									
	Required Return on Project	15.0%									
	Yr 0 NWC	\$ 20,000.00									
	NWC % of sales	15%									
	Equipment cost - installed	\$ 800,000									
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After-Tax Salvage Value											
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	Capital Gain/Loss		160,000								
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	Net SV (SV-Taxes)		105,600								
Required Net Working Capital Investment											
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Majestic Mulch & Compost Co

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Background Data:											
	Unit Sales Estimates			3,000	5,000	6,000	6,500	6,000	5,000	4,000	3,000
	Variable Cost /unit	\$ 60.00									
	Fixed Costs per year	\$ 25,000.00									
	Sale Price per unit	\$ 120.00	\$ 120.00	\$ 120.00	\$ 120.00	\$ 110.00	\$ 110.00	\$ 110.00	\$ 110.00	\$ 110.00	\$ 110.00
	Tax Rate	34.0%									
	Required Return on Project	15.0%									
	Yr 0 NWC	\$ 20,000.00									
	NWC % of sales	15%									
	Equipment cost - installed	\$ 800,000									
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	Book Value		685,680	489,760	349,840	249,920	178,560	107,120	35,680	0	
After-Tax Salvage Value											
	Salvage Value	20%	160,000								
	Book Value (Year 8)		0								
	Capital Gain/Loss		160,000								
	Taxes		54,400								
	Net SV (SV-Taxes)		105,600								
Required Net Working Capital Investment											
			20,000	54,000	90,000	108,000	107,250	99,000	82,500	66,000	49,500

Net Working Capital – Table 9.12

Majestic Mulch & Compost Co

YEAR		0	1	2	3	4	5	6	7	8
Initial Investment										
Equipment Cost		(800,000)								
Sales			360,000	600,000	720,000	715,000	660,000	550,000	440,000	330,000
Variable Costs			180,000	300,000	360,000	390,000	360,000	300,000	240,000	180,000
Fixed Costs			25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Depreciation (Eqpt)			114,320	195,920	139,920	99,920	71,360	71,440	71,440	35,680
EBT			40,680	79,080	195,080	200,080	203,640	153,560	103,560	89,320
Taxes			13,831	26,887	66,327	68,027	69,238	52,210	35,210	30,369
Net Operating Income			26,849	52,193	128,753	132,053	134,402	101,350	68,350	58,951
Add back Depreciation			114,320	195,920	139,920	99,920	71,360	71,440	71,440	35,680
CASH FLOW from Operations			141,169	248,113	268,673	231,973	205,762	172,790	139,790	94,631
NWC investment & Recovery		(20,000)	(34,000)	(36,000)	(18,000)	750	8,250	16,500	16,500	66,000
Salvage Value										105,600
TOTAL PROJECTED CF		(820,000)	107,169	212,113	250,673	232,723	214,012	189,290	156,290	266,231
Discounted Cash Flows		(820,000)	93,190	160,388	164,821	133,060	106,402	81,835	58,755	87,031
Cumulative Cash flows		(820,000)	(712,831)	(500,718)	(250,046)	(17,323)	196,690	385,979	542,269	808,500
NPV		\$65,483								
IRR		17.24%								
Payback		4.08								

MMC Pro Forma Income Statements

Majestic Mulch & Compost Co

YEAR		0	1	2	3	4	5	6	7	8
Initial Investment										
Equipment Cost		(800,000)								
Sales			360,000	600,000	720,000	715,000	660,000	550,000	440,000	330,000
Variable Costs			180,000	300,000	360,000	390,000	360,000	300,000	240,000	180,000
Fixed Costs			25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Depreciation (Eqpt)			114,320	195,920	139,920	99,920	71,360	71,440	71,440	35,680
EBT			40,680	79,080	195,080	200,080	203,640	153,560	103,560	89,320
Taxes			13,831	26,887	66,327	68,027	69,238	52,210	35,210	30,369
Net Operating Income			26,849	52,193	128,753	132,053	134,402	101,350	68,350	58,951
Add back Depreciation			114,320	195,920	139,920	99,920	71,360	71,440	71,440	35,680
CASH FLOW from Operations			141,169	248,113	268,673	231,973	205,762	172,790	139,790	94,631
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Cumulative Cash flows		(820,000)	(712,831)	(500,718)	(250,046)	(17,323)	196,690	385,979	542,269	808,500
NPV		\$65,483								
IRR		17.24%								
Payback		4.08								

MMC Projected Cash Flows – Table 9.14

Evaluating NPV Estimates

- NPV estimates are only estimates
- Forecasting risk:
 - Sensitivity of NPV to changes in cash flow estimates
 - The more sensitive, the greater the forecasting risk
- Sources of value
 - Be able to articulate why this project creates value

Scenario Analysis

- Examines several possible situations:
 - Worst case
 - Base case or most likely case
 - Best case
- Provides a range of possible outcomes

Scenario Analysis Example

	Base	Lower	Upper
Units	6,000	5,500	6,500
Price/unit	\$ 80.00	\$ 75.00	\$ 85.00
Variable cost/unit	\$ 60.00	\$ 58.00	\$ 62.00
Fixed cost/year	\$ 50,000	\$ 45,000	\$ 55,000
	BASE	BEST	WORST
Initial investment \$ 200,000			
Depreciated to salvage value of 0 over 5 years			
Deprec/yr	\$ 40,000		
Project Life	5 years		
Tax rate	34%		
Required return	12%		

Note: "Lower" ≠ Worst

"Upper" ≠ Best

Scenario Analysis Example

	BASE	WORST	BEST
Units	6,000	5,500	6,500
Price/unit	\$ 80.00	\$ 75.00	\$ 85.00
Variable cost/unit	\$ 60.00	\$ 62.00	\$ 58.00
Fixed Cost	\$ 50,000	\$ 55,000	\$ 45,000
Sales	\$ 480,000	\$ 412,500	\$ 552,500
Variable Cost	360,000	341,000	377,000
Fixed Cost	50,000	55,000	45,000
Depreciation	40,000	40,000	40,000
EBIT	30,000	(23,500)	90,500
Taxes	10,200	(7,990)	30,770
Net Income	19,800	(15,510)	59,730
+ Deprec	40,000	40,000	40,000
TOTAL CF	59,800	24,490	99,730
NPV	15,566	(111,719)	159,504
IRR	15.1%	-14.4%	40.9%

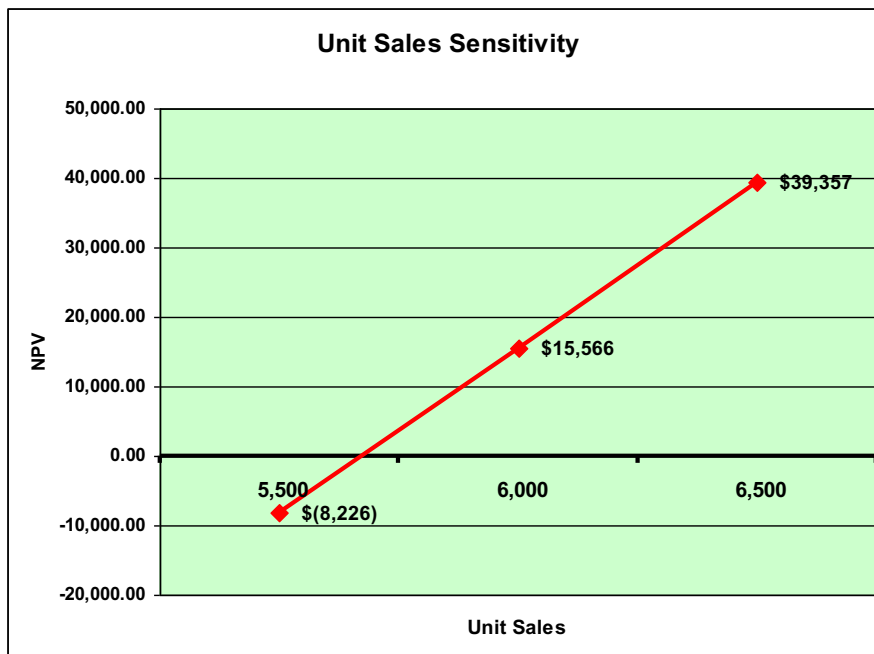
Problems with Scenario Analysis

- Considers only a few possible out-comes
- Assumes perfectly correlated inputs
 - All “bad” values occur together and all “good” values occur together
- Focuses on stand-alone risk, although subjective adjustments can be made

Sensitivity Analysis

- Shows how changes in an input variable affect NPV or IRR
- Each variable is fixed except one
 - Change one variable to see the effect on NPV or IRR
- Answers “what if” questions

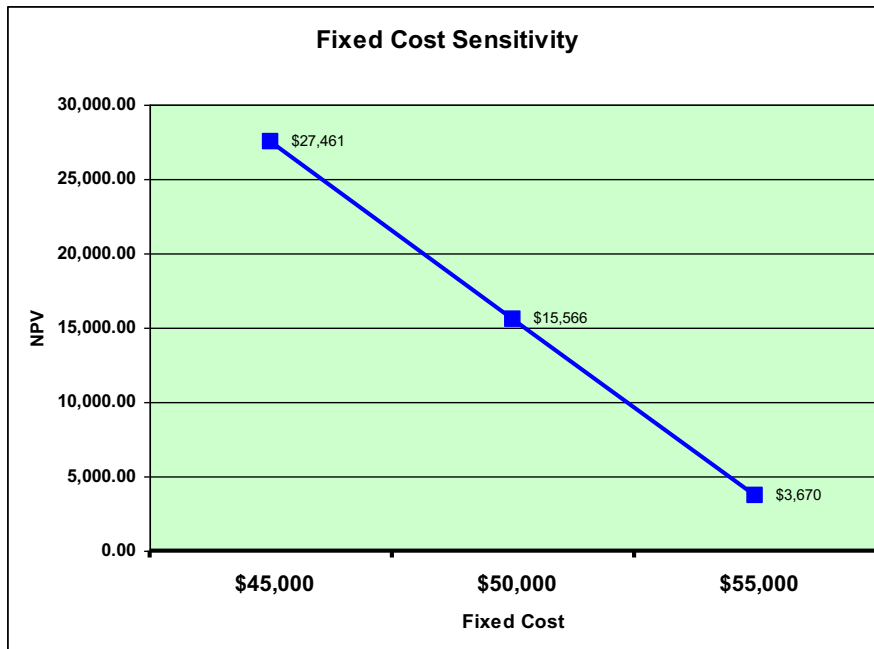
Sensitivity Analysis: Unit Sales



	Base	Units	Units
Units	6,000	5,500	6,500
Price/unit	\$ 80	80	80
Variable cost/unit	\$ 60	60	60
Fixed cost/year	\$ 50,000	50,000	50,000
Initial investment \$ 200,000 Depreciated to salvage value of 0 over 5 years			
Deprec/yr	\$ 40,000		
Tax rate 34%			
Required Return 12%			

	BASE	UNITS	UNITS
Units	6,000	5,500	6,500
Price/unit	\$ 80	\$ 80	\$ 80
Variable cost/unit	\$ 60	\$ 60	\$ 60
Fixed cost	\$ 50,000	\$ 50,000	\$ 50,000
Sales	\$ 480,000	\$ 440,000	\$ 520,000
Variable Cost	360,000	330,000	390,000
Fixed Cost	50,000	50,000	50,000
Depreciation	40,000	40,000	40,000
EBIT	30,000	20,000	40,000
Taxes	10,200	6,800	13,600
Net Income	19,800	13,200	26,400
+ Deprec	40,000	40,000	40,000
TOTAL CF	59,800	53,200	66,400
NPV	\$ 15,566	\$ (8,226)	\$ 39,357

Sensitivity Analysis: Fixed Costs



	Base	Fixed Cost	Fixed Cost
Units	6,000	6,000	6,000
Price/unit	\$ 80	80	80
Variable cost/unit	\$ 60	60	60
Fixed cost/year	\$ 50,000	55,000	45,000
Initial investment \$ 200,000 Depreciated to salvage value of 0 over 5 years Deprec/yr \$ 40,000			
Tax rate	34%		
Required Return	12%		

	BASE	FC	FC
Units	6,000	6,000	6,000
Price/unit	\$ 80	\$ 80	\$ 80
Variable cost/unit	\$ 60	\$ 60	\$ 60
Fixed cost	\$ 50,000	\$ 55,000	\$ 45,000
Sales	\$ 480,000	\$ 480,000	\$ 480,000
Variable Cost	360,000	360,000	360,000
Fixed Cost	50,000	55,000	45,000
Depreciation	40,000	40,000	40,000
EBIT	30,000	25,000	35,000
Taxes	10,200	8,500	11,900
Net Income	19,800	16,500	23,100
+ Deprec	40,000	40,000	40,000
TOTAL CF	59,800	56,500	63,100
NPV	\$ 15,566	\$ 3,670	\$ 27,461

Sensitivity Analysis:

- Strengths
 - Provides indication of stand-alone risk.
 - Identifies dangerous variables.
 - Gives some breakeven information.
- Weaknesses
 - Does not reflect diversification.
 - Says nothing about the likelihood of change in a variable,
 - Ignores relationships among variables.

Disadvantages of Sensitivity and Scenario Analysis

- Neither provides a decision rule.
 - No indication whether a project's expected return is sufficient to compensate for its risk.
- Ignores diversification.
 - Measures only stand-alone risk, which may not be the most relevant risk in capital budgeting.

Managerial Options

- Contingency planning
- Option to expand
 - Expansion of existing product line
 - New products
 - New geographic markets
- Option to abandon
 - Contraction
 - Temporary suspension
- Option to wait
- Strategic options

Capital Rationing

- Capital rationing occurs when a firm or division has limited resources
 - Soft rationing – the limited resources are temporary, often self-imposed
 - Hard rationing – capital will never be available for this project
- The profitability index is a useful tool when faced with soft rationing



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Thank You

