

# Net present value present value index

[Business](#), [Company](#)



The management team at Savage Corporation is evaluating two alternative capital investment opportunities. The first alternative, modernizing the company's current machinery, costs \$45,000. Management estimates the modernization project will reduce annual net cash outflows by \$12,500 per year for the next five years. The second alternative, purchasing a new machine, costs \$56,500. The new machine is expected to have a five-year useful life and a \$4,000 salvage value. Management estimates the new machine will generate cash inflows of \$15,000 per year.

Savage's cost of capital is 10%.

Required

- a. Determine the present value of the cash flow savings expected from the modernization program. Using the data from the Appendix on page 1169 of our text  $15000 \times 3.790787 = 47,385$ , which should be the PV cash flow savings expected from the first option of the modernization program.
- b. Determine the net present value of the modernization project. I believe the NPV of the 1st project is calculated by subtracting current machinery, costs \$45,000 from the figure above which equals 2,385.00
- c. Determine the net present value of investing in the new machine. This is determined by valuing future cash flows.

Using the same appendix in table 2 data, annual cash flow of 15,000 \* 3.790787 = 56862.00

Salvage cost of 4,000 \* 0.620921 (table 3 on page 523) = 2484.00

Total = 59,346.00 less the cost of machinery 56,500 = 2486.00 as the NPV

d. Use a present value index to determine which investment alternative will yield a higher rate of return.

$$PI = \$15,000 \times 0.620921 / 56,500 = 0.16$$

This investment is not acceptable because it has a PI of less than 1.0 therefore the modernization project or the first alternative will have a higher rate of return.

#### Exercise 24-4A

Determining the present value of an annuity The dean of the School of Social Sciences is trying to decide whether to purchase a copy machine to place in the lobby of the building. The machine would add to student convenience, but the dean feels compelled to earn an 8 percent return on the investment of funds. Estimates of cash inflows from copy machines that have been placed in other university buildings indicate that the copy machine would probably produce incremental cash inflows of approximately \$8,000 per year.

The machine is expected to have a three-year useful life with a zero salvage value.

#### Required

a. Use Present Value Table 1 in Appendix A to determine the maximum amount of cash the dean should be willing to pay for a copy machine. Years 1 - 3; where  $N = 1$   $r$  at 8%,  $N = 2$ , [email protected] 8%,  $N = 3$   $r$  @ 8%  $8000 \times 0.925926 = 7,407.41$   $8000 \times 0.857339 = 6,858.71$   $8000 \times 0.793832 = 6,350.$

66 Present Value / Ordinary Annuity = (\$) 20, 617. 00 Present Value / Annuity-Due = (\$) 22, 266

b. Use Present Value Table 2 in Appendix A to determine the maximum amount of cash the dean should be willing to pay for a copy machine.

Based on table 2 in appendix a, the maximum amount of cash the Dean should be willing to pay for a copy machine is (\$) 20, 617. 00

c. Explain the consistency or lack of consistency in the answers to Requirements a & b. The consistency in the answers is so seeing that table 2 in appendix A appears to be the sum of the PV for each of the 3 years in table 1.

#### Exercise 24-8A

Determining the internal rate of return Medina Manufacturing Company has an opportunity to purchase some technologically advanced equipment that will reduce the company's cash outflow for operating expenses by \$1, 280, 000 per year.

The cost of the equipment is \$6, 186, 530. 56. Medina expects it to have a 10-year useful life and a zero salvage value. The company has established an investment opportunity hurdle rate of 15 percent and uses the straight-line method for depreciation.

#### Required

a. Calculate the internal rate of return of the investment opportunity.

Year	Explanation	Cash Flow	Discount Factor	1 (hurdle rate of 15)	Discount	Discount Factor 2	Cash Flow @Discount 0

Cost to purchase some technologically advanced equipment(6, 186, 530. 56)  
 (6, 186, 530. 56) 1, 280, 0005. 01877\$6, 424, 0264. 6565, 959, 680

Net present value\$237, 495(\$226, 851)

b. Indicate whether the investment opportunity should be accepted. The Internal Rate of Return appears to be higher than the established investment opportunity hurdle rate of 15 percent therefore it would be a good idea to accept this investment opportunity.

#### Exercise 24-6A

Determining net present value Travis Vintor is seeking part-time employment while he attends school. He is considering purchasing technical equipment that will enable him to start a small training services company that will offer tutorial services over the Internet.

Travis expects demand for the service to grow rapidly in the first two years of operation as customers learn about the availability of Internet assistance. Thereafter, he expects demand to stabilize. The following table presents the expected cash flows.

Year of Operation	Cash Inflow	Cash Outflow
2006	\$5, 400	\$3, 600
2007	7, 800	4, 800
2008	8, 400	5, 040
2009	8, 400	5, 040

In addition to these cash flows, Mr. Vintor expects to pay \$8, 400 for the equipment. He also expects to pay \$1, 440 for a major overhaul and updating of the equipment at the end of the second year of operation. The equipment is expected to have a \$600 salvage value and a four-year useful life. Mr. Vintor desires to earn a rate of return of 8 percent.

Year	Explanation	inflows	outflows	Net	Discount	@8%	Discounted	2006
beginning	Cost of equipment	\$ -	\$ 8,400	\$ (8,400)	1		\$ (8,400)	
2006	Operational cash flows	\$ 5,400	\$ 3,600	\$ 1,800	0.925926		\$ 1,667	
007	Operational cash flows	\$ 7,800	\$ 4,800	\$ 3,000	0.857339		\$ 2,572	
2007	Major overhaul	\$ -	\$ 1,440	\$ (1,440)	0.857339		\$ (1,235)	
2008	Operational cash flows	\$ 8,400	\$ 5,040	\$ 3,360	0.793832		\$ 2,667	
2009	Operational cash flows	\$ 8,400	\$ 5,040	\$ 3,360	0.73503		\$ 2,470	
2009	Salvage value of equipment	\$ 600	\$ -	\$ 600	0.73503		\$ 441	Net present value of Investment Opportunity \$ 182

Required

(Round computations to the nearest whole penny. )

- Calculate the net present value of the investment opportunity.
- Indicate whether the investment opportunity is expected to earn a return that is above or below the desired rate of return and whether it should be accepted. General rule with NPV is that if NPV of a prospective project is positive, it should be accepted. However, if NPV is negative it should not be accepted. The calculations, if correct present a positive NPV therefore the investment opportunity should be accepted. Problem 19-24A Assessing simultaneous changes in CVP relationships Green Shades Inc. (GSI) sells hammocks; variable costs are \$75 each, and the hammocks are sold for \$125 each.

GSI incurs \$250,000 of fixed operating expenses annually.

Required

a. Determine the sales volume in units and dollars required to attain a \$50,000 profit.  $\text{Sales} = \text{Contribution Margin per Unit} = \text{Revenues per Unit} - \text{Variable Expenses per Unit} = 250,000 + 50,000/125 - 75 = 6,000$  in units  
 Verify your answer by preparing an income statement using the contribution margin format. Break-even Sales Dollars = Sales Price per Unit ? Break-even Sales Units Break-even Point in Sales Dollars =  $125 * 6000 = 750,000$   
 Income Statement Green Shades Inc. As of October 17, 2012  
 Sales 750,000  
 Variable Costs (450,000) Contribution Margin 300,000  
 Fixed Costs 250,000  
 Net Income 50,000

b. GSI is considering implementing a quality improvement program. The program will require a \$10 increase in the variable cost per unit. To inform its customers of the quality improvements, the company plans to spend an additional \$20,000 for advertising. Assuming that the improvement program will increase sales to a level that is 3,000 units above the amount computed in Requirement a, should GSI proceed with plans to improve product quality? Support your answer by preparing a budgeted income statement.

Income Statement Green Shades Inc. As of October 17, 2012

Sales 1,125,000 Variable Costs (765,000) Contribution Margin 360,000  
 Fixed Costs (270,000) Net Income 90,000  
 The company might want to consider going forward seeing the likelihood of profitability.

c. Determine the new break-even point in units and sales dollars as well as the margin of safety percentage, assuming that the quality improvement program is implemented.  $\text{Fixed Costs} / \text{Contribution Margin per Unit} = 270,000 / 125 - 85 = 6750$   
 Break-even Sales Dollars = Sales Price per Unit ? Break-

even Sales Units Break-even Point in Sales Dollars =  $125 * 6750 = 843,750$

Margin of Safety Measured in Units Measured in Dollars

Sales @ Budgeted 90001125000

Break Even 6750843,750

Margin 2250281,250  $281250/1125000 = .25$  or 25%

Problem 18-17B

Process cost system cost of production report At the beginning of 2004, Dozier Company had 1,800 units of product in its work in process inventory, and it started 19,200 additional units of product during the year. At the end of the year, 6,000 units of product were in the work in process inventory. The ending work in process inventory was estimated to be 50 percent complete. The cost of work in process inventory at the beginning of the period was \$9,000, and \$108,000 of product costs were added during the period.

Required

Prepare a cost of production report showing the following.

a. The number of equivalent units of production. Equivalent units of production

ACTUAL	Equivalent
Beginning 1,800	
Additional units of product 19,200	
Total 21,000	
Ending 6,000 @ 50%	3,000
To be transferred 15,000 @ 100%	15,000
Total	18,000

b. The product cost per equivalent unit. Beginning is 9,000 added to production of 108,000 to total 117,000



c. The total cost allocated between the ending Work in Process Inventory and Finished Goods Inventory accounts.

$117,000/18,000 = 6.50$  cost per unit

$15000 * 6.50 = 97,500$  finished goods  
 $18,000$  of equivalent units above  $* 6.50 = 117,000$

Total 117,000

Problem 15-17A Identifying cost behavior

Required

Identify the following costs as fixed or variable. Costs related to plane trips between San Diego, California, and Orlando, Florida, follow. Pilots are paid on a per-trip basis.

- a. Pilots' salaries are relative to the number of trips flown. variable
  - b. Depreciation is relative to the number of planes in service. variable
  - c. Cost of refreshments relative to the number of passengers. variable
  - d. Pilots' salaries are relative to the number of passengers on a particular trip. fixed
  - e. Cost of a maintenance check relative to the number of passengers on a particular trip. fixed
  - f. Fuel costs relative to the number of trips. variable
- National Union Bank operates several branch offices in grocery stores. Each branch employs a supervisor and two tellers.

- g. Tellers' salaries are relative to the number of tellers in a particular district. variable
- h. Supplies cost relative to the number of transactions processed in a particular branch. variable
- i. Tellers' salaries are relative to the number of customers served at a particular branch. Fixed
- j. Supervisors' salaries relative to the number of branches operated. Fixed
- k. Supervisors' salaries are relative to the number of customers served in a particular branch. Fixed
- l. Facility rental costs are relative to the size of customer deposits. Fixed
- Costs related to operating a fast-food restaurant follow.
- m. Depreciation of equipment relative to the number of restaurants. variable
- n. Building rental cost relative to the number of customers served in a particular restaurant. Fixed
- o. Manager's salary of a particular restaurant relative to the number of employees. Fixed
- p. Food cost relative to the number of customers. variable
- q. Utility cost relative to the number of restaurants in operation. variable
- r. The company president's salary is relative to the number of restaurants in operation. Fixed
- s. Land costs relative to the number of hamburgers sold at a particular restaurant. Fixed

t. Depreciation of equipment relative to the number of customers served at a particular restaurant. fixed

### Exercise 15-6B

Fixed versus variable cost behavior Professional Chairs Corporation produces ergonomically designed chairs favored by architects.

The company normally produces and sells from 5, 000 to 8, 000 chairs per year. The following cost data apply to various production activity levels.

Number of Chairs	5, 000	6, 000	7, 000	8, 000
Total costs incurred	Fixed \$ 84, 000	Variable 60, 000	Total costs \$144, 000	
Per unit chair cost	Fixed \$16. 80	Variable 12. 00	Total cost per chair \$28. 80	

### Required

- Complete the preceding table by filling in the missing amounts for the levels of activity shown in the first row of the table.
- Explain why the total cost per chair decreases as the number of chairs increases.

### Exercise 15-12B

Effect of cost structure on projected profits Logan and Martin compete in the same market. The following budgeted income statements illustrate their cost structures.

Income Statements	Company Logan	Martin	Number of Customers
(a)	160	160	160
Sales Revenue (n x \$75)	\$12, 000	\$ 12, 000	Variable Cost (n x \$0)
Contribution Margin	12, 000	(800)	Fixed Cost (6, 400)
Net Income (Loss)	\$ 5, 600	\$ (800)	

## Required

a. Assume that Logan can lure all 80 customers away from Martin by lowering its sales price to \$75 per customer.

Reconstruct Logan's income statement based on 160 customers.

b. Assume that Martin can lure all 80 customers away from Logan by lowering its sales price to \$75 per customer. Reconstruct Martin's income statement based on 160 customers.

c. Why does the price-cutting strategy increase Logan's profits but result in a net loss for Martin? This is so in that when sales to 160 clients at 75 (12, 000), more revenue is produced as opposed to sales to a lesser amount (80 clients) at 125 (10, 000). Fixed costs contribute to Logans increases in sales revenue.

## Exercise 16-9A

Allocating overhead costs to accomplish smoothing Mimosa Corporation expects to incur indirect overhead costs of \$72, 000 per month and direct manufacturing costs of \$11 per unit. The expected production activity for the first four months of 2007 is as follows.

January February March April

Estimated production in units 4, 000 7, 000 3, 000 6, 000

## Required

a. Calculate a predetermined overhead rate based on the number of units of product expected to be made during the first four months of the year.

Month January February March April total

Estimated production in units 4000 7000 3000 6000 20000  $72000 * 4 / 20,000 = 14.40$  per unit

b. Allocate overhead costs to each month using the overhead rate computed in Requirement a.

Month Jan Feb March April Total

Rate 14.40 14.40 14.40 14.40

Base 4,000 7,000 3,000 6,000

Cost 57,600 100,800 43,200 86,400 288,000

c. Calculate the total cost per unit for each month using the overhead allocated in Requirement b.

Month Units (A) Overhead (B) Cost (A\*11) Total Cost Per Unit (d/a)

Jan 4000 57600 44000 101600 25.40

Feb 7000 100800 77000 177800 25.40

March 3000 43200 33000 76200 25.40

April 6000 86400 66000 152400 25.40