



**NaviPlan Extended
Online/Offline
Monte Carlo Sensitivity
Analysis
Participant Guide**

USA version 10.2

EISI, Winnipeg

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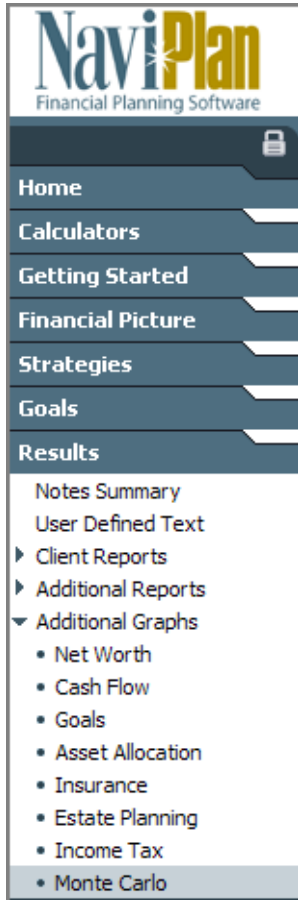
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Monte Carlo Sensitivity Analysis

Learning objectives



This module will enable you to

- Explain the purpose of a Monte Carlo analysis
- Identify assumptions
- Understand the effects of deficit coverage
- Determine how success is measured
- Analyze the results of the *Monte Carlo Sensitivity Analysis*

Figure 1: Navigation bar showing the Results section – Additional Graphs – Monte Carlo category

Purpose of Monte Carlo

- Analyzes more than one possible outcome
- Examines changes to the following variables:
 - Fluctuations in financial markets
 - Uncertain life expectancies
- Helps assess the effects of these risks on a plan by
 - Randomizing return rates
 - Randomizing life expectancies

Monte Carlo assumptions

- Cash flow-based approach
- Multiple trials of the plan are simulated
- Plan success based on deficits
- Percentage of successful trials is displayed
- Variables change in each trial
 - Life expectancies (based on GAM 83 Table)
 - Return rates (based on standard deviation)

Effects of standard deviation

Asset	Rate of Return	Standard Deviation
Default Holding (Mutual Fund/Joint/Non-Qualified)	10.00%	0.00%
10th Percentile 50th Percentile 90th Percentile		
Entire Plan 0 out of 100 (0%)	\$1,219,638	\$1,219,638 \$1,219,638

Asset	Rate of Return	Standard Deviation
Default Holding (Mutual Fund/Joint/Non-Qualified)	10.00%	12.00%
10th Percentile 50th Percentile 90th Percentile		
Entire Plan 0 out of 100 (0%)	(\$1,106,331)	\$1,050,949 \$4,278,298

Monte Carlo settings

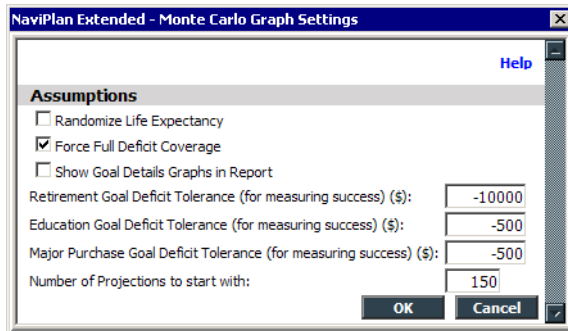


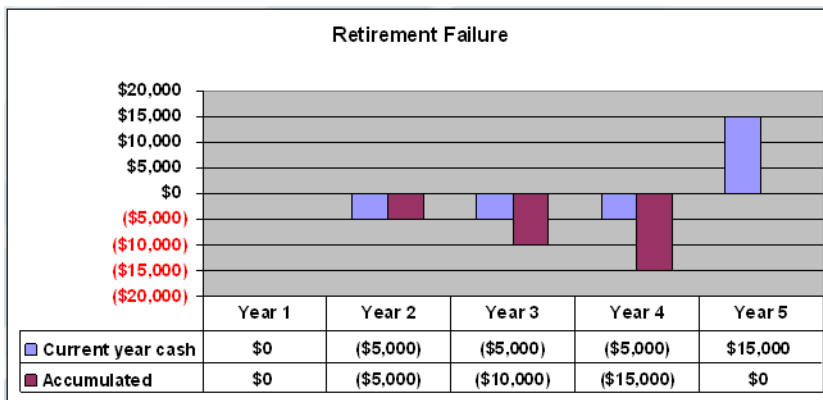
Figure 2: Results section – Additional Graphs – Monte Carlo category – General page – Assign Settings dialog box

Deficit coverage

What is deficit coverage?

- Two types:
 - Targeted
 - Full

Retirement failure



Exercise 2: Identify assumptions

To find the answers, see “Answers to Monte Carlo Sensitivity Analysis” on page 10.

1. Complete the following questions by answering true or false. If false, please indicate your reason for choosing false.

	True or false
a) Success for the retirement goal is based on the clients’ terminal net worth.	
b) <i>Randomize Life Expectancy</i> has a maximum life expectancy of 120 years.	
c) Deficit tolerance is the amount the client is willing to spend.	
d) <i>Force Full Deficit Coverage</i> implies that non-qualified assets are available in pre-retirement if necessary.	
e) Assets with low standard deviation indicate more risk than assets with high standard deviation.	
f) Monte Carlo should be generated on a completed plan.	
g) Traditional planning examines only one possible outcome.	
h) The maximum number of projections is 15,000.	
i) The minimum number of projections is 99.	

Exercise 3: Appreciate the effects of deficit coverage

To find the answers, see “Answers to Monte Carlo Sensitivity Analysis” on page 10.

1. What are the two types of deficit coverage used in NaviPlan?

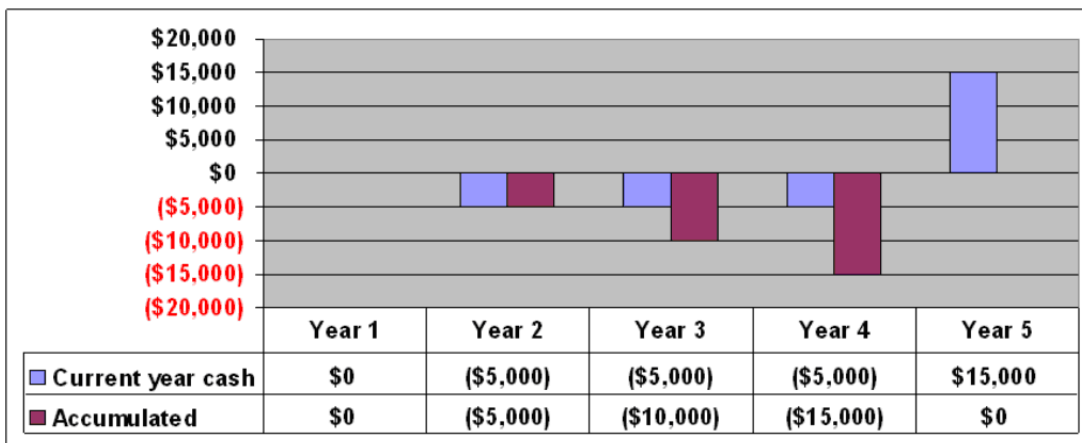
2. Targeted deficit coverage occurs during the retirement period in the plan. Is this statement true or false?
 - a) True
 - b) False
3. By default, lifestyle assets, real estate assets, and business entities are not included in NaviPlan’s deficit coverage strategy. Is this statement true or false?
 - a) True
 - b) False

HANDS-ON EXERCISES

Exercise 4: Determine how success is measured

To find the answers, see “Answers to Monte Carlo Sensitivity Analysis” on page 10.

- What factors should be considered when defining the deficit tolerance for a goal?
 - Clients’ overall risk tolerance
 - Clients’ net worth and ability to meet goal shortfalls by other means
 - Clients’ cash flow
 - All of the above
- NaviPlan determines a goal’s success based on which of the following?
 - The goal’s deficits
 - The plan’s terminal net worth
 - All of the above
 - None of the above
- The graph below displays the cash flow surpluses and deficits of a Monte Carlo projection during retirement. Based on this information, in which year will this projection be considered a failure if the clients have a deficit tolerance of -\$15,000 for retirement?



- Year 1
- Year 2
- Year 3
- Year 4
- Year 5
- Never

Exercise 5: Analyze the results of the Monte Carlo Sensitivity Analysis

To find the answers, see “Answers to Monte Carlo Sensitivity Analysis” on page 10.

Answer the questions using the information in this sample of a Monte Carlo report.

Entire Plan

		10th Percentile	50th Percentile	90th Percentile
Entire Plan	32 out of 100 (32%)	\$4,498,186	\$8,510,752	\$19,319,810

Assumptions

Assumptions	
Life Expectancy Randomized	Yes
Force Full Deficit Coverage	No
Annual Cash Flow Deficit Tolerance	(\$10,000)
Education Goals Success Tolerance	(\$500)
Major Purchase Goals Success Tolerance	(\$500)
Number of Projections	100

Goal success rates

Goal	Success Rate	10th Percentile	50th Percentile	90th Percentile
All Goals	33.00%			
Retirement Goal	63.00%	\$4,498,186	\$8,510,752	\$19,319,810
Kathy's Education	62.00%	\$134,977	\$160,351	\$196,628
Charles' Education	61.00%	\$126,043	\$192,787	\$296,371
Family European Vacation	68.00%	\$40,530	\$71,243	\$118,023

1. What is this table above from the Monte Carlo report telling us about this plan?

2. The results are showing that even in the lowest percentile (i.e., the worst outcome), the clients have a high net worth. Why is the success rate so low?

Conclusion

This module has enabled you to

- Explain the purpose of a Monte Carlo analysis
- Identify assumptions
- Understand the effects of deficit coverage
- Determine how success is measured
- Analyze the results of the *Monte Carlo Sensitivity Analysis*

Answers to Monte Carlo Sensitivity Analysis

Exercise 1: Explain the purpose of a Monte Carlo analysis

1. a) True. In NaviPlan, Monte Carlo performs a probability analysis by randomizing rates of return and, if applicable, life expectancy.
2. a) True. Monte Carlo results are more meaningful if the analysis is performed on a completed plan where goals are 100% funded.

Exercise 2: Identify assumptions

1.

	True or false
a) Success for the retirement goal is based on the clients' terminal net worth.	False – based on cash flow
b) <i>Randomize Life Expectancy</i> has a maximum life expectancy of 120 years.	False – 110 is the maximum
c) Deficit tolerance is the amount the client is willing to spend.	False – client is willing to borrow
d) <i>Force Full Deficit Coverage</i> implies that non-qualified assets are available in pre-retirement if necessary.	True
e) Assets with low standard deviation indicate more risk than assets with high standard deviation.	False – higher standard deviation indicates more risk
f) Monte Carlo should be generated on a completed plan.	True
g) Traditional planning examines only one possible outcome.	True
h) The maximum number of projections is 15,000.	False – 1,000 is the maximum
i) The minimum number of projections is 99.	False – 100 is the minimum

Exercise 3: Appreciate the effects of deficit coverage

1. Two types of deficit coverage used in NaviPlan are targeted deficit coverage and full deficit coverage.
2. b) False – Targeted deficit coverage only occurs during the pre-retirement period.
3. a) True – By default, lifestyle assets, real estate assets, and business entities are not included in NaviPlan’s deficit coverage strategy.

Exercise 4: Determine how success is measured

1. d) All of the above. All of the factors listed should be considered when defining the deficit tolerance for a goal.
2. a) The goal’s deficits – NaviPlan determines a goal’s success based on the its deficits.
3. f) Never. The projection is successful, so it will never be considered a failure if the clients have a deficit tolerance of -\$15,000 for retirement.

Exercise 5: Analyze the results of the Monte Carlo Sensitivity Analysis

1. The Monte Carlo report is telling us the following about this plan:
 - All goals are coming up short.
 - The plan is susceptible to market fluctuations and life expectancy changes.
 - The clients have a high net worth but the plan still fails.
2. The success rate so low because much of the net worth is made up of non-liquid assets such as real estate assets, lifestyle assets, and business entities.

