

# Rethinking Monte Carlo Results for Better Client Conversations

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**Analyst.** Lead Researcher, Kitces.com

**Educator.** Assistant Professor of Finance, University of Southern Maine

**Contributor.** Wall Street Journal's Experts Blog: Wealth Management



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## Perception

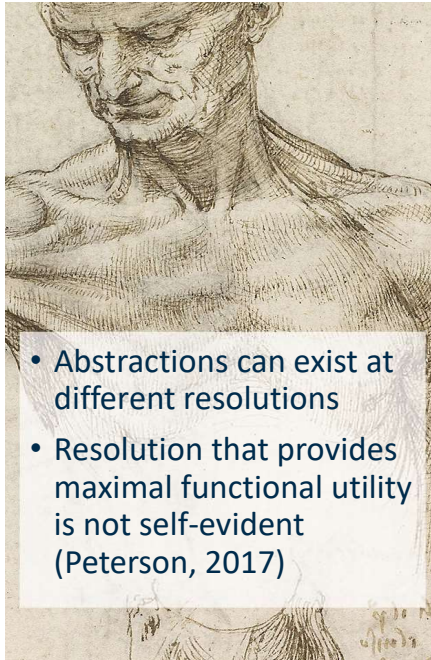
- A trickier issue than we may initially realize
- Predictive processing
  - We all navigate the world using mental models
  - Compare predicted sensory input to actual sensory input
  - If predicted  $\neq$  actual  $\rightarrow$  update our model
- Applies not only to our basic sensory inputs, but also mental models of more abstract concepts
- E.g., when consumers hear “financial advisor” they have a mental model of what an advisor is
  - If experience conflicts with their mental model, consumers may update their model

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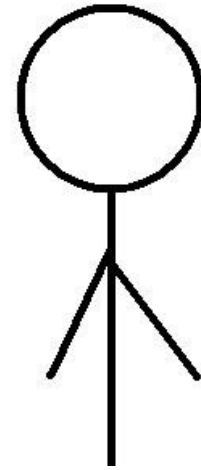


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## Abstraction



- Abstractions can exist at different resolutions
- Resolution that provides maximal functional utility is not self-evident (Peterson, 2017)



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## Levels of Abstraction



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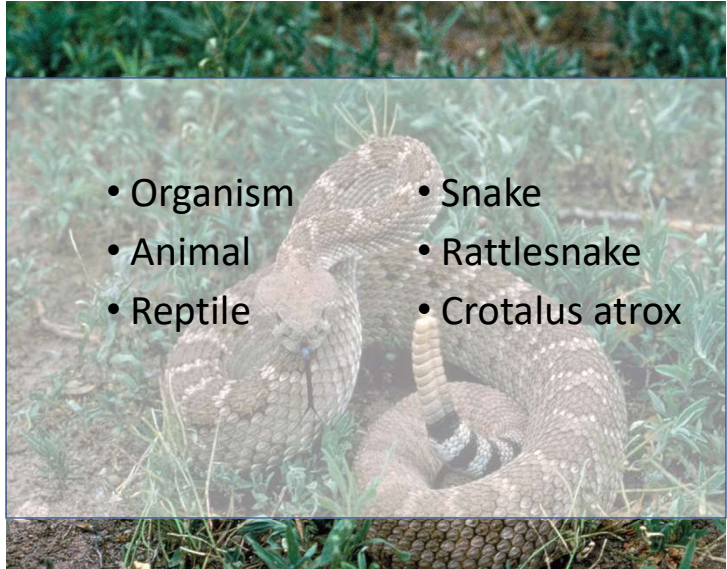
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## Levels of Abstraction

- Organism
- Animal
- Reptile
- Snake
- Rattlesnake
- Crotalus atrox



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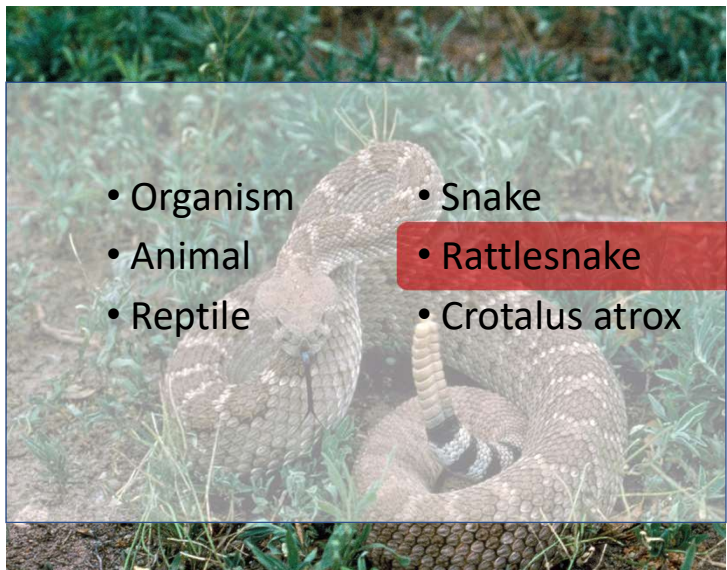


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## Levels of Abstraction

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## Functional Abstraction

- Morningstar Style Box™ is highly functional
- Conveys two most important dimensions of equity returns
  - Size
  - Value

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Morningstar Style Box™

			Large
			Mid
			Small
Value	Blend	Growth	

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## Functional Abstraction

- Morningstar Style Box™ is highly functional
- Conveys two most important dimensions of equity returns
  - Size
  - Value

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US Equity Factors  
1-Day Performance

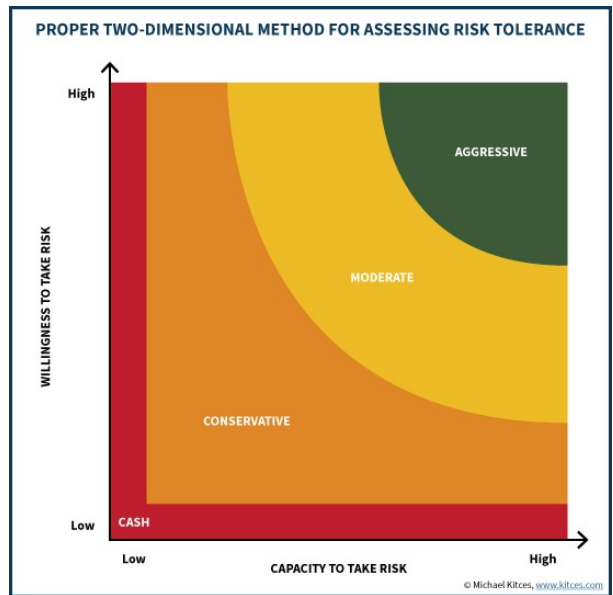
	Value	Core	Growth
Large	-0.4%	-0.7%	-0.8%
Mid	-0.3%	-0.0%	0.3%
Small	-0.3%	0.1%	0.5%

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## Functional Abstraction

- Generally speaking, two-dimensional abstractions work well
- Kitces' (2017) two-dimensional risk assessment
  - Risk tolerance
  - Risk capacity

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## Monte Carlo Abstraction

- Single Dimension
- "Probability of Success"



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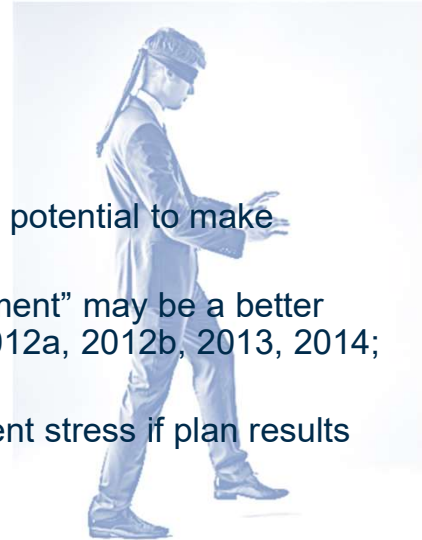
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## Monte Carlo Perception Issue #1

- Does not address the potential to make adjustments
- “Probability of adjustment” may be a better alternative (Kitces, 2012a, 2012b, 2013, 2014; Tharp, 2017)
- May cause undue client stress if plan results are poor



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## Example

### Two Ways To Frame The Same Result:

“Mr. and Mrs. Client, we calculated that you have a 90% probability of success in retirement.”

“Mr. and Mrs. Client, we calculated that you have a 10% probability of needing to adjust your spending in retirement.”

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## Monte Carlo Perception Issue #2

- **Addresses likelihood but not magnitude**
  - Kitces (2012a) noted that magnitude is not accounted for
  - Fullmer (2012) suggested the following:



*Shortfall Risk*  
 $\text{= Probability of Shortfall}$   
 $\text{* Magnitude of Shortfall}$

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## Example

**Spending Target: \$100,000**

Scenario A: 0% probability of success;  
 1% magnitude of failure (\$99k)  
 Shortfall risk = \$1k

Scenario B: 90% probability of success;  
 10% magnitude of failure (\$90k)  
 Shortfall risk = \$1k

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## Monte Carlo Perception Issue #3

- **Wrong side of maybe fallacy**
  - Assess whether a prediction was right or wrong based on which side of “maybe” (i.e., 50%) the prediction was on
  - 2016 Presidential election forecasts
    - 538 forecasted 28.6% chance Trump would win
  - “Wet bias” among weather forecasters

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## Example

**Sarah tells her client they have 90% probability of success in retirement.**

Client experiences one of the 10% of “unsuccessful” scenarios.

Client thinks that Sarah got it wrong.

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## Monte Carlo Perception Issue #4

- Tools can influence how advisors advise clients
- “You want to manipulate a tool to test your idea, not manipulate your idea to test a tool.” (Jolly, 2020)

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## Example

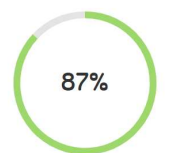


Total Spending: \$4,680,827



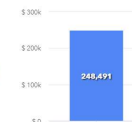
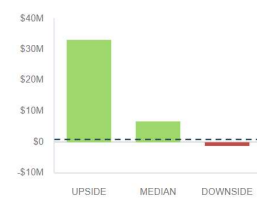
Total Spending: \$4,886,607

PROBABILITY OF SUCCESS



0% - 69% 70% - 81% 82% - 100%

PORTFOLIO ASSETS



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## What Should Advisors Aim For?

Tools often nudge advisors to 70%+ probability of success. Is that always right?

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## A Crazy Idea... 50% Probability of Success?

How many advisors would be comfortable recommending a spending level with a 50% probability of success to their clients?

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# A Crazy Idea... 50% Probability of Success?

How many advisors would be comfortable recommending a spending level with a 50% probability of success to their clients?

About 2%!

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## 50% Probability of Success

50% probability of success may not be as bad as you think...



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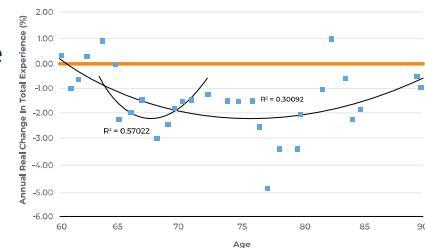
## 50% Probability of Success

First, let's acknowledge what this actually means:

We're saying, "There's a 1-in-2 chance that you would have to make *some adjustment*, at *some point in time*, to avoid running out of money.

- We're NOT saying adjustment next year
- We're (usually) NOT accounting for spending declines over time
  - We see roughly a **37% decline** in real spending over retirement
- We're (usually) NOT accounting for other reserves

This is very different than saying, "There's a 1-in-2 chance that you'll need to cut spending next year."



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## 50% Probability of Success

Second, we should distinguish between **one-time** projections and **ongoing** projections.

For a one-time plan, 50% probability of success is much riskier than an ongoing plan!

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## 50% Probability of Success

**Do advisors use different probability of success targets for one-time versus ongoing plans? *No!***

Tharp (2020) found that advisors randomly assigned to experimental conditions (one-time plan vs. ongoing plan) did not differ in the minimum probability of success level that they felt was prudent.

- 70-90% regardless of plan type
  - 65-year-old client
  - Desired spending level had very low probability of success
  - Advisor was told they'd need to recommend a spending level less than the client's desired

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## 50% Probability of Success

**For ongoing plans, probability of success does not matter as much as advisors think!**

Consider an example:

- Hank (66) and Marie (64) are married.
- 30-year retirement period.
- They have \$1 million invested in a 60/40 portfolio.
- They'll use long-term historical averages for capital market assumptions.
- They pay 1.2% in weighted average fees.
- Combined Social Security income = \$3,500 per month
- They are willing to make adjustments to their spending.

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## But First... 95% Probability of Success

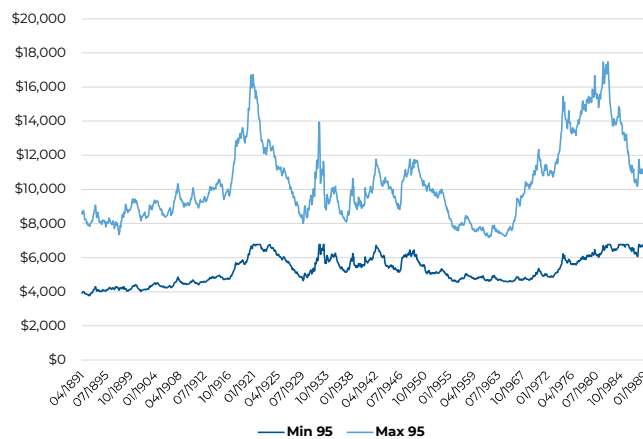
- What does retirement spending look like if we maintain a constant 95% probability of success?
- Initial spending: \$6,769 per month (\$81,228 per year)
  - **3.3% initial portfolio withdrawal rate** after backing out \$3,500/mo. Social Security

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## 95% Probability of Success



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## 70% vs. 95% Probability of Success

### 70%

Initial spending:  
\$7,898 per month  
(\$94,777 per year)

**4.4% initial portfolio  
withdrawal rate** after  
backing out \$3,500/mo.  
Social Security

### 95%

Initial spending:  
\$6,769 per month  
(\$81,228 per year)

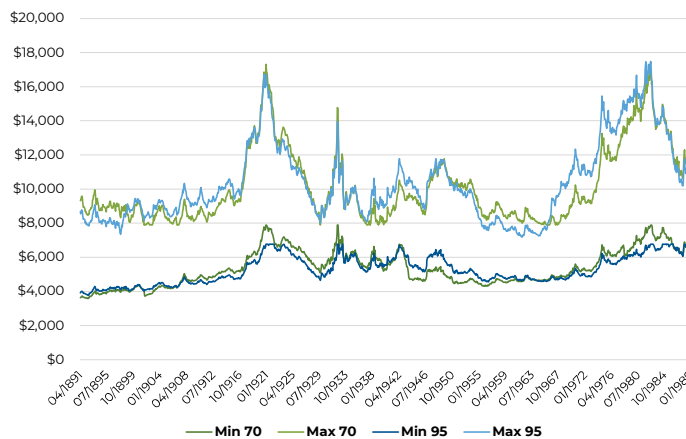
**3.3% initial portfolio  
withdrawal rate** after  
backing out \$3,500/mo.  
Social Security

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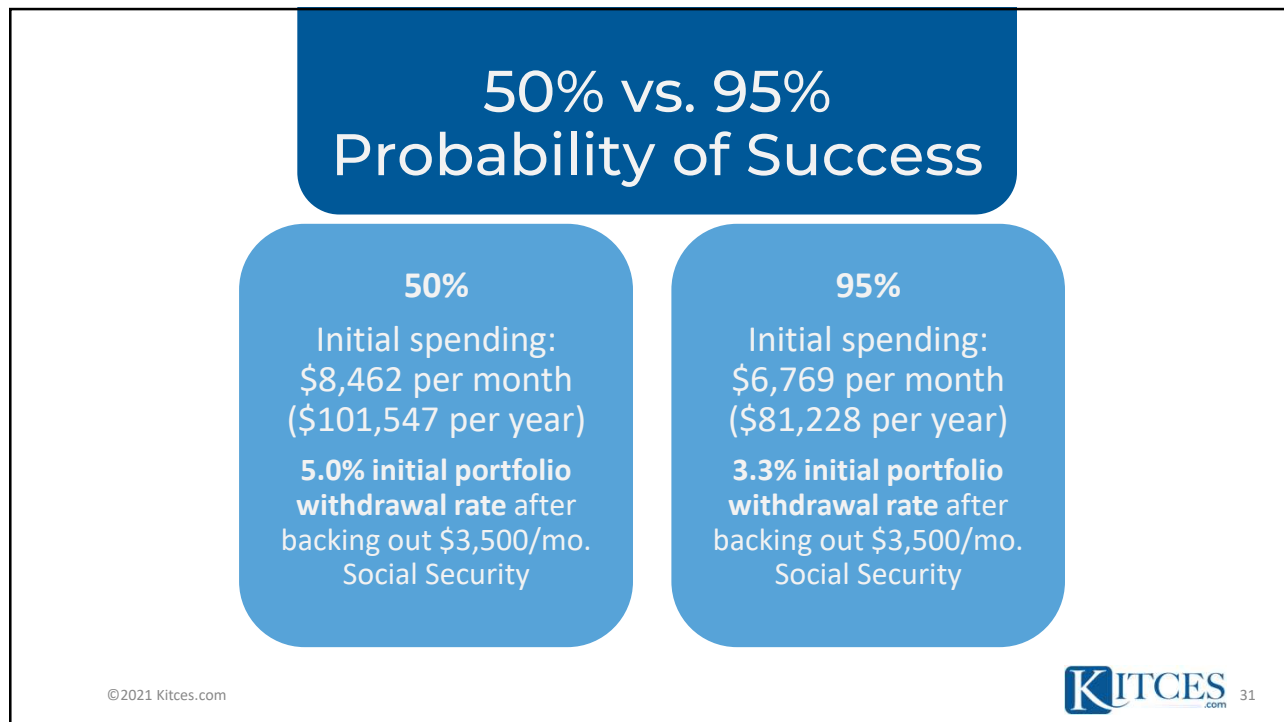
## 70% vs. 95% Probability of Success



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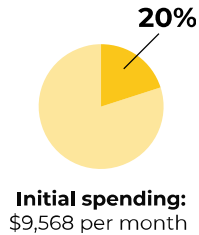


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## 20% vs. 95% Probability of Success



**20%**

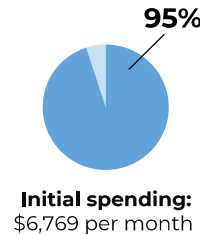
Initial spending:  
\$9,568 per month  
(\$114,815 per year)

**6.1% initial portfolio  
withdrawal rate** after  
backing out \$3,500/mo.  
Social Security

**95%**

Initial spending:  
\$6,769 per month  
(\$81,228 per year)

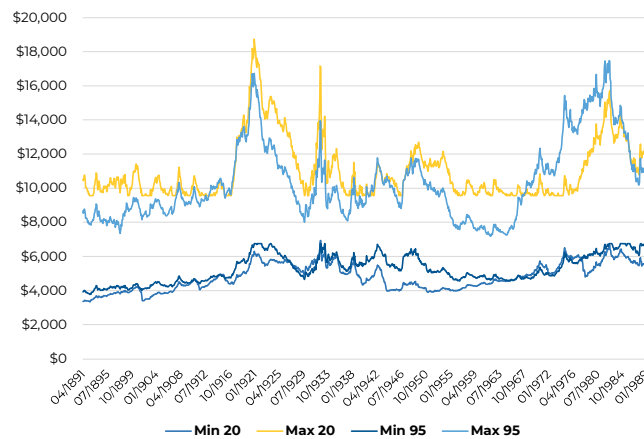
**3.3% initial portfolio  
withdrawal rate** after  
backing out \$3,500/mo.  
Social Security



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## 20% vs. 95% Probability of Success



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## Median Real Spending By Probability of Success



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## Difference in Median Spending (20% vs. 95%)

**Initial spending:**

20%: \$9,568 per month

95%: \$6,769 per month



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## Probability of Success Level (With Adjustments) Is an Income/Legacy Trade-Off

**When it comes to income, you ultimately get what the market will give you**  
Probability of success just shades income higher (low probability of success)  
or lower (high probability of success)

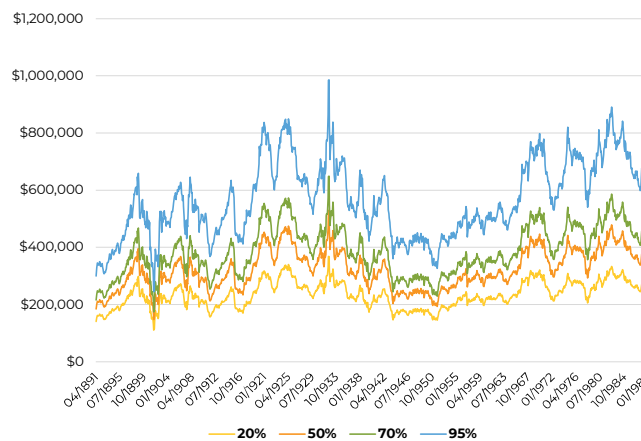
**Bigger differences are in legacy outcomes**  
Higher probabilities of success result in larger legacy values

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## Probability of Success Level (With Adjustments) Is an Income/Legacy Trade-Off

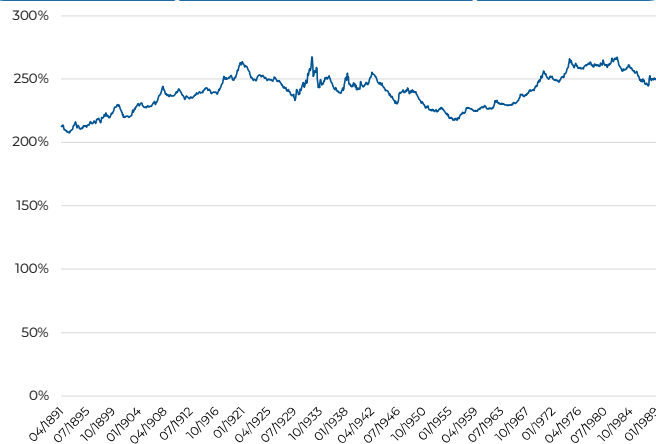


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## Terminal Real Wealth Levels by Probability of Success (95% vs. 20%)



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## Understanding the Probability of Success Threshold Used

Ultimately, the threshold used is more a matter of income/legacy trade-off *if* a client will adjust their spending

If you adjust spending based on market outcomes, then the market drives your spending experience much more than the probability of success level chosen

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## Monte Carlo Perception Issue #5



- Perceived “failure” can stress clients
- Currently framed at a poor level of abstraction
- Doesn’t really convey what clients want to know
- Unfortunately, however, there’s little empirical research on this topic

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## Influence of Monte Carlo Framing on Client Perceptions

- Tharp and Kitces (2020) aimed to explore how framing of Monte Carlo results influences client perceptions
- Recruited 288 individuals from households with income greater than \$100k to participate in our study
- Wanted to examine whether “probability of adjustment” framing influences consumer perceptions of retirement preparedness relative to “probability of success” framing

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## Influence of Monte Carlo Framing on Client Perceptions

- Showed individuals hypothetical plan results
- Reviewed plan for a hypothetical neighbor (but also answered for themselves)
  - Success-framing:
    - 90% (or 50%) probability of success
    - “Success” means making it through retirement without running out of money.
  - Adjustment-framing
    - 90% of scenarios with lifetime income above the planned amount
    - 10% of scenarios with lifetime income below the planned amount
    - Average spending increase of 5.5% every 1.4 years
    - Average spending decrease of 4.5% every 13.9 years

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## Influence of Monte Carlo Framing on Client Perceptions

Adjustment-framing (versus success-framing) is associated with:

### Greater positive emotion

- Optimism
- Preparedness
- Confidence during a turndown

### Less negative emotion

- Stress
- Feelings of needing to delay retirement
- Greater understanding of plan results (e.g., likelihood of increasing future spending)
- Differences in perceptions of dynamics related to the client-advisor relationship
  - Advisor trust
  - Informativeness of results provided
  - Appreciation of information provided



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## Influence of Monte Carlo Framing on Client Perceptions

- Participants were then told that a year had passed
  - Recession occurred and client's portfolio declined 30%
  - Probability of success/adjustment declined from 90% to 50% (or 50% to 10%)
- Adjustment-framing was associated with less skepticism of an advisor's modeling following large changes in plan results due to a market downturn
  - This is a context in which the client-advisor relationship may be particularly vulnerable

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## How Should Monte Carlo Results Be Presented to Clients?

### Two Time Frames For Managing Client Expectations

1. Short-Term Expectations
2. Long-Term Expectations

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## How Should Monte Carlo Results Be Presented to Clients?

**“Guardrails” approach has some very significant short-term communication advantages**

Tells a client when a change will occur

Tells a client what change will occur

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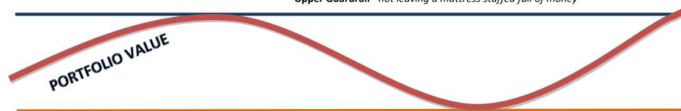
## How Should Monte Carlo Results Be Presented to Clients?

Income Strategy  
ZSAMPLE, Jane

In Good Times/Upper Guardrail		
If portfolio grows above:	\$1,390,000	
Income increases 10% to:	\$66,000	\$5,500

**JARVIS**  
FINANCIAL

Upper Guardrail - not leaving a mattress stuffed full of money



Lower Guardrail - not running out of money in retirement

Income Baseline:	\$1,111,000	
Distribution Rate:	5.40%	
Annually/Monthly:	\$60,000	\$5,000
	Plus inflation in growth years	

In Bad Times/Lower Guardrail		
If portfolio falls below:	\$930,000	
Income decreases 10% to:	\$54,000	\$4,500

To Be Successful:

- War Chest of Cash and Bonds
- Strategic Rebalancing
- Careful Diversification
- Tax Efficiency
- Discipline

*This strategy is designed to give you the highest possible monthly income, without jeopardizing your portfolio when (not if) the markets decline.*

All numbers are based on Portfolio value as of 12/31/2016

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## How Should Monte Carlo Results Be Presented to Clients?

- Monte Carlo-driven guardrails can be a powerful way to capture the best of both approaches
  - One limitation of traditional guardrails is that they don't capture the client nuance of MC analysis
  - Acceptable withdrawal rates should vary some over time
  - Probability of success guardrails can be used to make planning decisions
  - E.g., increase spending at 95% probability of success; cut spending at 50%
- Communicate results to clients in dollars

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## How Should Monte Carlo Results Be Presented to Clients?

### Retirement Income Summary



Income proposal for John and Sally Smith, February 2021.

#### Short-Term

- Current Proposed Income: **\$12,800/month**  
(est. \$11,974 net of tax)

- Current Portfolio: **\$2 million**

#### Income Adjustment Plan

↑ **\$13,400** (\$600 increase)  
if portfolio balance reaches **\$2,100,000**  
(4.93% higher than today).

↓ **\$12,500** (\$300 decrease)  
if portfolio balance reaches **\$1,500,000**  
(27% lower than today).

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INCOMELAB

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- ↓  
Spending level at initial target probability of success
- Income Adjustment Plan
- |   |  |
|---|--|
| <p>↑ <b>\$13,400</b> (\$600 increase)</p> <p>if portfolio balance reaches <b>\$2,100,000</b><br/>(4.93% higher than today).</p> | <p>↓ <b>\$12,500</b> (\$300 decrease)</p> <p>if portfolio balance reaches <b>\$1,500,000</b><br/>(27% lower than today).</p> |
|---|--|

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|---|--|
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|---|--|

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Spending level to align  
with target prob. of  
success after upper  
guardrail is hit

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Spending level at initial  
target prob. of success

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Portfolio value that  
decreases prob. of success  
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## How Should Monte Carlo Results Be Presented to Clients?

### Long-Term

#### Lifetime Income Experience

##### 80% Scenarios Above Plan

- ✓ Average: 28% above planned
- ✓ Best case: 199% above planned

##### 20% Scenarios Below Plan

- ✗ Average: 5% below planned
- ✗ Worst case: 14% below planned

#### Income Adjustments

##### Average Increase

**5.5%** every 1.6 years

- ↑ Largest increase 20.4%
- ↑ 90% of increases: 5% - 9%

##### Average Decrease

**-5.7%** every 26.9 years

- ↓ Largest decrease 13.5%
- ↓ 90% of decreases: 0% - 8.7%

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## Key Takeaways

- Our abstraction of results matters
  - Adjustment-framing over success-framing is a start
  - Two-dimensional frameworks (success & magnitude) are better than unidimensional frameworks
- The way the tools advisors use influence how we think about retirement income planning
  - Be careful to not let the tool manipulate how you think about planning

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## Key Takeaways

- Be thoughtful when presenting results to clients
  - Use adjustment-framing over success-framing
  - Can clients see plan results? Do they need to?
- What should the real focal point be?
  - Is it income? Is it something else?
- Probability-of-success-driven guardrails
  - Can capture the analytical advantages of Monte Carlo with the communication advantages of guardrails

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## Questions?

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