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A Blueprint for Retirement Spending

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Abstract

Research on retirement spending strategies usually focuses on what is optimal or sustainable. We select from this body of work in order to frame a strategy based on individual household characteristics and preferences. Financial planners and clients can construct a spending strategy foundation based on annual spending flexibility and whether the client is best served by safe or optimized spending. Once this foundation is established, several key determinants help inform the spending strategy blueprint. The first is an appropriate planning horizon, which should be adjusted for marital status, sex, health, and retirement age. The second determinant of the blueprint is the relative amount of pension and annuity income that the client expects to receive. Third, planners should offer a range of possible return assumptions in order to understand the array of possible outcomes. Return assumptions used in any research model have huge effects on outcomes. Finally, it is important to assess a client's tolerance for holding equities, bequest motive, and expected portfolio management fees to properly adjust the blueprint.

JEL Codes: G000, G020, G110, G170, D100, D140

Key words: finance economics, behavioral finance, personal finance, diversification, portfolio choice, investment decisions, analysis, risk, stock returns, consumption

1. Introduction

There has been considerable research on optimal and sustainable retirement spending strategies. This paper aims to guide planners and clients toward an *appropriate* spending strategy based on client preference. We specifically look at systematic spending strategies—those that employ a pre-defined method of spending. The intent is to review the lessons from existing research and determine which are applicable to different types of clients. The goal is to help workers approaching retirement draft a strategic blueprint for spending from savings.

Research conclusions are derived from assumptions and inputs provided by the researcher. The problem is that every household and every individual has specific needs, considerations, and preferences that cannot always be mapped into a simple model. By their nature, models are an abstraction from reality. The result is that researchers come to varied conclusions, pointing to an array of strategies that may be ideal. A sampling of these conclusions:

- Constant-dollar (inflation-adjusted) spending equal to 4 percent of the original balance is the maximum safe amount for a 30-year retirement period (Bengen 1994). This is based on historical returns for a portfolio that consists of 50 percent stocks and 50 percent bonds.
- Inflation-adjusted spending starting at 5 or 6 percent of the original balance may be safe for shorter retirements and/or higher stock allocations (Cooley, Hubbard, Walz 1998).
- 4 percent is not safe. Constant-dollar spending equal to 3 percent of the original balance may not even be safe because stock and bond returns in the near future will likely be lower than in the past (Finke, Pfau, Blanchett 2013).
- Retirees with higher-than-average risk tolerance and an annual pension may optimize spending at an annual amount equal to 7 percent of the original portfolio (Finke, Pfau, Williams 2012). This is because utility-maximizing retirees with pensions should take on greater risk with non-pension assets (Milevsky and Huang 2011).
- Constant-dollar spending strategies are far from optimal. Simple alternatives such as using the IRS's required minimum distributions are more efficient (Webb and Sun 2012).
- The optimal strategy varies spending over time using updated mortality probabilities (Blanchett, Kowara, Chen 2012).

Each section of this study looks at a unique aspect of the retirement spending puzzle. We ignore possibilities that could potentially increase retirement income such as liquidating a house, working longer, or drastically changing the asset allocation. This paper is aimed at households that will rely on savings for regular income in retirement, as opposed to those that will rely primarily on pensions, annuities, or Social Security.

Like building a house, having a blueprint for retirement spending can help ease nerves when unexpected events undoubtedly arise. A visualization that summarizes our blueprint is provided in the conclusion.

2. Data and Methodology

Throughout this study, we present existing research and confirm the findings with original analysis. The original analysis uses a variety of methods and definitions that are briefly described in this section.

Returns: We use equity returns as defined by the CRSP Total Market Index and bond returns as defined by five-year U.S. Treasury notes. Inflation is measured by the Consumer Price Index. We use monthly historical data from 1926 through 2014.

Baseline Assumptions: Our baseline simulation looks at a 65-year-old, married couple with life expectancy based on the Social Security Administration's 2010 period life table. We assume $0 in pension income, 0 percent fees, and a static 50/50 stock/bond allocation throughout retirement, rebalanced annually.

These baseline assumptions describe very few actual retirees, and this is the point of the blueprint. This unrealistic baseline is useful for comparing strategies and existing research. We categorically look at how varying assumptions would change the prescribed spending strategy. Taxes are not considered in the analysis.

Baseline Simulation: Our baseline simulation is a bootstrapped Monte Carlo simulation that is run 1,000 times. Under the bootstrapped Monte Carlo, months are randomly selected (with replacement) from the universe of months from 1926 through 2014. The stock, bond, and inflation return streams are generated from the selected months. Alternative simulation techniques are tested in the section on return assumptions.

Strategies: We examine and test several spending strategies in this study. For certain types of retirees, the appropriate strategy will be clear. For example, retirees who place high importance on knowing they can spend the same amount every year should employ a constant-dollar strategy, such as that specified by the 4 percent rule. Retirees looking to optimize spending who are willing to employ variable spending strategies have a wider array of potential strategies. We specifically compare the following strategies:

1. Constant Dollar: This is the method employed in the 4 percent rule (Bengen 1994). It uses the initial percentage to calculate a constant annual spending amount, which is annually adjusted for inflation.
2. Constant Percentage: This method selects a percentage of savings and spends that percentage of the portfolio each year. When the portfolio changes in value, total spending will change based on the static spending percentage.
3. Inflation-Adjusted Percentage: This method selects an initial spending percentage and adjusts the percentage for inflation each year. If first-year spending is 4 percent and inflation is 10 percent, second-year spending will be 4.4 percent of the remaining portfolio (Delorme 2014).
4. RMD Plus: This method uses the percentage from the IRS's required minimum distributions plus or minus a fixed percentage. In retirement years prior to age 70, the percentage is set to 3.5 percent plus or minus the fixed percentage. RMD + 0 percent would be the IRS's required minimums beginning at age 70 and 3.5 percent prior to age 70.

An analysis of many other variable spending strategies can be found in a recently released working paper by Wade Pfau (Pfau 2015).

We assume in this paper that households choose not to use annuities to lock in retirement income. Some research shows that it may be optimal for retirees to allocate at least some portion of the retirement portfolio to annuities (Pfau 2013; Ameriks, Veres, Warshawsky 2001), but in practice the use of annuities remains low for most retirees.

Outcome Measurement: We look at two measures of retirement outcomes: success rates and utility. The success rate estimates how often a strategy exhausts the portfolio during a pre-defined window, often 30 years. The success rate is easy to measure when a constant-dollar strategy is considered, but it lacks analytical value when we employ a variable-spending strategy. For instance, if a strategy always draws 6 percent of the remaining portfolio, the portfolio may "succeed" for 30 years by drawing a miniscule level of income during the later years.

The second measure we use is a utility model of constant relative risk aversion. The constant relative risk aversion framework is laid out in Blanchett, Kowara, and Chen (2012); Williams and Finke (2011); Finke, Pfau, and Williams (2013); and Delorme (2015).

An example can help in understanding the utility model. Consider a retirement income stream that provides a 50/50 likelihood of either $30,000 or $40,000 every year as long as a retiree survives. A retiree with a risk aversion parameter (gamma) equal to zero would not care about the difference between this pattern and a pattern with a guaranteed $35,000 annually. In reality, people tend to prefer guaranteed income. Many people would prefer a guaranteed $34,000 annually as opposed to the uncertainty of receiving either $30,000 or $40,000. These people have a positive gamma in the certainty equivalence equation. The certainty equivalent values provided in the results of this paper are given by the following equation.

For any retirement of length N, where c_i is the consumption in year i, P_i is the probability of dying in the ith year, and γ is the risk aversion parameter:

$$\sum_{i=1}^{50}\left[P_i * \left[\frac{1}{N} * \gamma * \sum_{i=1}^{N}\frac{{c_i}^{-\gamma}}{\gamma}\right]^{\frac{-1}{\gamma}}\right]$$

For the purposes of this paper, the baseline gamma is 4. This level is high to represent the risk-averse nature of retirees. As noted in Blanchett, Kowara, Chen (2012), results are not very sensitive to the specific gamma chosen.

Inflation: All amounts are inflation-adjusted to today's dollars based on simulated CPI inflation.

3. The Foundation: Spending Variability and Safety

Now we begin to build the retirement spending blueprint. We start by laying the foundation for retirement spending. We assume that retirees want a structured spending strategy. [Note that this may not be the case for all retirees, such as those who will not be reliant on savings for regular income in retirement (Delorme 2015)]. For retirees who want to engineer a structured spending strategy, we should first answer two questions:

1. Does the client prefer safe spending, whereby the portfolio has a minimal likelihood of running out during a pre-determined period of time? Or does the client prefer optimized spending, where there may be a higher likelihood of exhausting the portfolio, but it will be efficiently spent and there is a lower likelihood of under-spending during retirement?
2. Does the client need to have a steady and constant income over the course of retirement, or is the client comfortable with income flexibility during retirement?

Based on these questions, we attempt to lay one of four foundations for the retirement spending strategy. Each of these foundations has been featured in the existing literature, but the research does not usually offer an option between these fundamental goals.

Safe and Constant: The retiree wants to maximize the *safe constant-dollar* spending rate. He or she seeks the maximum constant-dollar amount that will allow the portfolio to last at least a certain length of time. Research that works toward this goal includes Bengen 1994; Cooley, Hubbard, Walz 1998; Finke, Pfau, Blanchett 2013; and Guyton 2004.

Optimal and Constant: The retiree seeks *optimal constant-dollar* spending. The client wants the same spending amount every year but also wants to optimize spending based on mathematical probabilities. This client is concerned not only with spending too much but also with spending too little during retirement. Research examples that work toward this goal include Williams and Finke 2011 and Finke, Pfau, Williams 2012.

Optimal and Flexible: The retiree wants *optimal flexible* spending. Strategies that provide optimal, flexible income are utility-maximizing. These are the strategies that work best with the economist's model of utility maximization. Research examples include Blanchett, Kowara, Chen 2012; Milevsky and Huang 2011; and Blanchett 2013.

Safe and Flexible: The retiree wants to maximize *safe flexible* spending. Flexible spending can allow for higher potential spending than constant-dollar strategies while remaining safe. The drawback is the potential that spending falls below what a safe constant-dollar pattern might allow. Research examples overlap with optimized flexible research and include Blanchett 2013, and Sun and Webb 2012.

3.1 Selecting a Foundation

We propose a system where we ask some basic questions in order to determine preference and an appropriate foundation, if it is not obvious.

How do you weigh running out of money versus maximizing lifetime spending?

I absolutely must not run out of money under any circumstances.	As long as my money lasts at least 30 years, I think I'll be all set.	I'm moderately concerned about running out of money, but I have a safety net if it happens.	I'm as concerned about not spending enough as I am about spending too much.	I want to maximize lifetime spending. I have a preference for spending while I can.

Safe Spending ⟷ *Optimal Spending*

This first question seeks to measure the client's attitude toward the risk of exhausting assets versus the risk of under-spending during retirement. For clients with an absolute aversion to running out of money under any circumstances, it is probably best to guide them toward spending strategies that focus on safety and are aimed to last at least a certain number of years. For clients who prefer enjoying life sooner rather than later and for those who have a robust safety net, an optimized strategy can help maximize lifetime spending and spending efficiency.

How flexible are you with year-to-year spending?

Not flexible. I need to know what I can spend every year.	A little flexible. If the market drops, I would be willing to not take a cost of living increase.	Totally flexible. I am willing to adjust spending based on market fluctuations.

Constant Dollar ⟷ *Flexible Percentage*

The second question seeks to measure the client's attitude toward spending variability. If the client needs to know exactly how much to spend every year, we should suggest constant-dollar strategies. If the client is somewhat flexible, a strategy such as that proposed in Guyton's Decision Rules may be appropriate (Guyton 2004). If retirees are totally flexible, recognizing that market fluctuations may lead to increased or decreased potential spending in any year, a flexible percentage strategy may be most appropriate.

Finally, as a sort of tiebreaker, we propose a simple analysis of the size of the safety net compared with the total amount of savings. Clients with large relative safety nets (high pensions and annuities compared with savings) may be well-served to optimize spending patterns. These strategies tend to entail more uncertainty, but pensions and annuities reduce uncertainty by providing a fixed level of annual income (Milevsky and Huang 2011). With clients who depend more on savings, it may be critical to select a conservative and sustainable constant-dollar strategy.

It is important to note here that we have not imposed a strategic spending preference on the client. Some research assumes that a client should optimize spending because it is more economically efficient, but we don't want to impose such restrictions. If a client prefers safe, constant-dollar spending, we build from that foundation. Existing guidelines and our baseline simulation results are provided below. We look at how these results change based on alternative assumptions in the subsequent sections.

For clients that seek safe and constant: For planners and clients seeking safe constant-dollar spending, Wade Pfau's website (retirementresearcher.com) offers a retirement dashboard that provides a sustainable spending guideline for a 65-year-old couple retiring today. Safe constant-dollar spending guidelines for a 65-year-old couple typically range between 3 percent (Finke, Pfau, Blanchett 2013) to around 4 percent (Bengen 1994; Cooley, Hubbard, Walz 1998).

Our baseline simulation with a 34-year horizon and a 95 percent success rate finds a safe spending rate of 3.8 percent. This is the baseline amount that we propose for retirees with a safe and constant foundation.

Alternate options for retirees who are not completely flexible but need higher initial spending would be to employ a guardrail approach (Guyton 2004, Guyton and Klinger 2006), or a floor-and-ceiling approach (Jaconetti, Kinnery, DiJoseph 2013). A comparison of these nuanced strategies and others can be found in Pfau 2015.

For clients that seek optimal and constant: Retirees seeking optimal constant-dollar spending would be well-served to start with Finke, Pfau, Williams (2012). The authors optimize the constant-dollar spending amount and equity allocation based on various levels of risk aversion. At a risk aversion parameter of four (the baseline measure used in this report), the optimal strategy spends at a 4 percent rate with a 30 percent allocation to equities for a household with a $20,000 Social Security benefit. If the household is more risk tolerant, it may consider spending rates up to 7 percent with equity allocations up to 70 percent.

Our baseline analysis finds that the optimal constant-dollar spending is 5.4 percent. This result differs from the findings in Finke, Pfau, Williams 2012 because it uses different returns, includes several more years of positive stock returns, and does not include pension wealth. However, the main finding confirms the existing research, which states that clients who seek to optimize spending should opt for a higher spending rate than those whose primary goal is safety. We propose a baseline of 5.4 percent (e.g., $54,000 inflation-adjusted annual spending for a client with $1 million) as the foundation for retirees seeking optimal and constant spending.

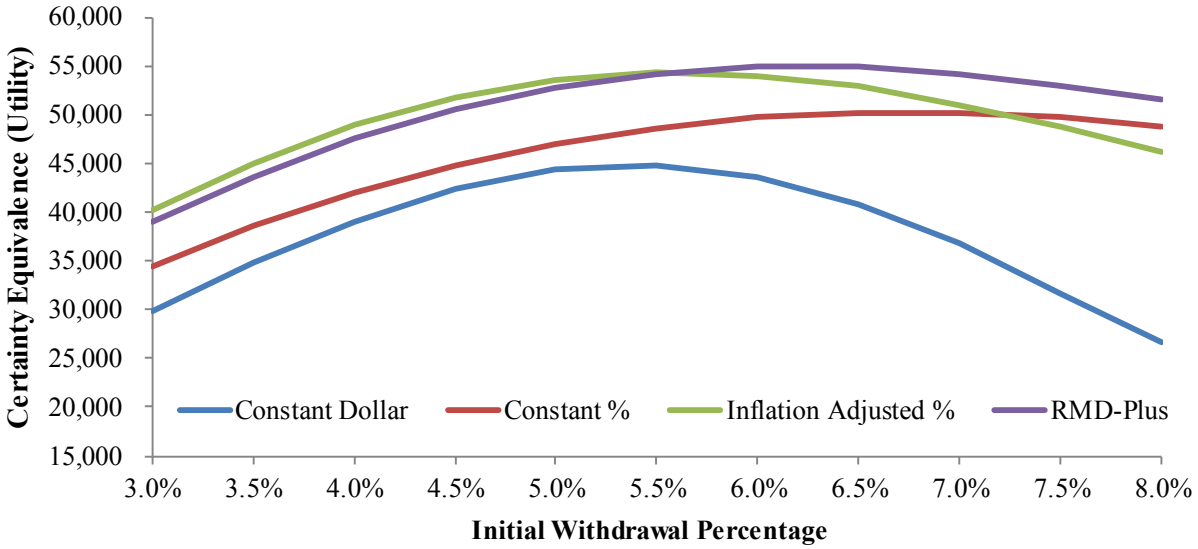
A 5.4 percent constant-dollar withdrawal results in failure for about 36 percent of baseline 34-year simulations. This is why the spending amount is too high for the retiree looking for a safe spending strategy. However, this spending level fails in only about 16 percent of simulations when life expectancy is considered. In other words, when the probability of success is weighted by mortality probabilities, five in six married couples retiring at age 65 should expect not to exhaust assets using a 5.4 percent constant-dollar withdrawal.

For clients that seek optimal and flexible: Blanchett, Kowara, Chen (2012) measure the relative efficiencies of various spending strategies. They conclude that changing percentage strategies, such as the RMD method, offer significantly improved spending efficiency compared with constant-dollar or constant-percentage strategies. We confirm the results that increasing percentage strategies are more optimal than fixed percentage or constant-dollar strategies (Chart 1). The utility measure assumes that

the retiree is willing to endure potentially lower spending for the opportunity to maximize spending under the more likely scenarios.

Utility is maximized from increasing-percentage spending strategies such as the inflation-adjusted percentage strategy starting at 5.6 percent spending, or RMD + 2.7 percent, which starts spending at 6.2 percent. Note that even at safer initial rates as low as 3.5 or 4 percent, the utility of the inflation-adjusted spending strategy is higher than the constant-dollar strategy at its highest utility. This is because the risk of under-spending is reduced with inflation-adjusted percentage spending as compared with constant-dollar spending.

Chart 1. Utility by Strategy and Withdrawal Percentage



Source: Author's calculations using baseline assumptions.

Notes: RMD + 0 percent is represented at 3.5% on the x-axis, RMD + 1 percent is represented at 4.5% on the x-axis.

For clients that seek safe and flexible: For retirees that seek safety first but are comfortable with income variability, we propose using the IRS's required minimum distributions as a baseline annual spending guideline (RMD + 0 percent). As an alternative, David Blanchett offers a simple spending calculator based on the findings from Blanchett, Kowara, and Chen 2012 (http://www.davidmblanchett.com/tools). We find that Blanchett's calculated spending guidelines are similar to RMD + 0 percent for a 65-year-old couple with a 34-year expected lifespan and 50/50 stock/bond portfolio.

We tested the RMD + 0 percent strategy, using spending of 3.5 percent for ages 65 through 69 (before the requirements kick in). We calculated the minimum annual spending amount for 1,000 simulated 30-year periods. The fifth percentile of this minimum annual spending is 2.35 percent of the original portfolio, inflation-adjusted. The RMD strategy also allows for a greater potential upside than the constant-dollar strategy. We calculated the median annual spending over each 30-year simulation, and then we looked at the median across 1,000 simulations. This "median of medians" was 5.89 percent of the original portfolio, a significant improvement from 3.8 percent fixed spending.

Note that all of these results will fluctuate depending on the return assumption, which we will discuss in greater depth later.

4. Square Footage: The Retirement Planning Horizon

We should now have an idea of the desired foundation for the systematic spending strategy. The next element that must be analyzed is an appropriate retirement planning horizon. We use the 2010 period life table from the Social Security Administration to judge the probability of any length of retirement. For clients seeking a safe spending rate, the baseline is a plan that fewer than 5 percent of retirees will outlive. As an alternative, we can consider the length of time at which only 1 percent or only 10 percent of retirees will outlive the planning horizon.

In general, a male retiree should plan to live to about 96 years in order to have a 5 percent or less chance of outliving the plan, while a female retiree should plan until age 98. A married couple retiring at age 65 can plan on at least one member of the couple living at least 34 more years (for a 5 percent-or-less chance of outliving the horizon). Table 1 provides the retirement planning horizon for any household type based on retirement ages from 55 to 80.

Table 1. Retirement Planning Horizons (Number of Years)

Retirement Age	Baseline: < 5% Chance of Outliving Horizon			Conservative: < 1% Chance of Outliving			Riskier: < 10% Chance of Outliving Horizon			Median: < 50% Chance of Outliving Horizon		
	Single Male	Single Female	Married Couple*	Single Male	Single Female	Married Couple*	Single Male	Single Female	Married Couple*	Single Male	Single Female	Married Couple*
55	40	43	44	44	47	48	38	40	42	25	30	30
56	39	42	43	43	46	47	37	39	41	24	29	29
57	38	41	42	43	45	46	36	38	40	23	28	28
58	37	40	41	42	44	45	35	38	39	22	27	27
59	36	39	40	41	43	44	34	37	38	21	26	26
60	35	38	39	40	42	43	33	36	37	20	25	25
61	34	37	38	39	41	42	32	35	36	19	24	24
62	33	36	37	38	40	41	31	34	35	19	23	23
63	32	35	36	37	39	40	30	33	34	18	22	23
64	31	34	35	36	39	39	29	32	33	17	21	22
65	30	33	34	35	38	38	28	31	32	16	20	21
66	30	32	33	34	37	37	27	30	31	15	20	20
67	29	31	32	33	36	36	26	29	30	15	19	20
68	28	30	31	32	35	35	25	28	29	14	18	19
69	27	29	30	31	34	34	24	27	28	13	17	18
70	26	28	29	30	33	33	23	26	27	12	16	18
71	25	27	28	29	32	32	22	25	26	12	15	17
72	24	26	27	28	31	31	22	24	25	11	15	17
73	23	26	26	27	30	30	21	23	24	10	14	16
74	22	25	26	26	29	29	20	22	23	10	13	16
75	21	24	25	25	28	28	19	21	23	9	12	15
76	20	23	24	24	27	28	18	20	22	9	12	15
77	19	22	23	23	26	27	17	20	21	8	11	14
78	19	21	22	23	25	26	16	19	20	7	10	14
79	18	20	21	22	24	25	16	18	19	7	9	14
80	17	19	20	21	23	24	15	17	18	6	9	13

* Assumes the married couple is the same age (male/female couples). For spouses of differing ages, the planning horizon should generally be based on the younger spouse's age.

** Does not account for current health status.

Source: Author's calculations based on Social Security Administration Period Life Table, 2010.

A single male retiring at age 80 has a 95 percent likelihood of living 17 years or less. For a 20-year planning horizon, safe spending rates found in the literature generally increase from about 4 percent to about 5 percent (Cooley, Hubbard, Walz 1998). On the other hand, a married couple retiring at 65 may want to plan on a horizon as long as 38 years (for a 1 percent or less chance of outliving the horizon). For this couple, the 4 percent rule may prove to be too dangerous, and spending 3.5 percent of the original balance may be more appropriate.

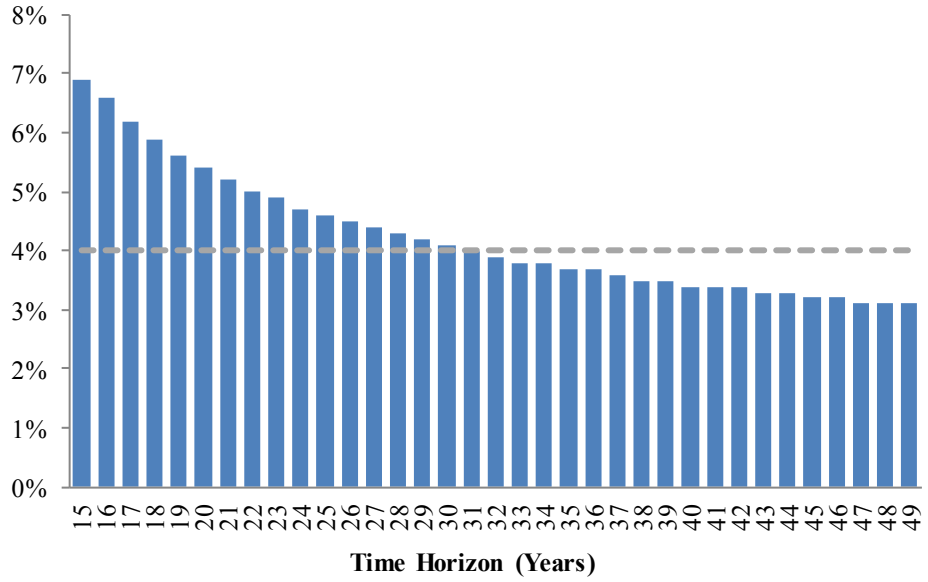
We calculated the maximum safe spending rate that results in at least 95 percent simulated success. For a 34-year planning horizon, the safe spending rate that provides this chance of success is 3.8 percent

(the baseline). For an extended horizon of 40 years, the safe constant-dollar spending rate falls to 3.4 percent. For a shorter horizon of 25 years, the safe rate jumps up to 4.6 percent (Chart 2).

We propose an approximate rule of thumb to increase or decrease safe and constant spending by 0.1 percentage points for each year more or less than 34 in the planning horizon.

For safe and flexible spending, an RMD approach will still dictate the spending percentage for ages 70 and above. During retirement years prior to age 70, spending should be reduced from 3.5 percent by 0.1 percentage point for each year of retirement prior to age 65. For retirement at ages 66 through 69, exercise caution and maintain 3.5 percent spending during the years before the RMD pattern takes hold.

Chart 2. Maximum Safe Withdrawal Percentage



Source: Author's calculations using baseline assumptions and 95% success rate.

Clients that instead choose to optimize spending may find it preferable to spend more early in retirement to maximize lifetime spending, but this must be balanced by the possibility of living longer than expected.

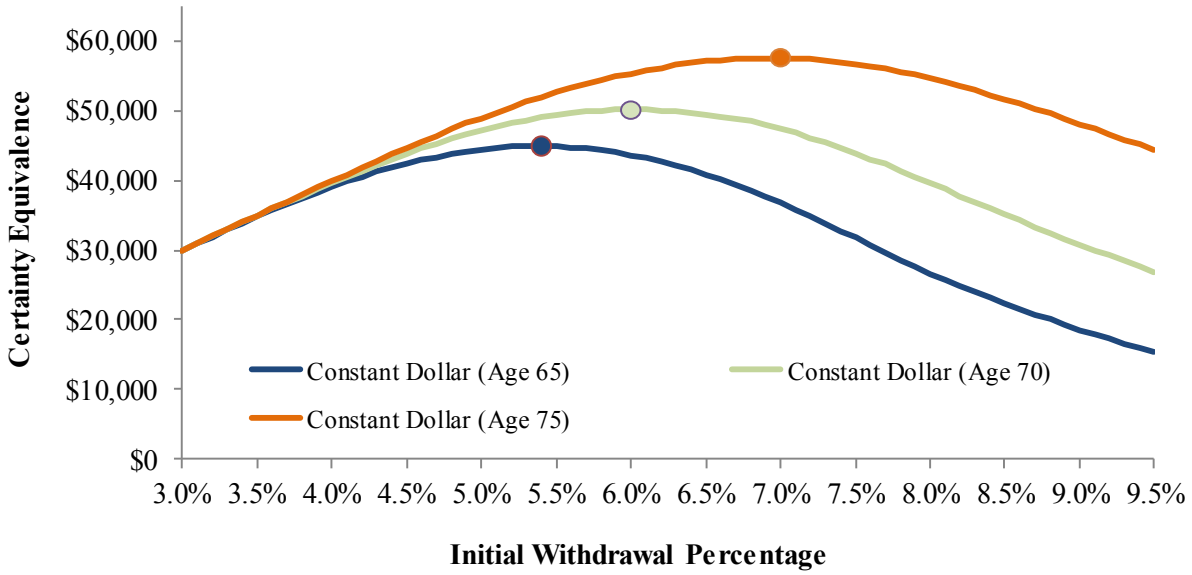
As the retirement age is delayed, it is optimal to start at a higher level of initial spending (Charts 3 and 4). The optimal and constant spending percentage increases from 5.4 percent for a married couple retiring at age 65 to 6 percent for that couple at age 70. For optimal and constant spenders, we propose a rule of thumb where married couples increase spending by 0.1 percentage points for each year that the couple delays retirement beyond age 65 (based on younger spouse's age).

The optimal and flexible strategy is an inflation-adjusted percentage starting at 5.6 percent for a married couple retiring at age 65. The optimal and flexible percentage is 6.6 percent for the married couple retiring at age 70. For optimal and flexible spenders, we propose a rule of thumb where the initial spending percentage is increased by 0.2 percentage points for each year a married couple delays

retirement beyond age 65. Unmarried retirees, especially men, may choose to further increase spending since they have a shorter potential time horizon than a married couple.

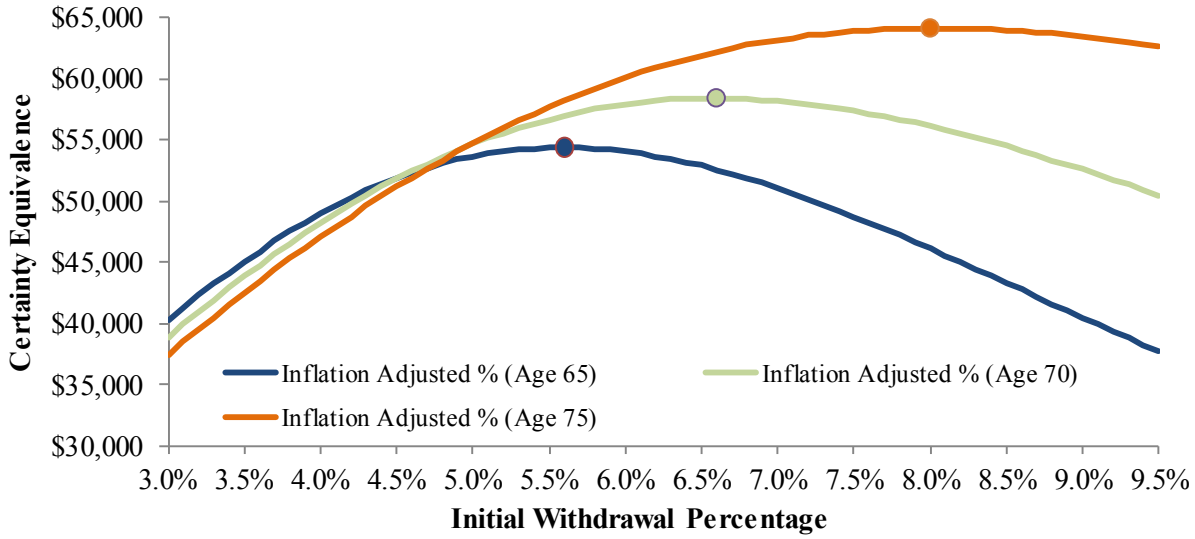
All this is a lot of analysis to make the rather obvious point that the length of expected retirement is critical to crafting an appropriate spending strategy.

Chart 3. Optimal and Constant Spenders: Utility by Retirement Age of Married Couples



Source: Author's calculations using baseline assumptions.

Chart 4. Optimal and Flexible Spenders: Utility by Retirement Age of Married Couples



Source: Author's calculations using baseline assumptions.

5. Needs and Wants: Accounting for Pension Income

To this point, we have assumed no pension income. In truth, many households of retirees today have a sizable pension. Many have pensions from corporate or government employers, and nearly everyone has a pension in the form of Social Security. For average retirees, pension income will make up the majority of retirement income (Munnell 2014, Delorme 2015). Any pension income should be a consideration for utility-maximizing clients (those with an optimal spending foundation).

It has been shown repeatedly in the literature that increased pension income relative to savings should result in riskier strategies for utility-maximizing households, which may entail higher spending or increased equity allocations. Milevsky and Huang (2011) seek to convince planners to advocate flexible spending patterns in order to maximize utility. The study offers several succinct and thoughtful conclusions, but the one that is applicable here is, "The larger the amount of the pre-existing pension income, the greater the optimal consumption rate and the greater the [portfolio withdrawal rate]." In other words, when pension income is higher, utility is maximized when the initial spending percentage is increased.

The bottom line is that "[a] greater income stream from Social Security, pensions, or annuities increases both the optimal withdrawal rate and allocation toward risky assets" (Finke, Pfau, Williams 2012). In Finke, Pfau, Williams (2012), the optimal constant-dollar spending increases from 4 percent to 5 percent for households with $60,000 in pension income as opposed to $20,000. Likewise, Williams and Finke (2011) find that optimal initial spending increases from 5 percent to 6 percent when the annual pension income increases from $20,000 to $65,000 (for a 60/40 stock/bond portfolio and gamma equal to 2).

Our analysis confirms that as the ratio of pension to savings increases, optimal strategies will spend a higher percentage of savings. We also find that as this ratio increases, the range of "near-optimal" spending percentages widens.

At its most extreme, imagine a case where a household will receive $50,000 per year from a pension but has only $10,000 saved. If the strategy is to spend 20 percent per year, the household will be able to spend roughly $52,000 for five years and $50,000 thereafter. This income stream is not drastically different from a household that chooses to spend 3 percent per year and may get to spend $50,300 for the length of retirement. Either way, the calculated utility depends mostly on the pension.

At the other end of the extreme, take a household with $1 million in savings and $0 annual pension. The amount this household chooses to spend has a huge effect on utility. If the household spends too much, it may run out of income prior to the end of retirement, a dire circumstance with no safety net.

Table 2 shows our results for optimal spending at various savings-to-pension ratios. A pension of $200,000 may be unrealistic, but a household with savings five times pension income is common (think of a household with $60,000 pension and $300,000 savings). Although the starting spending amounts may be higher than most planners would advise for risk-averse retirees, the pattern of increasing spending at higher relative levels of pension is clear. As the pension becomes more important, the range

of near-optimal outcomes also widens drastically. Again, this is because the pension is the critical component of retirement income and the structure of the spending strategy becomes less important.

At the low end of the savings-to-pension ratio, the range of near-optimal outcomes becomes so wide that there is little formulaic recommendation worth the time of clients. For these clients, it may be advisable to throw out systematic spending strategies entirely and instead focus on other priorities (Delorme 2015).

Table 2. Utility Maximizing Percentage Drawdowns

	Utility Maximizing Constant Dollar Percentage	Utility Maximizing Inflation-Adjusted Starting Withdrawal Percentage	Range of Near-Optimal Starting Withdrawals (Inflation-Adjusted Percentage)**
$1,000,000 savings and annual* pension…			
…$0	5.4%	5.6%	4.9% - 6.3%
…$20,000, a ratio of 50:1	5.6%	5.8%	4.9% - 6.8%
…$40,000, a ratio of 25:1	5.9%	5.9%	4.8% - 7.1%
…$60,000, a ratio of 16.67:1	6.1%	6.0%	4.7% - 7.5%
…$80,000, a ratio of 12.5:1	6.2%	6.1%	4.6% - 7.8%
…$100,000, a ratio of 10:1	6.4%	6.1%	4.5% - 8.2%
…$200,000, a ratio of 5:1	6.8%	6.4%	4.0% - 9.5+%
…$400,000, a ratio of 2.5:1	7.2%	6.6%	***

Source: Author's calculations using baseline assumptions.

*Pension amounts are assumed to be inflation protected.

**Near-optimal withdrawals result in certainty equivalence measures within 2% of the peak certainty equivalence.

***At low saving-to-pension ratios, it may be advisable to consider non-systematic withdrawals.

Finally, clients who seek safe spending strategies will probably not be influenced by the amount of pension. We can try to encourage those with generous pensions to consider optimal strategies because the safety net is more robust, but retirees focused on safety may not be convinced.

6. The Yardstick: Return Assumptions

The return assumptions used to model retirement income may be the single largest driver of outcomes. Unfortunately, we don't have a crystal ball that predicts future returns. Bengen (1994) simulates historical returns as they happened, assuming that history will repeat itself, or at least that the worst case in history will be no better than the worse possible case in the future.

An alternative assumption would be that future returns will not repeat past returns. Recent research suggests that "the success of the 4 percent rule in the United States may be a historical anomaly" (Finke, Pfau, Blanchett 2013). The compelling evidence for lower safe spending rates is today's historically low bond yields. The authors suggest that if bond returns are reduced for just five years, the 4 percent rule may result in failure rates as high as 18 percent. Dr. Pfau's retirement dashboard (retirementresearcher.com) takes account of current equity-market valuations and bond yields and suggests a safe initial spending rate below 3 percent (he also includes a 0.5 percent annual administrative fee).

The table below looks at suggested initial spending based on five different return assumptions. Baseline safe spending can fluctuate from 2.8 to 4.1 percent depending on the return assumption. The advisable action is probably to analyze the client's risk aversion and skew the spending amount appropriately. For planners, it may also be important to show the full range of outcomes so that the client can be fully informed of the limitations of any single model.

Table 3. Range of Starting Withdrawals by Return Assumption

	Safe and Constant	Optimal and Constant	Optimal Inflation-Adjusted Starting Percentage
Historical (480 Simulations)	4.1%	4.8%	5.1%
Bootstrapped Monte Carlo with Historical Returns (1,000 simulations)	3.8%	5.4%	5.6%
Bootstrapped Monte Carlo with 5 Years of Reduced Returns (1,000 simulations)*	3.4%	4.9%	5.5%
Mean/Variance Monte Carlo with Historical Returns (1,000 simulations)	3.2%	4.8%	5.2%
Bootstrapped Monte Carlo with Permanent Reduced Returns (1,000 simulations)*	2.8%	4.4%	5.0%

Source: Author's calculations using baseline assumptions. Sustainable constant dollar has 95% success for 34 years.
*Equity returns reduced by 3.33% per year, bond returns reduced by 0.80% per year. Historical inflation is used.

For safe and flexible strategies (not shown in the table), we suggest potentially reducing the RMD + 0 percent by up to 1 percentage points (the difference between the baseline model and the worst-case model for the safe and constant starting percentage), or reducing the Blanchett simple calculation similarly.

7. Design Aesthetic: Equity Exposure, Bequest Motive, and Fees

There has been considerable recent research on the optimal asset allocation strategy in retirement. In general, recent research suggests that outcomes may be improved with a rising equity glide path, but the findings depend on input assumptions (Pfau and Kitces 2015). Delorme (2015b) finds that rising equity glide paths lead to higher utility measures, but the improvement is small compared with static or declining equity glide paths.

This paper is relatively agnostic about asset allocation in retirement. The share of equities in a retirement portfolio may be affected by the amount of pension income, the measure of success, the retirement horizon, and other factors that have been mentioned. It may be difficult to get clients to drastically adjust asset allocations once a decision is embedded.

While planners may hope to guide retirees toward a higher or lower equity allocation, the decision will ultimately be made by the client. For this reason, existing research must be adjusted to meet the client's risk tolerance. For example, there are circumstances where retirees are not comfortable with an allocation to equities greater than 30 percent. Bengen (1994) finds that a 25 percent allocation to

equities results in a reduced safe spending rate. Dr. Pfau's retirementresearcher.com offers current sustainable spending rates using three alternative equity allocations (he uses return assumptions that are lower than historical data).

For clients who seek safe spending, we propose no change based on equity allocation within the range of 30 to 60 percent. Our analysis suggests that this range produces a shift of plus or minus only 0.2 percentage points from initial spending. This change is small enough that we propose no spending change based on equity allocation.

For optimal spenders, increased exposure to equities may encourage higher spending. Table 4 looks at the optimized starting percentage under our baseline assumptions for various equity allocations. Generally, an increase of 0.2 percentage points for every additional 10 percent allocated to equities is advised.

Table 4. Optimal Starting Withdrawals Based on Static Equity Allocation

Equity Allocation	Optimal and Constant	Optimal Inflation-Adjusted Starting Percentage
30%	4.9%	5.2%
40%	5.1%	5.4%
50%	5.4%	5.6%
60%	5.6%	5.8%
70%	5.8%	6.0%
80%	6.1%	6.2%

Source: Author's calculations with baseline assumptions.

Clients may also have strong feelings toward leaving a bequest to their heirs. Whether or not it is financially advisable, many clients will insist on bequeathing as much as possible to children and grandchildren. Others will have little to no motivation. The math is fairly simple for those with a bequest motive: the lower the spending, the greater the bequest potential.

Likewise, the higher the fees are, the lower the proposed spending should be. Our analysis to this point unrealistically assumed zero fees. We propose across-the-board spending reductions equal to the amount of fees regardless of the strategy.

8. Conclusion: How to Use the Blueprint

Existing research does an excellent job of prescribing retirement spending strategies for specific types of retirees. Most notably, research tends to focus on married couples retiring at age 65 with no pension income. The research tends to prescribe either safe or optimal strategies but not usually a decision between the two.

We suggest that client preference should drive the spending strategy. A foundation can be engineered that accounts for client preference for either safety or optimization and for either constant-dollar spending or variable spending. After these preferences have been revealed, there are systematic ways

to adjust the spending amount based on the retirement horizon, amount of pension, return assumptions, equity exposure, bequest motive, and expected fees. We hope that this systematic blueprint will help to provoke client/planner discussions about spending in retirement.

A summary graphic is provided below that acts as a decision tree to develop an appropriate initial strategy.

Foundation	**Safe and Constant**	**Safe and Flexible**	**Optimal and Constant**	**Optimal and Flexible**
Strategy	Constant Dollar	RMD, or inflation-adjusted percentage	Constant Dollar	RMD, or inflation-adjusted percentage
Baseline spending amount (65-year-old married couple, $0 pension, $0 fees, 50/50 stock/bond)	3.8% of initial balance	RMD + 0%, or Blanchett simple calculator	5.4% of initial balance	5.6% (inflation-adjusted percentage), or RMD + 2.7%
Adjustment for planning horizon (retirement age)	+/- 0.1% for each year above or below 34 in the planning horizon.	Reduce spending prior to age 70 by 0.1% for each year of retirement prior to age 65. Maintain RMD spending pattern otherwise (with 3.5% from ages 65-69).	Married couples can add 0.1% for each year retirement is delayed past age 65 (younger spouse). For singles, consider even higher withdrawals.	Married couples can add 0.2% for each year retirement is delayed past age 65 (younger spouse). For singles, consider even higher withdrawals.
Adjustment for pension	No change proposed for safe spending.		Add up to 2% depending on amount of pension.	
Adjustment for return assumptions	Subtract up to 1 percent for alternative return assumptions.			
Adjustment for Equity Exposure	No change proposed for equity allocations between 30 and 60 percent.		+/- 0.2% for each 10 percentage point increment above or below 50 percent equities.	
Adjustment for Fees and Bequest Motive	Reduce spending by total amount of fees. Further reduce for bequest motive.			

9. Appendix

We have gone through what we believe to be the most critical elements of client preference and characteristics to help construct a blueprint for retirement spending. Let's use the blueprint for two example clients to show how this can be used to inform an appropriate strategy.

Client Example #1:

- *Married couple, retiring at age 62 in good health.*
- *Strong preference for safe and constant spending.*
- *No pension income beyond Social Security.*
- *Conservative portfolio of 30 percent equities.*
- *Administrative fees of 0.50 percent.*
- *Relatively strong bequest incentive.*

Foundation: It seems clear that this client should choose a safe constant-dollar strategy. The baseline suggestion is constant annual spending equal to 3.8 percent of the current portfolio.

Square Footage: The good health of the couple and early retirement suggests a planning horizon of 37 years. Reduce spending by 0.3 percentage points, bringing annual spending to 3.5 percent.

Needs and Wants: The small Social Security benefit does not affect the spending strategy.

The Yardstick: Given the seemingly high risk aversion of the couple, consider reducing spending by up to 1 percentage point. The spending amount is now between 2.5 and 3.5 percent.

Design Aesthetic for Asset Allocation: The conservative allocation does not drastically change the safe constant-dollar strategy.

Design Aesthetic for Bequest Motive and Fees: Reduce spending by 0.5 percentage points for administrative fees. Consider reducing by an additional 0.5 percentage points for bequest motive.

Final Proposed Blueprint: 1.5 to 3 percent constant-dollar spending. This is among the most conservative clients.

Client Example #2:

- *Married couple, retiring at age 75 in average health.*
- *Utility maximizers that can handle flexible spending, love travel, and want to live it up.*
- *Pension plus Social Security income equal to $60,000 per year (compared with $1 million in savings).*
- *Moderate portfolio of 60 percent equities.*
- *Administrative fees of 0.80 percent.*
- *No bequest motive.*

Foundation: This client is a utility maximizer who understands that spending will change when market returns fluctuate. The baseline suggestion is 5.6 percent spending. We will adjust the percentage each year for inflation.

Square Footage: Add two percentage points for retirement at age 75. This brings initial spending to 7.6 percent.

Needs and Wants: With the relatively robust safety net, the household may be comfortable with higher spending. Based on the ratio of savings to pension (16.67 to 1), increase spending by 0.4 percentage points. This brings initial spending to 8 percent.

The Yardstick: Based on return assumptions, spending could be between 7 and 8 percent.

Design Aesthetic for Asset allocation: A 60/40 portfolio suggests an additional 0.2 percentage points, bringing the range up to 7.2 to 8.2 percent.

Design Aesthetic for Bequest Motive and Fees: Reduce spending by 0.8 percentage points for fees. The total initial spending is 7.4 to 8.4 percent. The percentage would increase by the rate of inflation each year. If the client prefers an RMD-based strategy, this initial rate would represent an additional 3 to 4 percent on top of the calculated 4.4 percent RMD at age 75. An RMD + 3 percent strategy may be an appropriate suggestion. This is among the more aggressive plans, but would represent an economically efficient spending strategy and would minimize the likelihood of under-spending.

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