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PGIM DC SOLUTIONS

SPENDING FLEXIBILITY AND OPTIMAL PORTFOLIO RISK LEVELS

AUTHOR

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As the retirement solutions provider of PGIM, we plan to deliver innovative defined contribution solutions founded on market-leading research and capabilities. Our highly-experienced team partners with clients on customized solutions that seek to solve for current challenges facing DC participants. As of 12/31/2024, PGIM has $170 billion[2] DC assets under management and PGIM DC Solutions AUM is $1.3 billion.

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Retirement is seldom as simple as commonly assumed in research and financial planning tools. Inadequate models can result in bad advice for investors and retirees. I recently wrote a research paper with David Blanchett that introduced a better way to think about the retirement liability and demonstrates that doing so can result in notably different optimal risk levels for retirees.

In the below brief I will examine the following:

- Rethinking the retirement income goal
- Decomposing retirement spending into Needs and Wants
- Measuring participant outcomes
- Determining retirees' optimal portfolio risk profiles
- Dynamic spending considerations: the practical aspect of variable retirement withdrawals
- The implied cost of spending flexibility: what's it worth?

[1] PGIM DC Solutions does not establish or operate pension plans.
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Rethinking the Retirement Income Goal

Many of today's retirement strategies assume that the retirement income goal is fixed, or inflexible, rather than variable, or flexible, when modeling participant outcomes. This unrealistic assumption implies retirees have neither the desire nor the ability to change their spending over time.

In reality, most retirees can adjust their spending, at least to some extent, if they suspect their savings may not last throughout retirement. Alternatively, if markets do well, retirees can potentially spend more than originally planned. The flawed assumption that retirement spending is static has significant implications on a myriad of retirement decisions, particularly determining the optimal risk level for retirement income generating portfolios.

Retirement Spending: Needs vs Wants

To further explore the retirement income goal and how to account for retirees' ability to adjust spending, a deeper dive is necessary. In our recent paper titled "Retirement Income Beliefs", we discussed the concept of decomposing retiree spending into two categories: Needs and Wants.

Source: PGIM and Bureau of Labor Statistics (BLS) Consumer Expenditure Surveys. For illustrative purposes only.

Needs Spending: These expenses are generally less flexible and tend to be recurring in nature. Retirees generally have less discretion over the level or frequency of these types of expense.

Wants Spending: These expenses are generally more flexible and may be more irregular in nature. Retirees tend to have more discretion in both the level and frequency of these expenses.

Another way to think about Needs and Wants is the desired certainty for the various underlying types of spending. Expenditures for which retirees desire a high level of certainty, i.e., Needs, would generally be considered "inelastic" in nature (from an economist's perspective), while those expenditures which require less certainty, i.e., Wants, would be considered more "elastic."

Distinguishing between the required level of certainty for different types of spending has important implications when thinking about how to invest a retiree's assets. Asset supporting Needs, spending would have a different risk profile than Wants spending. For example, a portfolio focused on Needs would likely have a greater focus on downside protection and inflation protection, while a portfolio focused on Wants would have more of a growth focus.

Measuring Outcomes

The probability of success is a widely used metric that measures the effectiveness of retirement income solutions, and is very common in financial planning tools. A key issue with relying on probability of success-related metrics is that they ignore the size, or magnitude, of failure. Ignoring the magnitude of failure can result in guidance that is incredibly unintuitive. For example, if a retiree had a target annual income goal of $100,000 for 30 years but were to fall $1,000 short in the final year of retirement, the outcome would be treated as a "failure" using traditional probability of success-related metrics, even though nearly 99.9% of the goal was achieved.

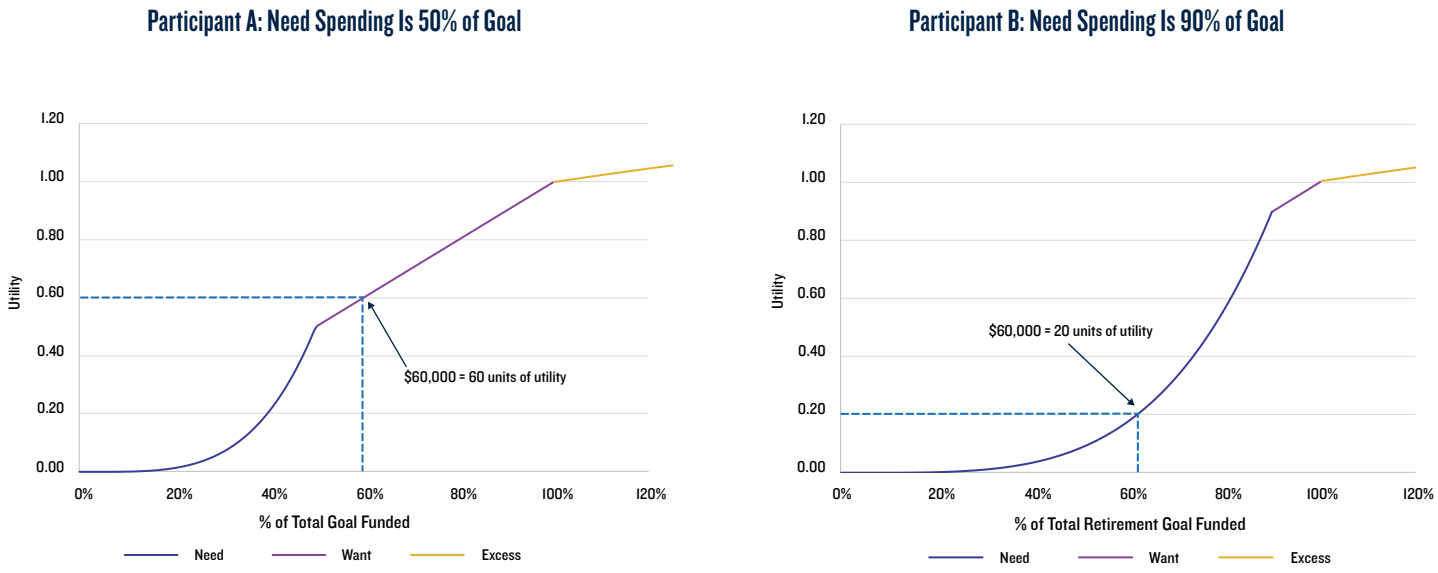
We believe using a metric that focuses on goal completion can be more intuitive since this type of metric provides some perspective on what portion of the goal is going to be accomplished. Even a retiree with a 0% chance of success could be on track to replace 80% (or more) of the retirement goal based on existing guaranteed income levels.

Additionally, we think it's important to incorporate retiree preferences, via a utility function, when estimating the respective goal completion metric. Utility is a way to measure how someone feels about achieving a given outcome, where the greater the utility, the greater the implied happiness. While utility approaches are relatively common in academic research on optimal retirement strategies, they are relatively rare in client-facing solutions because they can be unstable and hard for the average investor to understand.

Our specific approach uses a utility function rooted in prospect theory, which is based on the belief that individuals evaluate outcomes based on a specific reference point and that deviations from this goal are valued differently. More specifically, prospect theory suggests individual utility functions are concave in the domain of gains and convex in the domain of losses. In other words, losses tend to hurt more than gains.

Exhibit 1 provides a relatively straightforward example of how to interpret a utility function, based on two assumed participants with either 50% or 90% of the goal as Needs, for Participant A and B, respectively.

Exhibit 1: Utility of Income for Various Goal Funding and Needs Levels



Source: Blanchett and Stempien, 2022, "Spending Elasticity and Optimal Portfolio Risk Levels."

The expected level of utility (i.e., happiness) increases as the goal is increasingly funded, but at notably different rates (depending on the breakdown between Needs and Wants). Participant A will generate significantly more utility by funding 60% of the total goal than Participant B because the Needs portion of the goal is fully funded. While both participants are achieving the same income level, the notably different levels of utility can have incredibly important implications for the optimal retirement income strategy. For example, Participant B would likely benefit more from allocating additional savings to guaranteed income than Participant A, in order to reduce the possibility of a shortfall and the significant penalty (i.e., disutility) associated with it.

We can use our utility-adjusted goal completion metric to more accurately account for the unique composition of the retiree liability and therefore provide a better estimate of what the optimal portfolio risk level should be.

Analysis of Optimal Portfolio Risk Levels

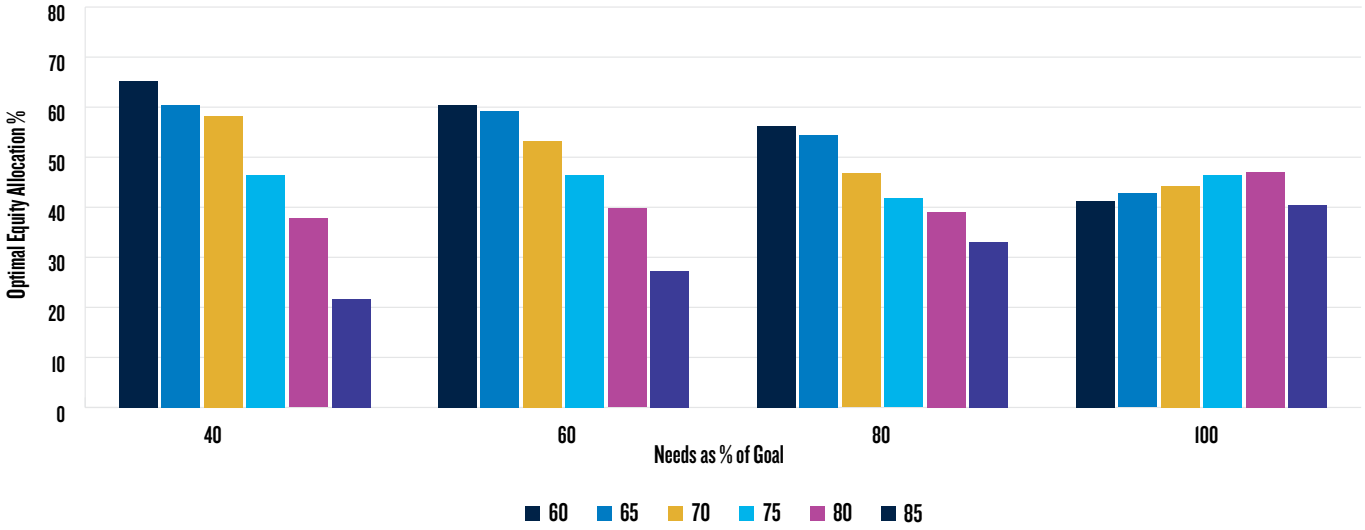
Using Monte Carlo analysis, we determined the optimal portfolio risk levels (i.e., equity allocations) for retirees' retirement savings for different situations (i.e., savings levels, guaranteed income levels, retirement ages, and Needs percentages) and for different preferences. We focus on two specific preferences for our analysis: income volatility preference and risk tolerance.

- **Income volatility preference** represents an individual's desired level of income volatility during retirement. A retiree with a high income volatility preference would be comfortable with more variation in their retirement income in the hope that on average this will increase their amount of income. For example, they would be comfortable with having $50,000 to $80,000 in retirement income per year, versus a fixed $55,000, because their average expected income level ($65,000) would be higher, although with increased variability.
- **Risk tolerance** is an individual's preference regarding portfolio volatility (i.e., risk). A retiree with a high risk tolerance would be more comfortable taking on portfolio risk if it is expected to improve their retirement outcome, while a retiree with a low risk tolerance would need higher levels of income to be comfortable investing in a more aggressive portfolio. This is conceptually similar to income volatility preference, but focused on portfolio volatility (versus income variability). For example, a retiree who had a low risk tolerance might invest in cash, which has a relatively low standard deviation; however, since it also has a low return it might result in a lower level of income during retirement. Therefore, it might be possible to persuade a retiree with a low risk tolerance to invest in a more aggressive portfolio, but only if it results in a meaningful increase in expected retirement income.

Exhibit 2 provides some perspective on the average optimal equity allocations across the scenarios considered for retirees with moderate income volatility and risk preferences with different Needs percentages and retirement ages. There is a clear effect that the optimal equity allocation changes as the Needs percentage changes, where younger retirees with higher Needs percentages typically have more conservative portfolios than younger retirees with lower Needs percentages. Also, older retirees with higher Needs percentages typically have more aggressive portfolios than older retirees with lower Needs percentages. Additionally, the glide paths for the 100% Needs portfolios (across ages) is relatively flat, while the slope of the glide paths increase as Wants become a larger component of the retiree goal.

Exhibit 2: Average Optimal Equity Allocations by Needs Percentage and Age

Moderate Income Volatility Preference and Moderate Risk Tolerance

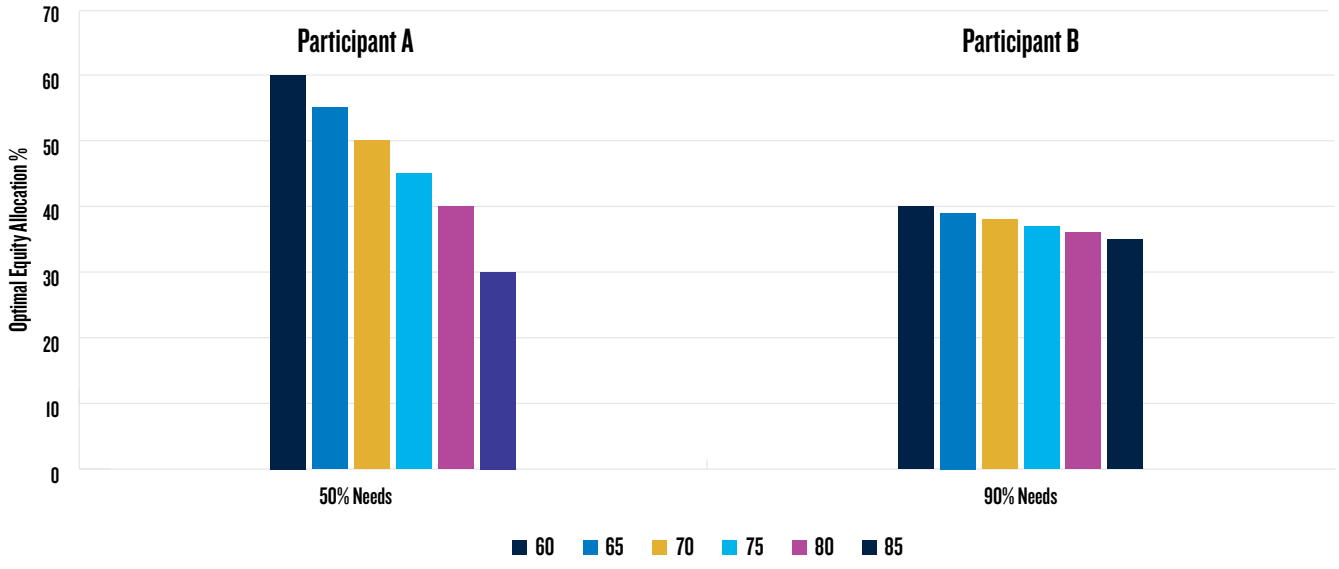


Source: Blanchett and Stempien, 2022, "Spending Elasticity and Optimal Portfolio Risk Levels."

Continuing with the example from Exhibit 1, we can estimate the optimal equity allocation for Participants A and B for various ages and include the results in Exhibit 3. The equity allocations for both participants reflect a funded ratio of 1.0 (i.e., 100% funded) for the total retirement goal.

Exhibit 3: Optimal Equity Allocations by Age and Needs Percentage for Participants A and B (from Exhibit I)

Moderate Income Volatility Preference and Moderate Risk Tolerance



Source: Blanchett and Stempien, 2022, "Spending Elasticity and Optimal Portfolio Risk Levels."

Exhibit 3 also demonstrates that while Participants A and B have the same level of retirement savings and the same target annual retirement income goal, there are significant differences in the optimal equity allocations, and glide paths, given their differing projected Needs spending. Participant A, who has more flexibility with retirement spending (i.e., is 50% Needs and 50% Wants) can take on considerably more risk at younger ages than Participant B and should decrease the risk level of the portfolio considerably throughout retirement.

Our analysis considers a variety of potential retiree scenarios. A summary of the more general results is included in Exhibit 4 and deeper discussion is included in the research paper.

Exhibit 4: Portfolio Implications of Various Scenario Assumptions

Scenario Variables	Key Takeaways
Retiree Risk Tolerance (e.g., conservative, moderate, aggressive)	Higher levels of risk tolerance are, not surprisingly, associated with more aggressive portfolios.
Income Volatility Preference (e.g., low, mid, high)	The portfolio implications of income volatility preference are more varied. A retiree more comfortable with income variability will have a more aggressive portfolio, on average.
% of Guaranteed Income (e.g., funding 20%, 40%, 60%, or 80% of the retirement income goal)	When the retirement income goal is assumed to be inflexible (i.e., 100% Needs), the amount of guaranteed income has little impact on the optimal equity allocation. In contrast, when the retirement goal is assumed to be somewhat flexible (70% Needs), there are notable differences in the optimal equity allocation depending on the guaranteed income benefit level, especially when guaranteed income benefit levels are just below or above the desired spending rate.
Retiree Funded Status (e.g., the initial withdrawal rate)	The portfolio funded status affects the allocation the most for retirees who are underfunded, where there can be significant differences depending on other scenario assumptions; however, as the retiree's funded status improves the optimal risk levels tend to compress.

Overall, our analysis suggests that incorporating spending elasticity into the portfolio optimization process is likely to result in more aggressive portfolio risk levels for younger retirees (e.g., age 60) and more conservative for older retirees (e.g., age 80), on average, and that incorporating additional factors further customizes the optimal risk level for individuals.

Dynamic Spending in Retirement

Retirees typically have some control over withdrawals and will likely adjust spending (to some extent) based on their portfolio value and market fluctuations, as previously discussed. The majority of today's retirement income solutions and financial planning tools assume a static retirement spending, which essentially treats the entire retirement income goal as Needs. Although there are decades of research on incorporating adaptive (i.e., dynamic) spending rules in retirement, these strategies have incredibly low adoption in financial planning tools to date.

We've developed a dynamic spending framework that is designed specifically to work inside a financial planning forecast that is based on the concept of the funded ratio. The funded ratio is a metric commonly used to describe the health of pension plans and can also be used to estimate the ability of an individual to fund his or her (or their) retirement spending goal.

As opposed to estimating a single overall funded ratio for a retiree, we estimate two separate funded ratios, based on their Needs and Wants, consistent with the perspective that retirement is not really a single goal, but a combination of goals with varying levels of elasticity. Our approach assumes all assets are available to fund the Needs goal while the Wants funding is assumed to be marginal only after considering Needs spending. We can apply dynamic spending adjustments to each goal that vary across different funding levels. Our model results in a notable improvement in retirement income forecasts and can yield guidance on other investor decisions (like how much to save, when to retire, etc.) compared to using tools that assume a completely static retirement income spending goal.

The Implied Cost of Ignoring Spending Elasticity

Our analysis clearly demonstrates that considering spending flexibility can lead to significantly different estimates of optimal risk levels for retirees. To provide additional context on the cost of ignoring spending flexibility when solving for optimal equity allocations, we perform a separate analysis to determine the additional balance required to generate the same level of utility as the optimal portfolio when the unique structure of the liability is ignored (i.e., it is treated as 100% Needs versus based on the actual retiree breakdown).

Our analysis suggests that there are significant implied costs associated with ignoring spending flexibility. We estimate the average balance for a 65-year-old retiree would need to be 14.4% higher, on average, if portfolio risk levels are determined ignoring spending elasticity (i.e., assumed to be 100% Needs) and 10.2% higher, if the portfolio risk level is a constant 40% equities, versus when portfolio risk levels are determined based on the unique asset and liability composition for that retiree.

For reference purposes, a retiree would need to generate 30-56 basis points of annual alpha to generate the equivalent balance increases. This suggests a retiree is likely to incur a significant implicit cost if spending flexibility is ignored when determining optimal portfolio risk levels.

Conclusions

Retirement is significantly more complex than assumed in most retirement income solutions available to DC participants today. A notable shortfall is the assumption that the retirement spending goal is inflexible, or more simply that a retiree is unable and unwilling to "change course" during retirement depending on how their situation evolves. This is an incredibly simplistic assumption and unlikely to reflect the actual choices a retiree would make in retirement.

Incorporating spending flexibility has a notable impact when determining the optimal portfolio risk level. We find evidence that ignoring spending flexibility can result in allocations that significantly differ from the efficient portfolio had spending flexibility been considered. Acknowledging the varied spending of individuals during retirement based on portfolio health indicates embedding dynamic spending elements in retirement income solutions will result in better outcomes for participants.

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