

LDI for Individual Retirement Planning: A Good Fit

Corporate Defined Benefit Practices Applied to 401(k) and IRAs

Version for Employees and Their Advisors

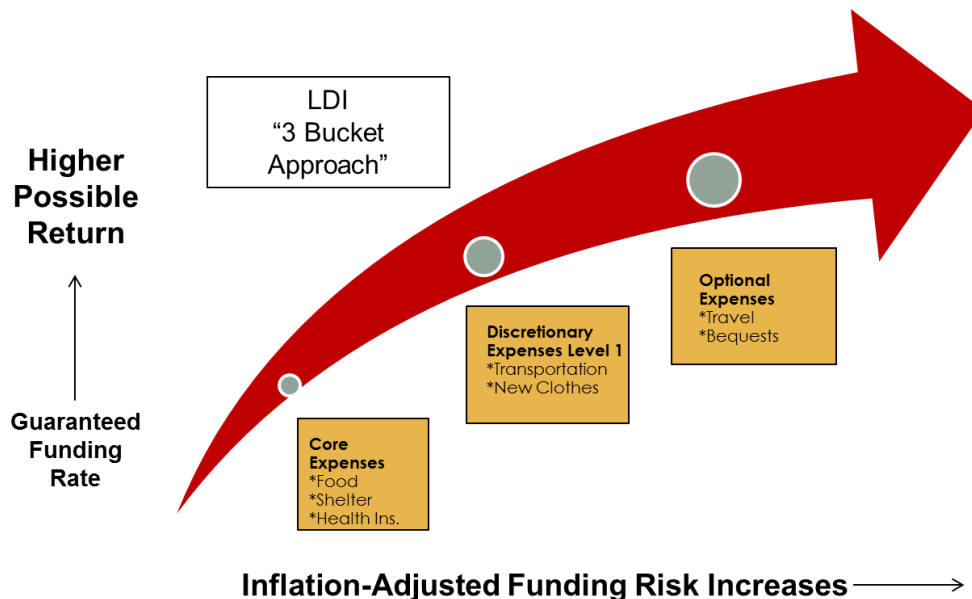
(This is food for thought, not advice*)

This essay is for people who are wondering how to safely turn their 401(k) savings into lifetime purchasing power, especially those who are about to make the leap into the great unknown of retirement. They will need to maintain their desired lifestyle with as much security and permanence as possible. In the corporate pension world, a process known as Liability Driven Investing (LDI) has become a best practice for managing the risk of running out of money. We suggest individuals should learn about LDI as an option to consider for their own retirement planning.

While older consumers have the most urgent need for understanding the benefits of what we propose, other readers may be planning ahead. It's helpful for everyone to know the concepts.

Here's an illustration of what LDI for individuals might look like:

Financial Economics Concept: Higher returns come with higher risk
LDI Concept: Critical expenses should be funded with secure cash flows



In our chart, **the bucket labeled "Core"** is positioned lower left, indicating a near-zero tolerance for the risk of not being able to meet must-have expenses such as food, shelter and health care. LDI suggests the source of cash flows used to fund this bucket should be guaranteed in order to

match the economic profile of the need. Social Security income is one example, but it may not be enough to cover all Core expenses for life (especially after the death of one of the spouses). Another Core cash flow example is an annuity with a built-in cost of living adjustment (COLA). Those fortunate enough to cover their core expenses without needing Social Security to fund them should weigh the benefits of delaying it.

The “Discretionary” bucket is to the right, indicating a consumer’s willingness to accept more uncertainty for expenses that they see as less critical. This bucket is also higher on the chart, indicating that investments with more potential return might be chosen to fund these discretionary items. One benefit of higher expected return assets is they add hoped-for increases in future cash flows to the model, and higher returns means less savings are required to fund those buckets versus what is required to generate the guaranteed income in the Core category.

The “Optional” bucket is even further right and higher still, representing both higher funding variability and higher possible return.

When risky investments do poorly, retirees may have to reduce Discretionary and Optional expenses, but their Core needs, funded with low risk assets, will be covered. If riskier investments like stocks and bonds do well, retirees may be able to easily cover and even increase the expenses in their Discretionary and Optional buckets.

Case Study: Connie and Ziggy’s Retirement Nightmare

The following real world example may help to clarify the reasons why individuals need a better retirement solution than what is commonly used today.

Connie and Ziggy, a married couple well into their retirements by 2008, were not ready for the global financial collapse that engulfed them back then. In an effort to be wise with their finances, they’d created a retirement plan many years before. They’d sought retirement planning advice from competent investment professionals who followed standard industry best practices. It was based on asset allocation theory modeled with statistical simulations. While this was a current best practice for individual investment advice, and blessed by the firms’ compliance departments, they were unaware of a risk reduction approach followed by corporate pension plans since before 2008 known as Liability Driven Investing (or LDI).

Their plan included Ziggy selling his optical business but continuing to work there part time. He could walk to work from their condo, a home which held tremendous sentimental value for them. Both agreed that aging in place was their top priority in retirement (Note: This seems a common goal for retirees in America; a 2018 AARP survey found 76 percent of those ages 50 and older said they preferred to remain in their current residence as they age.)

The global financial collapse of 2008 created a crisis that grew by the day as a threat to their dream. Like many Americans, they were exposed to several pitfalls in common retail financial planning strategies. To begin with, the common use of risk tolerance questionnaires to determine asset allocations turned their retirement security into a stressful nightmare.

This couple did not understand how much their investments were designed to fluctuate. They knew their portfolio could vacillate, but did not fully comprehend they were susceptible to big declines at any point in time. Their advisors' computer simulations modeled average annual losses within a likely range of "plus x and minus y percent" two thirds of the time. Less understood was the potential for losses of y percent "or more" one sixth of the time. The Global Financial Collapse that began in 2008 was the "or more" part of that bargain.

Former Wharton professor David Babbel describes the problem of retirees counting on retirement income from projections based on statistics as like playing Russian roulette with live ammunition: "[the risk] may only be 15%... [but] that is roughly equivalent to the 16.7% odds of losing in a game of Russian roulette... and few people are prone to participate in such games!"

Panicked by such a market decline, Connie and Ziggy tried to find a better solution from a different company. But without realizing it they were essentially put right back in the same portfolio. They again received the standard recommendation – using statistics to create a diversified portfolio without regard to matching assets with expenses – and their ability to cover their essential needs like housing was still in question. Their must-haves were lumped in with more discretionary things like entertainment, and averaged into risk tolerance scores that exposed their entire budget to fluctuations in stock and bond markets.

Connie and Ziggy didn't know how this was risky for them because they were not offered a sensible alternative. The outcome was terrifying.

Looking back, Connie believes it is impossible to pinpoint what came first: the onset of Ziggy's failing memory or the financial collapse. However, she knows the bear market was clearly a contributor to the exponential increase in his overall stress levels. Causes and effects for dementia and Alzheimer's typically highlight psychological factors that include anxiety and depression. Ziggy began a daily obsession of watching price declines of their mutual funds in the paper. He lost sleep and grew more and more forgetful. This unfortunately compounded the overall situation as it also impacted his part time employment, which in turn contributed to further progression of his memory loss.

Connie still remembers her husband's biggest concern was that their brokerage account would run out of money. He had crunched their spending numbers enough to know what would happen if he died first and the investment account failed: Connie would lose one of their two Social Security checks and would struggle financially to remain in the condo alone. Whether this

outcome was probable or not based on their advisor's statistics-driven simulations was irrelevant. To Ziggy it simply felt like Connie's safety was at risk.

The condo was their most important must-have expense item. The idea of losing it felt like an existential threat. The need for a fail-safe funding strategy was never discussed. Their financial plan put them in an unmatched position, they did not know how to solve it, and hearing the words "just change your spending" didn't fix it.

In 2009, their financial advisor recommended switching to a fee-based discretionary account diversified with low cost ETFs. This was still a mix of risk exposures and many of the values continued to decline. Signs appeared that Ziggy's forgetfulness was progressing rapidly. Their financial adviser lost patience while trying to keep him calm, insisting he look at the return of the whole portfolio instead of individual funds. This was an exercise in futility. Ziggy's diminished capacity kept him from appreciating the logic of a diversified mix of risky assets.

They next tried moving their account to a discount brokerage, where they were guided to invest in a professionally managed active mutual fund program. This approach was nearly identical to that of their prior firm. Unfortunately, many of these new funds fared poorly as well. To add to their despair, Ziggy lost his job. The new owner of the business told Connie Ziggy couldn't continue interfacing with customers given his memory loss. It was like a rogue wave to their financial plan. Sadly, the disease progressed quickly, leading to a nursing home, physical decline from things such as urinary tract infections and, tragically, hastened his death a year later.

Connie's physical health deteriorated during this time too. The stress of watching her beloved suffer and slip away, plus the pressure of assuming sole decision making responsibility for their financial security, became too much to bear. It was all new to her, and scary. She wishes there could have been a different way they could have budgeted for retirement and that they done so well in advance.

What if they had prioritized their retirement expenses into three buckets based on what was most important to them? The approach of segmenting and funding different expenses with more economic precision would have eased Connie and Ziggy's overall stress and does not require rocket science. If implemented from the start, it may have helped Ziggy live longer.

The following hypothetical table illustrates the concept of a list of expenses that are categorized according to an individual's needs and wants, and then matches them with a funding solution that has similar economic characteristics.

Example of Categorizing Expenses in a Hypothetical LDI-Like Framework
Set by the Individual(s)

Expense Item	Most Important	Discretionary	Optional	Funding Match
Food	*			*Social Security
Shelter costs: HOA, Taxes, Maintenance	*			*Annuity W/COLA *Reverse Mortgage
Health Insurance	*			*Medicare *Social Security *LT Care Insurance
Income Taxes	*			*Social Security
Liquidity	*			*Savings *Reverse Mortgage
Transportation		*		*Social Security
Inheritances			*	*Home Equity *Investments *Life Insurance
Travel/Entertainment			*	*Social Security *Investments
Clothing Other Optional Items			*	*Investments

Like Corporate Pension Plans' Three Bucket Approach

Companies with defined benefit pension plans record their retirement promises they've made to employees as liabilities (expenses) on their balance sheets. They regularly calculate their pension liability amounts each year relative to the assets they have saved, which indicates whether they are fully funded for all current and future pensions as employees retire. Not all employees retire in any one year, so not all pension promises are due in any one year.

Companies separate their different employees' pension needs by the dates they will be due, and match them with income cash flows of similar economic certainty. The same kind of three bucket approach is used: current and near-term pensions are their "core" bucket (modeled with lower interest rates). Large pension plans often fund this bucket with annuities.

For their employees retiring in the medium term, pension asset needs are estimated using intermediate income sources that have higher expected returns but also higher expected risks.

Pensions due long into the future are modeled with even less certain income sources (which will hopefully generate higher income).

The plan is considered “fully funded” when the present value of the income from the weighted average of the three asset buckets matches the present value of the three pension liability buckets – that is, the pension plan is then in a matched position, protected against the risk of running out of money to pay pensions when they are due as people retire.

Most experts agree this rule has made pension disclosure more transparent and more secure by removing the discretion of plan sponsors and actuaries to assume higher returns for the first two buckets, such as potentially higher returns from stocks.

Securing an Individual’s Retirement Plan

If current law says that different corporate pension liabilities should be valued with assets of a similar economic risk/return profile, we equate this for individuals by saying retirement expenses should be paired with income streams having a similar risk/return profile. Applying this approach simply requires defining expense risk buckets in customizable way, tailored to each individual’s differing needs and wants, and then finding income vehicles that will match those needs based on basic economic finance. Don’t worry -- we will explain this concept further as we go into real world applications!

The Importance of Inflation Adjusted Income

To review, the three buckets represent different risk levels. The retiree may want to take as little risk as possible with their assets that cover core expenses, adjusted for inflation. Social Security is a government guaranteed annuity with built-in inflation protection. As such it would be ideal for funding the core bucket except, for most people, even if they wait to claim benefits at age 70, the monthly benefit is often not enough to cover core expenses.

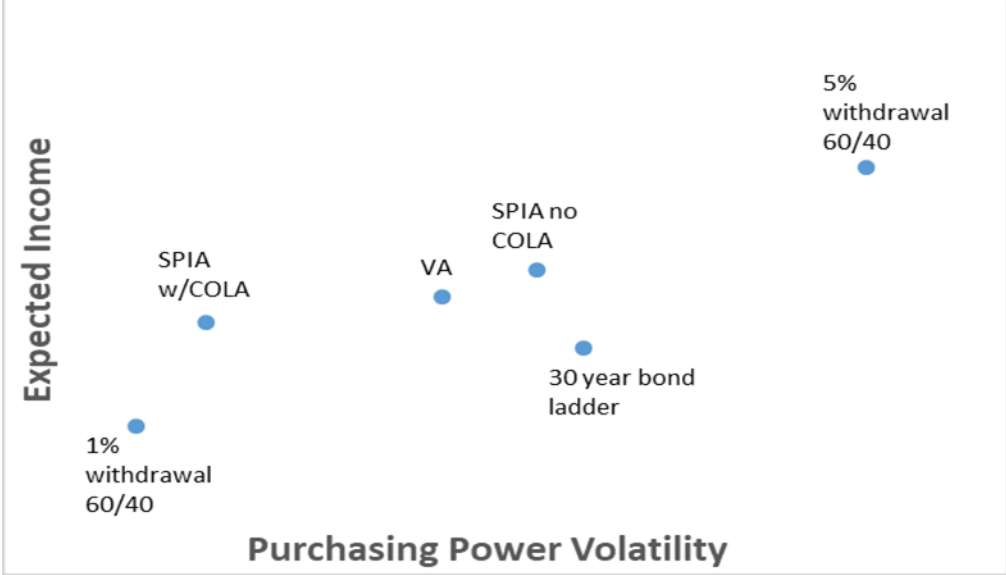
Also, couples need to realize that funding the cost of aging in place at home with income from social security is subject to a major reduction when one of the spouses dies.

One simple way consumers can appreciate the impact of inflation is with the rule of 72; dividing 72 by any number will calculate the amount of time until the value doubles at that rate. At 2% inflation compounding annually, the purchasing power is cut in half in 36 years. At 3% inflation, it’s 24 years. But even if people don’t live that long, if property taxes increase by 2% per year and you have a nominal income stream funding it, you grow increasingly underwater from the start. The table below is an example which might help educate plan participants. The following table shows the impact of 2% annual inflation over a long retirement.

Hypothetical Annual Property Tax Bill	With 2% Annual Inflation Bill Increases To	Yearly Shortfall Amount if No Cost of Living Increase
At Age 65	\$5,000	-\$0.00
At Age 75	\$6,095	-\$1,095
At Age 85	\$7,430	-\$2,430
At Age 95	\$9,057	-\$4,057
At Age 105	\$11,040	-\$6,040

The chart below shows how different income alternatives might be expected to fare over time when inflation is considered. It is helpful to review this with an experienced professional.

Evaluating Different Income Strategies/Products (not meant to be comprehensive)
Hypothetical Illustration of Potential Variability of Purchasing Power with 2% Annual Inflation



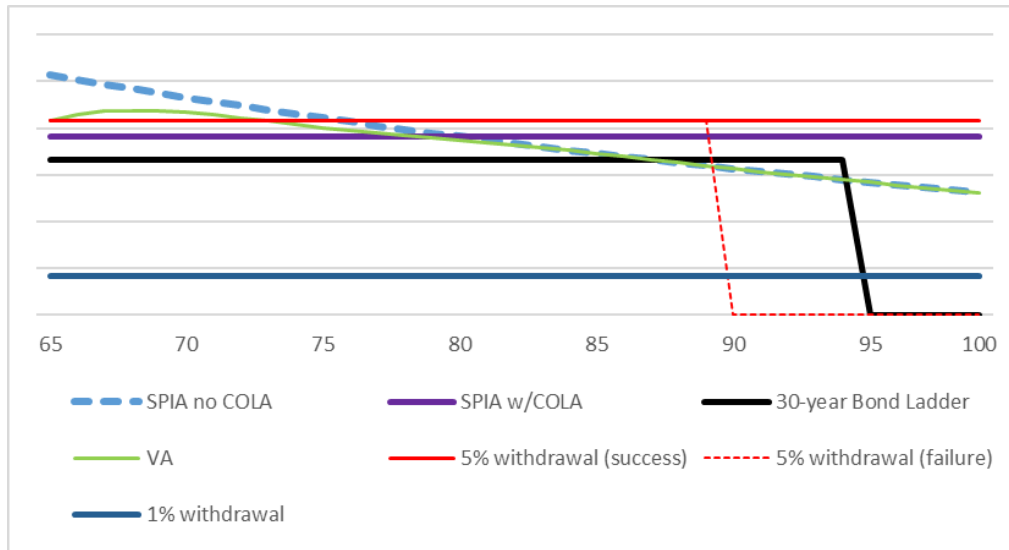
The vertical axis represents the size of the annual cash flow, while the horizontal axis portrays the variability (reliability) of cash flows increasing to offset inflation. Descriptions of each strategy and their tradeoffs follow.

- 1) **A SPIA with a COLA** (cost of living adjustment): A Single Premium Immediate Annuity with a COLA can generate guaranteed lifetime income that can grow each year.
- 2) **A SPIA with no COLA**: The same product as #1, but initial income typically starts higher in year one and will decrease in real dollars year after year after inflation.

- 3) **VA w/income rider:** Variable annuities with income riders have initial income that cannot decrease, and have the potential for inflation protection. However, our analysis shows the possibility that at some point the increases will likely cease and income in real dollars will decline thereafter.
- 4) **30-year bond ladder:** A bond portfolio with staggered maturities includes a degree of inflation protection, but will likely run out of money in 30 years and due to principal withdrawals necessary to offset inflation.
- 5) **Systematic Withdrawal:** This stock/bond portfolio is shown twice (1% and 5%). Income adjusted for inflation assumes principal withdrawals will be needed from time to time, and at higher withdrawal rates like %5 the retiree is likely to run out of money is 25 years or less. 1% withdrawals are safer but may be too low to cover expenses.

The next chart uses the same income alternatives, but illustrates their risks according to another kind of factor: the risk of an income strategy running out of money over time.

Hypothetical Inflation-Adjusted Income Lifetime Risk Trajectories*



Evaluating the Tradeoffs of Different Retirement Income Options

The alternatives discussed below present tradeoffs for individuals to consider: some are more liquid and offer the possibility of an inheritance, but cannot match a SPIA with a COLA for low risk income guaranteed for life with inflation protection.

1. **A SPIA with a COLA.** **Single Premium Immediate Annuities** offer guaranteed cash flow for life that is generally higher than the yield on low risk products like bank CDs, and can do so

over the entire lifetimes of two spouses. In order to accomplish this, insurers take advantage of risk pooling, which combines interest with return of capital, and uses the assets of those who die at younger ages to fund those people in the annuity who live longer. Many companies offer COLAs as options which can be purchased to match a variety of inflation forecasts. A consumer's risk is extremely low as the lifetime cash flow and inflation protection are guaranteed by contract, are fully reserved by the annuity provider, and supported by state-specific guaranty funds that specify maximum coverage limits. The chances of a highly rated provider defaulting on a SPIA contract are low, and diversifying across multiple issuers is easy to do to reduce this risk even further.

Tradeoffs: SPIA payments are terminated when the holder(s) die so the contract does not allow for bequests (unless a "cash refund" option is purchased, which generates lower income than one without a cash refund version). A joint and survivor SPIA continues for the longer of the two lives and then terminates. This is a lifetime contract, which means SPIAs are generally not considered liquid, but some contracts do offer a withdrawal provision in the early years that allows access to more than the contract payment in return for partial or full surrender of future benefits. Consumers should evaluate the full array of options and ramifications for possible beneficiaries that are present with annuity contract decisions, and make a written statement which explains their decisions to their potential heirs.

Note: Deferred fixed annuities are used to first accumulate assets and are not considered here because of our hypothetical need for immediate income. For example, **fixed indexed annuity (FIA)** products have deferred income riders; tradeoffs include contract complexity, which may be subject to change (possibly due to market conditions or financial troubles of the issuer.)¹ FIAs usually provide income similar to a SPIA with no COLA once the income rider is activated (see next category).

2. **A SPIA with no COLA.**

This is the same basic product as #1 above, but initial income will be higher than the COLA version. **Tradeoffs:** Purchasing power of that income may begin higher but will decline with inflation, and at some point the COLA version crosses over to generate higher purchasing power. Other SPIA issues are same relative to the bequest and liquidity factors described for #1.

3. **A Variable Annuity with an income rider.**

A Variable Annuity is riskier than a SPIA because the underlying investments are riskier, although beneficiaries who may inherit them may be protected from loss. Income riders can be

¹ See NAIC Rules section B(2)(c)(1); <https://content.naic.org/sites/default/files/inline-files/MDL-520.pdf>

purchased to guarantee income for life even if your annuity loses money (due to an investment market decline). **Tradeoffs:** Total internal expenses of VAs can be high, and the income rider feature also comes at a cost, lowering the net rate of return the contract earns. At some point, income increases will likely cease due to costs, and purchasing power will decline thereafter.

4. **A portfolio with 60% equities and 40% bonds: 1% withdrawal and 5% withdrawal**

Many financial planners recommend a 60/40 portfolio as balanced between income (bonds) and growth (stocks). While this advice is questionable in our current low interest environment, it is the standard solution, promising both income and capital gains. Withdrawing 1% per year, adjusted for inflation, has a low risk of running out of money historically. **Tradeoffs:** The **1% withdrawal** may be too small to fund expenses not covered by Social Security. Generating enough income to fund core expenses after Social Security income would require a very large initial investment, making this 1% income strategy one of the most expensive of the alternatives to use. On the other end of the spectrum, A higher **5% withdrawal** increases the probability of running out of money dramatically, which is portrayed in both of our charts.

5. **A laddered bond portfolio.**

A laddered bond portfolio holds bonds that mature progressively every year from retirement to thirty years later. For example, some bonds mature after one year, some after two years, some after three years, and so on. Withdrawals modeled in our chart include all interest and some principal to maintain purchasing power. **Tradeoffs:** This portfolio will likely run out of money as principal is invaded to offset the increasing costs of expenses. Today, a bond portfolio is an expensive alternative to fund because interest rates are so low.

Changing Retirement Planning Current Practices

We certainly do not suggest that all of a retiree's savings be used to purchase a SPIA with a COLA. Liquidity is an important component is to maintain as well, and reverse mortgage lines of credit can be a good source for this. Also, a portfolio invested for growth and income also helps with the flexibility to meet unexpected expenses while funding the discretionary and optional buckets.

It should not be prohibitively difficult for the retirement profession to help consumers itemize their expenses and separate them into three buckets based on priority. Dedicating funding sources like Social Security to inflation sensitive expenses like food is straightforward. Social Security, while important, probably will not cover all core expenses, because after deducting for food, Medicare and taxes, not much may be left.

Calculating the amounts to allocate to SPIA with COLA purchases might benefit from assuming not all expenses are subject to the same inflation rate. One idea is to buy different SPIAs with different size COLAs based on different inflation expectations for food versus shelter, etc. Software already exists for estimating future healthcare expenses. Homeowners Associations are using technology to forecast future property maintenance costs. Are we so far away from the day when LDI becomes scalable for average Americans?

Modelling and monitoring the balance between Social Security, SPIAs with COLAs, and the investment portfolio creates new added value for the advice industry. Segregating expenses and finding the appropriate funding source is a great place for financial planners to create simple and understandable retirement strategies for consumers. Funding ratios could be tracked continually, beginning in the client's accumulation stage and continuing through their retirement.

The Role of Plan Sponsors

An annuity calculation is the default for illustrating lifetime income on 401(k) statements to help Americans understand how much money it takes to purchase a secure retirement -- and how far apart they may be from being able to accomplish it. Not all companies will use it, but we think many will.

Conclusion and Next Steps

We believe open minded DC plan fiduciaries and financial planning professionals can support the ideas we have outlined. Applying a corporate pension approach to matching assets and liabilities can be helpful for individuals planning and funding their retirements. Consumers will benefit if the advice industry can reach a consensus on the kinds of tradeoffs we discuss. While our presentation of these ideas is not perfect, we hope it can be one upon which retirees and their educators can build. In order to keep this introduction to LDI as simple as possible, many technical details were left on the cutting room floor. For anyone interested in a deeper dive, a much more technical essay is our essay for Fiduciaries. As a next step, the following pages offer suggestions individuals might use as a starting place to enhance their retirement planning.

****Disclaimer: Please consult retirement and estate planners for specific recommendations. The information and ideas presented here are not for sale and are not intended to be a solicitation for insurance or investment advisory services by the authors to the public. The collaborators of the Open Architecture 2020 Group operate as a volunteer think tank which seeks to contribute to the conversation about retirement planning, and has no sponsors, fees, or revenues. Consumers should evaluate the full array of options and ramifications for possible beneficiaries that are present with annuity contract decisions, and make a written statement which explains their decisions to their potential heirs.***

Questions to Begin

1) *“Do I have any idea what my core expenses are a likely to be if I or my spouse lives to be over 100 years old?”*

2) *“Do we each know what our tolerance is for running out of money in retirement? Do we also know our spouse’s risk tolerance will be if I die first?”*

3) *“Are my core expenses currently projected to be funded for life, even if one of us dies?”*

Sample Tables for Categorizing Expenses in a LDI-Like Framework

Expense Item	Most Important	Discretionary	Optional	Funding Match Solution
Food				
Shelter costs: HOA, Taxes, Maintenance				
Health Insurance				
Income Taxes				
Liquidity				
Transportation				
Inheritances				
Travel/Entertainment Clothing				
Addition(s)				

Template for Calculating Core Funding Ratios

	Inflation	Age 67	Age 77	Age 100
CORE EXPENSES				
Food				
Shelter				
Medical Ins.				
CORE INCOME				
CORE FUNDING RATIO				