portfolio construction forum

The optimal shape of retirement planning

Michael Kitces | Nerd's Eye View | 10 November 2017 | 0.50 CE

EXECUTIVE SUMMARY

As the retirement research has evolved over the decades, so too have the "optimal" retirement strategies, and the entire approach to the retirement planning process itself.

In the early years, optimal retirement planning was all about determining which portfolio on the efficient frontier was best suited to achieve retirement goals. Then practitioners shifted to a more goals-centric approach, where clients pursued a Maslow-style hierarchy of goals, from the "basic" essential goals of retirement (e.g., food, clothing, and shelter), to the more discretionary wants and wishes. In recent years, retirement planning has increasingly shifted towards a more holistic "household balance sheet" approach that aims to capture all of the household's present and future assets and liabilities, to determine if the household is fully funded (or if not, what its funded ratio is).

And in a recent paper, researchers Patrick Collins and Francois Gadenne note that each of these retirement modeling approaches has their own "shape" – from the curve of the efficient frontier, to the triangle of the Maslow-style hierarchy of retirement needs, to the rectangle of the household balance sheet with its assets and liabilities. And each shape leads to its own unique views on what is "best" for retirement planning, and what is considered "safe" – from cash under the curve approach (the most conservative portfolio on the efficient frontier), to the lifetime annuity under the triangle approach (guaranteeing that essential expenses are covered for life), to a laddered portfolio of TIPS bonds with the rectangle approach (aiming to perfectly match assets to liabilities and immunise the household against future changes in interest rates or inflation).

Yet ultimately, while each of the different shapes of retirement planning may prescribe different recommendations, it's still not entirely clear which is "best". After all, the rectangle approach may be effective to determine the household's funded ratio and explore what's possible, but is a poor framework for making trade-off decisions about which goals to prioritise. And while the triangle approach is better for prioritising goals, it doesn't necessarily produce a clear portfolio allocation the way the efficient frontier curve does.

In the end, the best approach for retirement planning may incorporate all three – the rectangle to explore the Possibilities, the triangle to Prioritise, and the curve to allocate the Portfolio itself.

THE EVOLUTION OF MODELS FOR ANALYZING RETIREMENT PORTFOLIOS

While his original paper was simply called "Portfolio Selection", Harry Markowitz's 1952 article in the *Journal of Finance* ultimately became the foundation of portfolio design, aptly dubbed Modern Portfolio Theory (MPT). Its key breakthrough (of the time) was that the investments of a portfolio shouldn't be selected based solely on their individual return potential. Instead, effective portfolio design should consider both the expected return and the risk (volatility) of the investment - and, furthermore, that a portfolio should be evaluated based on the overall risk of the entire portfolio (not just its component parts).

This Mean-Variance Optimization (MVO) approach to designing a portfolio was originally created to select investments on an annual basis (based on annual expected return and volatility metrics), but was ultimately adopted as an approach to fund longer-term goals like retirement as well. After all, if the MVO approach could effectively minimise risk for a given level of expected return, or maximise return for a given level of risk tolerance then - in theory - buying and holding that portfolio for the long run should deliver the best path to achieving the retirement goal. The investor simply had to constrain the portfolio to a level of overall risk that was comfortable (i.e., to pick a portfolio on the efficient frontier that was consistent with risk tolerance). However, while the MPT approach was relatively straightforward to apply to a single portfolio pursuing a single goal (ideally over a single time horizon), it was more problematic in the context of a broad range of financial planning goals, each of which might have not only different time horizons and different comfort levels with risk, but also outright different priorities. For instance, funding college for children in middle school might be a high-priority, intermediate-term goal, while funding retirement is a high-priority but longer-term goal, and funding a vacation home is another longer-term goal, but one with a much lower priority. Yet Modern Portfolio Theory didn't give an effective means to construct a portfolio that covered each of these separate goals, with their distinct time horizons and varying levels of prioritisation.

Thus emerged the concept of "goals-based" financial planning, and the associated "goals-based portfolios", where the portfolio in the aggregate may be comprised of mini-portfolios or buckets, each of which is tied to a particular goal, with an investment allocation that is appropriate for that particular goal, with that particular time horizon, and consistent with the tolerance of risk for that specific goal. Accordingly, "essential" expenses - the food, clothing, and shelter kind of needs - might be covered with a guaranteed income stream from an immediate annuity, while more flexible "discretionary" expenses might be invested via a growth portfolio, but short-to-intermediate-term needs might be invested with a series of laddered bonds that produce the requisite cash flows as needed.

Yet the problem with the goals-based planning approach is that it starts with the spending goal in mind, and then works backwards to the portfolio (or other alternative product solution), rather than looking objectively at the balance between available assets and spending goals (and other current and future liabilities) to decide whether the best path forward is to adjust the portfolio to fit the goal, or to adjust the goal to fit the portfolio. In

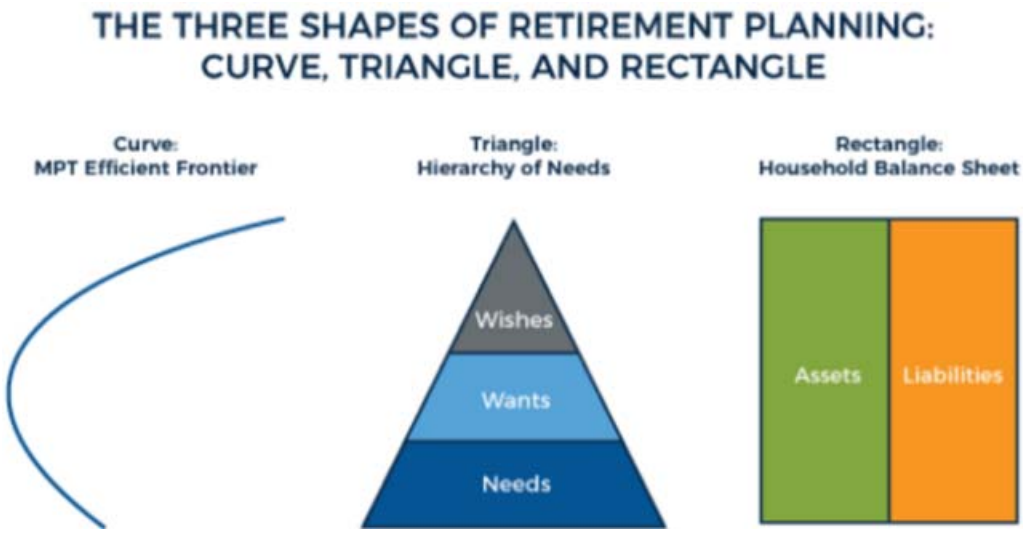
other words, some (retirement or other) goals can't be effectively funded, regardless of the portfolio, because the goal itself just isn't economically feasible given the available assets. And for others, available assets may so overfund the goal that in reality, the investor could afford to pick new (i.e., higher) goals. And none of this is necessarily captured in an approach that simply focuses on allocating investment assets to "match" goals.

Instead, the necessary retirement model is to create a "household balance sheet" that fully captures all current (and future) assets, along with current (and future spending) liabilities, to first determine whether the goal is feasible, and whether the household overall is overfunded, underfunded, or right on track. And to the extent that the household is over- or under-funded, adjustments can then be made to the "asset" side of the balance sheet (e.g., by adjusting the portfolio), or to the "liability" side of the balance sheet (e.g., by changing the spending goals). And when the value of all current and future assets (from portfolio assets and future savings, to the remaining human capital of future years of work, and illiquid “capital” like the value of Social Security benefits), along with all liabilities (from current liabilities like credit card and mortgage debt, to the "future" liability of spending goals themselves) are calculated on a present value basis, the investor gets a "pure" apples-to-apples comparison of whether the household is adequate funded or not.

In fact, in a recent paper entitled "The Shapes Of Retirement Planning: Are You A Curve, A Triangle, Or A Rectangle?", retirement researchers Patrick Collins and Francois Gadenne suggested that these three different approaches to determining the right portfolio for retirement – finding a portfolio on the Efficient Frontier using Modern Portfolio Theory, building goals-based investment buckets based on a hierarchy of goals, or allocating based on the overall "fundedness" of the entire household balance sheet after considering all assets and liabilities – form the basis of three different modeling approaches for retirement planning.

The distinctions between the models matter, because their different philosophical approaches mean that each may take substantively similar inputs (regarding the client's goals and circumstances), but come up with different outputs (i.e., recommendations). Or, viewed another way, each has its own "shape" that becomes the dominant lens through which retirement planning is viewed: the first is a curve (based on the efficient frontier); the second is a triangle (akin to Maslow's hierarchy of needs, but applied in the context of a retirement portfolio); and the third is a rectangle (the assets-and-liabilities ledge format of a household balance sheet).

Figure 1: The three shapes of retirement planning: Curve, Triangle, and Rectangle



Source: Collins and Gadenne (2017), The Shapes of Retirement Planning

THE CONFLICTING SHAPES OF RETIREMENT PLANNING

The fundamental challenge to these different shapes of retirement planning is that, in essence, they're different models to analyse the possibilities, priorities, and optimal portfolios for retirement. They all take in various inputs about the client's retirement goals and circumstances to produce some outputs, but the way those inputs are analysed will differ – such that the "same" inputs can produce different outputs (i.e., different recommendations).

For instance, the MPT framework focuses on an efficient frontier of portfolios that either maximise return for a given level of risk, or minimise risk for a targeted level of expected return. Finding the "right" portfolio is about matching the portfolio that best fits the required return for the client's goal, without violating his/her risk tolerance. Yet Kahneman and Tversky's work on prospect theory finds that people's preferences regarding risk are impacted by where their finances stand when it comes to their goals in the first place. In other words, we experience more negative feelings about a loss than we do positive feelings about a gain, and whether something is a loss or a gain depends on where we currently stand financially.

Thus, a prospective retiree who has no wealth may look aspirationally towards accumulating $1,000,000 for retirement, while someone who already has $1.2 million would be highly distressed by going down to $1.0 million... despite the fact that they can both afford the same retirement at that point. And at the same time, the prospective retiree with no wealth

who accumulates $1.0 million experiences more happiness than the retiree who already has $1.2 million and accumulates another $1.0 million to grow the portfolio to $2.2 million.

These distinctions matter, because it means the "best" portfolio with the traditional curve approach is simply the one that maximises the risk/return tradeoff for a given level of risk, while with the "best" portfolio under the triangle approach, it may be OK to invest more conservatively after achieving enough to cover the goals (and ensure that the retiree doesn't go backwards). Or viewed another way, the triangle approach recognises that maximising risk-adjusted return is not the sole goal (as it is with the curve approach).

Similarly, the MPT curve approach has limited tools to evaluate the trade-offs between using guaranteed income streams like a lifetime immediate annuity in lieu of a risk-based portfolio altogether. It takes a triangle approach to recognise that it might be a good idea to satisfy certain essential needs with guaranteed income, and then plan to fund discretionary expenses by building a "riskier" portfolio on top.

In turn, even a goals-based triangle approach struggles to recognise and plan around all of the assets that actually exist on the household balance sheet. For instance, the decision to delay Social Security can be especially effective at stabilising the household balance sheet against low market returns or high inflation – as those factors benefit the delay of Social Security, even as they adversely affect other parts of the household balance sheet – but a goals-based framework has no effective tools to evaluate such trade-offs. By contrast, with the rectangle approach, the household balance sheet's Social Security asset would rise in value as inflation increases, helping to offset the potential decline in the value of other fixed-income assets (and the rise in the "cost" of retirement as future spending liabilities increase with inflation). More generally, it takes a household balance sheet approach, where all assets and liabilities are discounted to a consistent present value basis, to truly understand whether the household is effectively "funded" in the first place, given all the different income and expense cash flows that may occur at different times throughout retirement.

And at the most basic level, even defining what is a "safe" investment will vary depending on the approach. After all, "safe" in the context of the curve approach – the efficient frontier of MPT – is simply a portfolio that is 100% cash. But with the triangle approach, "safe" would be a lifetime immediate annuity that covers all the essential expenses of retirement. And with a rectangle approach, "safe" would be a laddered TIPS portfolio that immunises all future spending obligations against any changes in inflation or interest rates.

The bottom line is that the shape of your retirement planning approach dramatically impacts the lens through which you evaluate what is a good or bad retirement strategy, or optimal allocation of (retirement and other) assets. The "shapes" of retirement planning are the lenses through which we evaluate retirement strategies.

WHAT IS THE OPTIMAL SHAPE OF RETIREMENT PLANNING?

So given the varying retirement planning recommendations and conclusions depending on the curve, triangle, or rectangle shape to the analysis, what is the optimal shape of retirement planning?

Collins and Gadenne suggest that the rectangle approach, using the household balance sheet framework, is the most comprehensive approach that allows for effective procedural prudence in the retirement planning process (an important issue in a fiduciary future). Notably, Gadenne is the Executive Director of the Retirement Income Industry Association (RIIA), which has built the curriculum of its own Retirement Management Analyst (RMA) designation around the Household Balance Sheet, which gives Gadenne some incentive to promote the rectangle approach. Obviously, however, if the rectangle approach really is the most comprehensive and effective, that simply means the RMA has built around the "optimal" approach.

That being said, i's not entirely clear that the rectangle approach really is the most effective to formulate retirement recommendations – at least, not on its own. For instance, in calculating the household balance sheet – where all future cash inflows and outflows are discounted back to their present value – the results can be highly sensitive to the discount rate that is used in those time-value-of-money calculations. Whether or how "funded" the household is can vary significantly, with higher discount rates generally improving fundedness (as it implicitly increases assumed growth rates on assets and reduces the discounted cost of future liabilities). Yet nothing on the household balance sheet directly conveys the greater risk that is inherent in assuming a higher discount rate. More generally, there's still very little agreement about what an "appropriate" discount rate is for analysing various retirement strategies in the first place. This means two practitioners using the same rectangle approach may still come up with substantively different conclusions and recommendations about whether the prospective retiree is on track.

Similarly, there's nothing about showing multiple goals on a household balance sheet that inherently prioritises one goal over the other. The rectangle approach implicitly assumes that if the present value of all assets doesn't add up to the present value of all liabilities, that the household is "underfunded". But in the real world, if a prospective retiree doesn't have enough money to retire and achieve all of their goals, saving more or earning more or working longer (to shore up the asset shortfall) aren't the only answers. The retiree can also choose to settle for less, selectively eliminating lower-priority goals (e.g., retiring now but with a plan to take fewer vacations, or just rent instead of owning a second vacation home, or downsizing the retirement home and the associated cost of living, etc.). The rectangle approach is helpful to reflect if the current goal is feasible, but is a weak framework for prioritising which goals to cut (or if the plan is "overfunded", where to add to spend more).

And once the goals are selected and funded, it's still necessary to actually allocate the assets to fund the plan, which entails some investment decisions and trade-offs. The rectangle

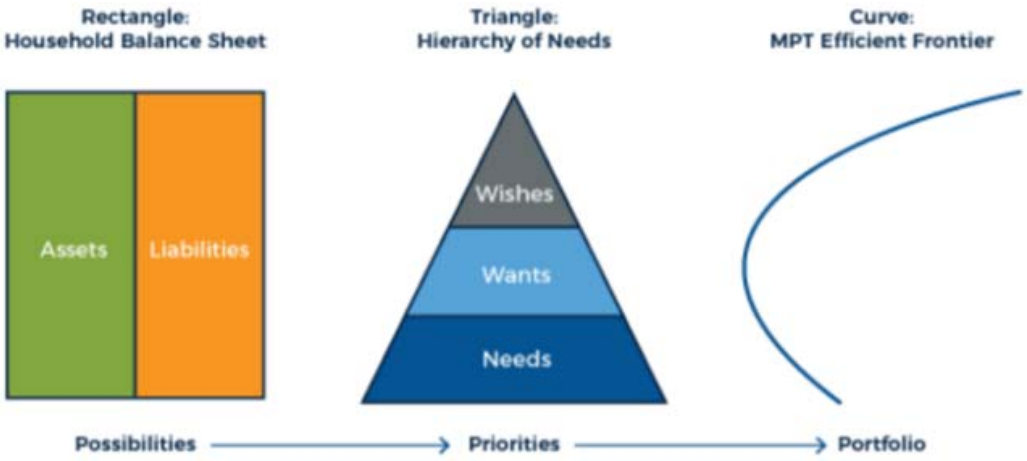
approach would imply a form of asset-liability matching (e.g., liability-driven investing), though to the extent a portfolio is used (even if just for certain long-term goals), at some point, an MPT-style approach to allocate the diversified portfolio still remains relevant.

In other words, the rectangle approach doesn't eliminate the need for the curve approach, it just recognises that the curve should be applied to allocate the portfolio at the end of the process (as those who just focus on the curve may miss the rest of the retirement picture).

This means that ultimately, the rectangle, triangle, and curve approaches all offer relevant contributions to the retirement planning process. The rectangle may help to determine whether the plan (as currently stated) is feasible and what's possible, the triangle approach is better for actually prioritising goals, and the curve is still relevant when it comes time for portfolio implementation.

Each shape of retirement planning offers its own unique contribution to the planning process.

Figure 2: The Shapes and three P's of retirement income planning



Source: Collins and Gadenne (2017), The Shapes of Retirement Planning

At a minimum, though, the Collins and Gadenne shape approach to retirement is an interesting way to think about different philosophical views and different modeling approaches when it comes to thinking about and analysing a retirement plan - and, more generally, about the state of a household's financial situation (now and in the future).

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