

## BUILDING PORTFOLIOS FOR HOUSEHOLDS WITH MULTIPLE INVESTMENT GOALS

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This is the second article in a series that aims to enhance the methodology by which financial planning is conceptualized and implemented. In the first article in this series, “Using Economic Balance Sheets for Financial Planning,”<sup>2</sup> we showed that financial planners need to have balance sheet (“stock”) information, not just income and expense (“flow”) information, about households in order to help them identify their liabilities and allocate their assets.

Here, we present an approach for mapping the liabilities on the balance sheet into investment objectives and matching portfolio holdings to those objectives, as best as can be done given existing market realities.

The conventional solutions, broadly diversified portfolios of individual assets and/or packaged products such as ETFs and mutual funds, aren’t working as well as they could be. The reason is the added requirement of funding a schedule of liabilities, or equivalently, funding a household’s goals. If the liability were a risk-free cash flow that occurs once, there would be no difference; the conventional solutions would be the correct ones. But, in real life, the liability is multi-period and not fully predictable.

Therefore an unconventional solution is called for. We will call our solution *goal-based*, as contrasted with the risk-based solutions that result from straightforward application of MPT and the single-period CAPM — yet our answers are completely consistent with those theories.

### GOAL-DRIVEN INVESTING

We custom-tailor an investment program to the specific liabilities or goals of an investor.<sup>3</sup> We start with the liability and identify a portfolio of assets that match its major characteristics: duration, beta, inflation sensitivity, and so forth. For example, the duration of the liability can be calculated by estimating the times when cash for spending will be needed, as well as the amounts of cash, then performing the usual duration calculation. The beta of the liability is, in principle, the extent to which the present value of the liability moves with the stock market; this can be nontrivial. (For example, after the crash of 2008 we found great bargains in luxury hotels; they are bargains no more. A lifestyle that involves staying in these hotels thus has a high beta.)

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<sup>2</sup> *The Journal of Wealth Management*, May 2013.

<sup>3</sup> We use “goals” and “liabilities” interchangeably. Goals are self-imposed, liability-like obligations. We recognize that the formal meaning of “liability” — a legal obligation entitling the counterparty to seize assets of the obligor in case of default — is different.

Inflation sensitivity is usually assumed to be one-for-one with consumer price inflation; that is, the liability is assumed to be a “real” one. If the investor holds this liability-matching portfolio as his or her only investment, then we’re done. The investor bears little or no risk, and earns the risk-free rate. However, there are two problems with this easy solution. First, it locks in a low rate of return. To earn a return higher than the risk-free rate, he or she will have to bear some of the risk of holding assets that are not matched to the liability (usually this is equity risk).

Second, some liabilities are either sufficiently complicated or markets are insufficiently complete that one cannot find a matching portfolio of assets. As a result, goal-based investors can be forced to take on risk from the asset characteristics not being fully matched to those of the liabilities even at the risk-minimizing portfolio position. However, this mismatch risk is typically small. When goal-based investors take significant risk, it is because they want to have the possibility of earning a risk premium. If you consider the unpredictability of the cost of education or health care — or even taxation — 40 years from now, they will need the risk premium!

Unfortunately this technology, widely used by institutional investors, is barely known at all to planners and advisors.<sup>4</sup> That is a pity, since the few pension funds and other institutional funds that have practiced liability-relative investing are in good shape, while most of the remainder are a shambles.<sup>5</sup>

Individuals and households can benefit from this technology as well, and they need it even more, since they do not have donors or plan sponsors to whom they can turn when there is a shortfall. Indeed, one of major differences between institutions and individual investors is that the latter have the ability to manage both their assets and liabilities. When retooled for the household we call the technology *goals-based* or *goal-driven investing*.

## IMPLEMENTATION ISSUES IN GOAL-DRIVEN INVESTING

### DEFINING THE PROBLEM

At its simplest, we each invest in order to help achieve our goals and objectives. What are they? Some goals are fairly nebulous (how lavish a lifestyle do you hope to fund? What are your bequest intentions?), while others may be much more concrete (a trip to view gorillas in Uganda, a specific vacation home). In short, the investor desires to deploy her assets over time to fund her goals.

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<sup>4</sup> Liability-driven investing (LDI) and liability-relative investing (LRI), at least as we understand them, are slightly different. LDI involves holding, as best one can, assets with the same duration and other characteristics as the liability. (The term is also used in the industry — nonsensically, if you ask us — to refer to the *part* of an investor’s portfolio that is devoted to liability duration matching, the other parts being managed with little or no sensitivity to the liability.) LRI is looser and treats the LDI portfolio as one extreme — the riskless choice — in a continuum that extends, at the other end, to conventional and even leveraged risky investments; the return on the liability is the benchmark, or investment objective, by which the success or failure of a portfolio on that continuum should be judged. For LRI, see Waring [2004a, 2004b].

<sup>5</sup> One need look only as far as the many dramatically underfunded state and local pension funds for evidence.

This observation naturally leads to a worthwhile exploration of the investor's or family's goals, not just in the immediate future but in the longer term. The easiest approach is to focus on typical life events and the financial goals that relate to them: marriage, purchasing a house, having children, paying for their education, starting a business, weddings, retirement, long-term care, and bequests.

Such a specific approach, however, tends to make discussion of the more diffuse goals difficult. Life rarely works out exactly as expected, and some planned events may not need to be financed while other, unplanned events do require financing. In addition, the success of a plan must be evaluated not just in terms of rates of return and account balances, but by how the investor's broader goals have been achieved.

### THREE LEVELS OF LIABILITY

First, we recognize that not all liabilities are equal. One kind of liability represents the minimum acceptable, or *necessary*, level of consumption, and should be funded with conservative, liability-matching investments. A second layer is the *target* amount of consumption, the amount that one plans for and under reasonable circumstances expects. Finally, the *aspirational* amount is the part beyond the target that one does not really plan to consume but that is still worth taking some investment risk to have a chance of achieving. These last two components of the liability are funded with investments that have at least some risk.

The multi-period nature of all of these liabilities is an added source of complexity. Should one buy a BMW now, possibly risking the children's college education (but possibly having no effect on it at all)? How about an iced latte? Clearly there is no simple rule for making these tradeoffs.

For those who prefer short words and Anglo-Saxon diction, necessary, target, and aspirational amounts can be called needs, wants, and wishes.

In the rest of this article, we use shorthand expressions reflecting the incremental nature of these liability components. Specifically, the "necessary liability" is the whole of the liability representing expenses regarded as necessary by the investor, while the "target liability" *excludes* the necessary part, and the "aspirational liability" *excludes* both the necessary and target parts. Exhibit 1 is a stylized diagram showing these liabilities for a hypothetical investor, along with assets that are sufficient to pay the necessary liability and part of the target liability, but none of the aspirational liability. We believe that such a financial position is common among mid-career professionals and others who have made substantial progress in saving for retirement but who are not wealthy.

### HEDGING LONGEVITY RISK

The second major modification has to do with the fact that people, unlike institutions, die. You should not have to save enough money to live to the outer edge of your possible life span — say, age 110 — if there is a cheaper way to guarantee that you will not outlive your money. Fortunately, there is, and it's called a life annuity or deferred annuity. We'll cover annuitization and the insurance principle in greater detail in future

work, but for now it suffices to say that annuities are a vitally important part of investing for individuals, and that we're going to rely on them.<sup>6</sup>

So that the investor can hedge inflation risk in the post-retirement period, we recommend the purchase of an annuity that offers inflation adjustments to the payouts, although the market for these is not very deep or complete. As a substitute, a rough-and-ready inflation hedge can be achieved by laddering the annuity contracts.<sup>7</sup>

### GOAL-DRIVEN INVESTING VS. SINGLE PORTFOLIO OPTIMIZATION

Goal-driven investing, involving segmentation of the liability into three parts, makes sense to many people. But readers schooled in portfolio optimization typically have a hard time with goal-driven investing, because breaking up the liabilities – and hence the assets to which they're matched – in this way, with no account taken of the interactions or correlations among the parts, is clearly suboptimal. It has a cost, which is measurable and can be significant.

Yet some degree of segmentation is unavoidable. Investors have tax-deferred and taxable accounts; restricted accounts, such as IRA and 529 educational accounts, that can only be used to fund specific liabilities such as retirement or education respectively; and so forth. Because goal-based investing uses segmentation to help the investor overcome behavioral and other risks, it is no certainly worse than segmentation used to defer taxes.

Under certain conditions goal-based investing gives the same answer as optimization (Brunel 2006), so there is no loss from segmentation. Even where there is, however, the cost can be managed to a low level and is a price most investors are willing to pay for guaranteeing a minimum acceptable level of consumption that one can never outlive, while retaining the possibility of capital growth.

### PARSING THE LIABILITY RISKS

Let's identify the real economic risks faced by the individual investor saving for retirement or for another goal. Identifying the risks will help us decide what portfolios to hold and will enable us to see if we're hedging the risks we're hoping to hedge.

The principal risks facing any would-be retiree are:

1. Inflation risk (the desire to keep planned consumption constant in real or inflation-adjusted terms)
2. Growth risk (the need for more money if the target or aspirational levels of consumption are to be achieved)
3. Longevity risk (the desire not to outlive one's money)

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<sup>6</sup> See, for example, Milevsky [2013], and Sexauer and Siegel [2013].

<sup>7</sup> For example, the investor could purchase an annuity that pays \$100,000 per year from age 65 onward; a second annuity that pays \$20,000 per year from age 70 onward; a third annuity that pays \$25,000 per year from age 75 onward; and so forth, building into the structure an annual inflation assumption of about 4%.

*Inflation risk.* Zvi Bodie, a pioneer in the academic study of retirement issues, once wondered out loud why financial planners bother to calculate the probability of failing to earn an adequate income in retirement when the whole point of financial planning is to *guarantee* one.<sup>8</sup> We sympathize with Bodie on this question and suggest that the necessary liability be defeased, or prepaid, with a ladder of TIPS bonds. At today's low real yields, this answer may be seen as unrealistic and, in fact, we modify it a bit, taking some carefully calculated risk to raise the expected return; but, in principle, the necessary liability should be prepaid risklessly and we look forward to the day when TIPS yields are high enough to make such a strategy once again attractive to investors.

*Growth risk* is shorthand for the risk posed by the possibility that capital growth will be less than expected or desired; "lack of growth" is the real risk faced by the investor. Either way you say it, investing only for inflation protection will guarantee the investor a low real return. The stated or real yield on a 5-year TIPS bond is currently (as of August 2018) a stingy 0.8%. For almost all investors, aspirational asset balances will remain forever aspirational unless the investor can earn higher returns than that. Growth risk needs to be addressed by holding equities and other assets that are expected to provide capital growth.

*Longevity risk.* The risk of running out of money before running out of life is very serious; almost everyone knows somebody who has had to support an ailing parent or grandparent, an unwelcome expense whether or not the supported person is in a nursing home. Not everyone has children they can turn to. Our method supposes that the individual is on his or her own, responsible for planning ahead so that late-in-life expenses are provided for.

Immediate life annuities, deferred life annuities, and long-term care insurance are the principal relevant tools.<sup>9</sup> They work because of the insurance principle: those who die younger help pay for those who live a long time. The savings from this wealth transfer, called "mortality credits" in the insurance industry, are remarkable, reducing the amount one needs to save by about one-third.

#### **DISCOUNT RATES FOR THE THREE LIABILITY COMPONENTS**

To reduce estimates of future liability values to a present value, we use the following discount rates:

- Necessary liability: TIPS (inflation-indexed U.S. Treasury bond) yield curve
- Target liability: Expected real return on a 60/40 global portfolio
- Aspirational liability: Expected real return on a 100% global equity portfolio

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<sup>8</sup> The quote is from a personal communication. For some of Bodie's more accessible work, see Bodie and Taqqu [2012].

<sup>9</sup> Some recent innovations can achieve life annuity-like payoffs without committing separate capital to the annuity issuer. These include ruin-contingent life annuities (RCLAs), which pay off only when the covered portfolio is spent down to a zero balance. These are of great interest given the three risks (inflation, growth, longevity) we are trying to hedge and the overconstrained nature of the problem in the absence of a longevity overlay.

The entire analysis is conducted in real terms, so we don't need an inflation estimate. Another way to view this is to note that the inflation assumptions in the estimates of future liabilities and the inflation assumptions in the discount rates net out.

*Necessary liability.* Because TIPS yields are only available for a limited number of maturity dates, the match to the cash flows is necessarily approximate. An example is that the twentieth year's cash flow, as of this writing in July 2018, is needed in July 2038 and the nearest TIPS maturity date is February 2040 (yes, the long-dated TIPS market is that thin), so we use the real yield on the February 2040 TIPS bond, currently 0.82%.<sup>10</sup>

*Target liability.* We use expected real returns from Grinold, Kroner, and Siegel [2011] as real discount rates. These authors estimated nominal returns to be 7.03% for equities and 3.4% for bonds, each in excess of a 2.4% inflation rate. Subtracting out inflation and taking a 60/40 weighted average, the expected real discount rate for the target liability is 2.38%.<sup>11</sup>

*Aspirational liability.* The Grinold, Kroner, and Siegel estimate of the expected real return for a 100% equity portfolio is 4.63%.

Readers familiar with pension fund accounting may object that asset expected returns should not be used to set liability discount rates. The objection is valid for pension funds. The pension plan sponsor, or payor, who discounts the pension liability at a higher-than-riskless rate because he might not pay it, is clearly in the wrong, and could be accused of trying to weasel out of the obligation. However, the *recipient* who discounts part of the retirement benefit he hopes to receive (in this case, the target and aspirational amounts) at a higher-than-riskless rate because he might not *get* it is right! (It is like discounting the money you expect to inherit from one's uncle in proportion to the likelihood you might not get it – a well-established principle.) Thus, adjusting for the risk of not receiving part of the benefit by discounting it at a higher rate is justified.

## BUILDING PORTFOLIOS TO DEFEASE EACH LEVEL OF LIABILITY

The asset portfolios follow the logic used to set the liability discount rates. A riskless portfolio is set against the necessary liability; a 60/40 global equity-bond mix is set against the target liability; and a portfolio of the highest expected-return assets the investor can identify and tolerate is set against the aspirational liability. We provide some more detail below.

## NECESSARY PORTFOLIO

If the investor's necessary expenses really are necessary, the investments dedicated to paying them should be riskless. For an investor with a clearly defined liability, or schedule of cash flow requirements, the riskless asset is not "cash" but a laddered

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<sup>10</sup> Data as of June 28, 2018.

<sup>11</sup> The stock market has doubled since 2011, so readers who believe they can estimate time-varying risk premia might want to use a lower equity return estimate. We believe it is very difficult to make this adjustment and that the Grinold *et al.* estimate is reasonable, because markets are discounting substantially larger future cash flows than they were in 2011.

portfolio of TIPS bonds (inflation-indexed Treasury bonds) constructed so the cash flows from the bonds, including both interest and principal, match the investor's cash flow requirements.<sup>12</sup>

As noted earlier, at today's low interest rates it is reasonable, and almost unavoidable in practice with clients, to try to enhance the return on the necessary portfolio by taking a small amount of risk. One particularly effective way to do this is to add investment-grade credit risk, so that corporate and other bonds are used in place of some of the government bonds that would make up a riskless strategy. If one does this, the strategy should clearly be called low-risk, not riskless.

Saving for the necessary part of the liability is like paying off a mortgage. It is a slow climb up a big hill, but one with a very predictable slope, and it gets easier toward the end. Savers who think this way about the necessary liability will have an easier time defeasing it than savers who do not.

### TARGET PORTFOLIO

The base case for the target portfolio is a 60/40 mix of global equities and bonds. This is a good proxy for the aggregate weights of all of the liquid return-generating assets in the world. Assets such as real estate (other than REITs, which are in the equity index), private equity, and commodities are left out because they are illiquid or involve high costs.

This mix can be adjusted to reflect specific needs or preferences. For example, if the saver is an airline pilot, he may wish to overweight oil stocks and underweight (or completely avoid or even sell short) airline stocks to hedge the risk in his job. This kind of human capital hedging is complex and can rarely be fully satisfactory (you'd have to short a lot of airline stock), but is worth exploring with sophisticated clients.

### ASPIRATIONAL PORTFOLIO

The base case for the aspirational portfolio is 100% in global equities and other risky assets. The expected return on this portfolio can be boosted even beyond that offered by a 100% global equity portfolio by adding real estate, private equity, commodities, and other investments believed by the saver to offer special promise. As with all alternative investments, one should be extremely mindful of costs, including hidden costs, such as the cost of illiquidity. One can also overweight emerging and frontier market equities relative to their market-cap weights.

### INTEGRATING THE PORTFOLIOS

Rather than hold three separate portfolios, we merge them into a single asset pool. This step not only conveys the advantage of simplification but allows the portfolio manager to eliminate or reduce any suboptimality that comes from the bucketing procedure. For example, the world wealth portfolio used to fund the target liability may have too short a duration for the investor's overall needs, because bond issuers have

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<sup>12</sup> This strategy is called cash flow "dedication," and there is a rich literature on it, much of written by Martin L. Leibowitz (see Fabozzi [1992]). The intellectual forebears are Yaari [1965], who proposed life annuities as the riskless asset for individuals, and Modigliani and Sutch [1966], who asserted that long bonds are preferentially held by those who perceive them as less risky than shorter issues.

tended to keep durations short. We can lengthen the total portfolio duration at this juncture, possibly using an actual bond ladder as described in the section on the necessary liability.

The downside of integrating the portfolios is that we lose some of the benefits of bucketing or separate mental accounts. For example, if short of money, the investor can invade the “necessary” portfolio to fund expenses that are not, strictly speaking, necessary. The financial advisor plays an important role in making sure that such cross-portfolio transfers are executed only in justified circumstances.

### **“NECESSARY FIRST” OR “BUILD EVENLY”?**

If this ambitious plan is fully funded with respect to all three portfolios, we are done. But, over an adult lifetime, it’s more typical for the portfolio to go from completely unfunded when our investor saves her first dollar to fully funded much later on. In between, we need to decide what to do.

As a young investor begins to build her wealth, she is faced by a dilemma: should she follow a strict “necessary first” rule — investing only in riskless assets until she has the necessary liability fully defeased — or should she build evenly, as Monopoly™ players do, getting an early start on risky-asset investing while simultaneously accumulating the riskless, necessary part?

Building relatively evenly is the only answer that makes any economic sense, and our decision to combine the three portfolios into a single asset pool facilitates this practice. An investor who buys no risky assets until her necessary liability is fully funded will have little time for the risky assets to grow, defeating the purpose of buying them. Our young investor has plenty of human capital that she can put to work to overcome bad draws from the investment markets.

### **CHARACTERISTICS OF THE OVERALL PORTFOLIO**

When you put all the portfolios together into a single bundle, especially for the non-wealthy, you get a much more hedged or low-beta (conservative) portfolio than one sees in current practice. This answer is justified by the fact that, except for wealthy investors, most savings is spoken for by necessities and quasi-necessities.

As an investor’s wealth rises, the overall portfolio may look more like the typical equity-focused portfolio arrived at by other methods. However it would have the “bells and whistles” that we’ve suggested adding along the path to affluence, such as alternative investments and human capital hedges.

### **DECUMULATION**

We also need some rules for spending down the three portfolios, including how to “deconstruct” the Monopoly game (evenly, risky assets first, risky assets last, etc.) This is not a decumulation article and the question we’ve raised requires further investigation, but it is an important question that should not be glossed over. We can start to answer it by saying that the gradual removal of risk as one ages is not a bad idea, but can be overdone. This is because even quite old investors, say in their seventies, may have a 20 year or longer planning horizon for part of their money. They are unlikely to benefit from a very low-risk strategy that has little or no potential for capital growth.

Looking at spending more generally, there is a rich literature on it, ranging from the 4% rule of Bengen [1994] to the annually recalculated virtual annuity, or ARVA, of Waring and Siegel [2015]. The same authors (Waring and Siegel 2018) criticize Bengen's method on the ground that it introduces new and little-appreciated kinds of risk — the risk of ruin if markets underperform, and of leaving too much in unspent assets to one heirs if markets perform well. Annuitization, in full (which we don't recommend) or done partially (which we may recommend), is another decumulation strategy deserving of careful consideration; see, for example, Milevsky [2013].

Further analysis of decumulation options is beyond the scope of this article, but advisors and wealth managers must be very well informed on these issues, and should put as much effort into decumulation as accumulation, if not more. It's a time of life when you don't have much opportunity to correct for the effects of mistakes.

### WHAT'S WRONG WITH 60/40?

When all of the ideas discussed above are combined and implemented, the investor is likely to find that the overall, aggregated portfolio is considerably more conservative than the typical investor's 60/40 mix. This is because most people following our recommendations will have a large weight on the necessary portfolio, which is all fixed income; they don't have enough money to have large weights in the equity-heavy target and aspirational portfolios. In other words, they are principally liability hedgers.

In contrast, most investors today, including clients of professional financial planners and advisors, have portfolios closer to 60/40 or even 70/30, even if they are relatively close to retirement or even already retired. We've proposed something quite different. Why? What is so bad about 60/40?

Few investors have a liability that looks anything like 60/40, but we have been down that road so let's turn to other issues. We believe that stocks are riskier than most people think, even if held for the long run. If stocks are a large enough proportion of one's portfolio, they are risky enough to jeopardize the plans of even the most disciplined and patient investor.

The literature on the long-run risk of equities is extensive, and we can only offer the most cursory summary. In brief:

- Many investors imagine that "mean reversion" or the apparent long-run stability of the equity risk premium will enable them to earn the long-run historical return (more or less) if they hold on long enough. However, the future return could be much lower because of:
  - High current valuations
  - Survival bias (looking only at the U.S. produces an upward biased estimate of the historical returns obtained by investors globally)
  - Small-sample bias (we have only one sample of the past to study, and we have no idea whether that sample is representative of what can happen in the future)

- Stock returns aren't really a random draw from a stationary process; they just look that way.<sup>13</sup> They're influenced by outside events, such as economic success or failure, demographics, politics, war and peace, and changes in technology. In the future, we could very easily have a series of bad draws that are not reversed over the time horizon that matters for a given individual. If the bad draws occur during the first few years of one's retirement, the damage to the portfolio could be overwhelming.
- Many investors' impression of the risk and return from financial assets comes from the work of Ibbotson and Sinquefeld (later Ibbotson Associates and Morningstar), who made a careful study of historical market performance.<sup>14</sup> While Ibbotson *et al.* emphasized risk as well as return, most people focus on the high historical returns of stocks, and don't care as much about risk, or don't even know that the Ibbotson group measured risk carefully and advised investors to pay close attention to it. Looking at the probabilistic forecasts of Ibbotson *et al.*, the 5<sup>th</sup> percentile, or 1-in-20 worst-case, forecast scenarios are quite bad over long time horizons, much worse than the results from holding riskless assets. And the 1-in-20 worst case is not the worst possible case; 5% of the observations are worse than that and we don't know how much worse.

We don't mean to end this discussion on a down note, but our job as we see it is to protect investors from bad outcomes while exposing them to the opportunity to profit from good ones. Overlooking or understating the badness of the bad outcomes is in no one's interest.

## CONCLUSION

We've presented a framework by which the various separate needs or consumption liabilities of households can be matched to investment portfolios. The categories of needs are necessary, target, and aspirational. The portfolios, while customized to each investor's situation, can be described as liability-hedging (for the portfolio that is matched to the necessary liability), diversified (target), and maximum return (aspirational). For most investors, when combined, the three portfolios add to a more conservative mix, with a lower equity beta and a longer bond duration, than is seen in common practice.

We've left out more elements of the retirement puzzle than we've included. Liability identification and portfolio construction are only two parts of a complex puzzle that includes investor psychology, understanding of the markets, and other factors such as taxation and estate planning. The use of psychological questionnaires to ascertain investor risk preference or tolerance is an important related topic we hope to cover in future work.

Decumulation, or spending when retired, is another crucial topic, as important as asset accumulation. Annuities and other guaranteed-income products present an opportunity

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<sup>13</sup> This is the Peter Bernstein critique, namely that every stock price or index level reflects the accumulation of all the relevant events (including returns on the stock or index) that came before it.

<sup>14</sup> See Ibbotson Associates [2016].

to make decumulation more predictable and orderly; absent the investor participating in a defined-benefit pension plan, there is no other effective way to hedge longevity risk, the risk of outliving one's money. This is another topic for our future work.

We hope that the approach we have presented makes it possible to think more constructively about retiring with at least adequate resources and, we hope, better than that. Our intention is to bring the investor's aspirations and reality closer together by making his or her expectations realistic and by introducing technologies, ways of thinking, and business processes that help advisors help their clients to retire in prosperity.

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