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Making a Complex Investment Problem Less Difficult: *Robo Target-Date Funds*

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Constructing a well-diversified portfolio is an inherently complex task. The task is made even more difficult, and probably impossible, for many people by their financial illiteracy. This problem may deter some people from participating in defined contribution pension plans and lead to unwise decisions by those people that do participate.

Seeing this problem as a market opportunity, financial services providers have developed products to make investing less complex. First, providers developed mutual funds, offering investors a diversified portfolio of stocks. Similarly, and more recently, providers developed exchange-traded funds (ETFs) that allow intraday trading. While these innovations simplified the portfolio choice problem, investors are still subject to complexity because of the wide range of mutual funds and ETFs available. Second, providers created funds of funds that offer broader diversification than traditional mutual funds. Third, providers created target-date funds. Target-date funds are a specific category of funds of funds that attempt to match a portfolio to an investor's profile of declining risk tolerance with age.

While these developments, culminating with target-date funds, have considerably simplified the problem of investing, a further step is still needed because target-date funds with the same target-date differ considerably in

their level of risk. Lloyd [2018], recognizing this problem, proposed replacing target-date funds, once they have reached a certain asset level, with managed accounts. He argued that the higher fees associated with managed accounts can be justified by the better outcomes in terms of greater personalization of portfolios.

This article proposes a step further in the evolution of financial products to simplify investing for pension participants. It first describes target-date funds in some detail, explaining why our proposal is needed. It then describes the development of robo advisers. Finally, combining these two developments, it presents our proposal for further simplifying investing in target-date funds.

TARGET-DATE FUNDS

Target-date funds have grown to play a key role in retirement income in Canada, the United States, and other countries. Providers first developed target-date funds in the 1990s in the United States for defined contribution plan investments. In Canada, the largest target-date funds are BlackRock's Life Path and Fidelity's Clear Path. In 2016, Vanguard [2016] entered the Canadian market, launching a series of ten target-date funds. In the United States, as of 2015, target-date funds were offered by 90% of 401(k)-type plans and accounted for 23% of

their assets (Katzeff [2016]). A Mercer study found that U.S. target-date funds had \$1.43 trillion in assets as of March 31, 2017, compared to \$0.5 trillion five years earlier (Lloyd [2018]).

Target-date funds are specifically designed to simplify retirement savings for 401(k)-type pension plan participants. The typical provider offers a stable of target-date funds, each of which caters to a different age group. For example, Fidelity offers the Fidelity Freedom 2020 Fund, the Fidelity Freedom 2025 Fund, and so on in five-year increments up to the Fidelity Freedom 2060 Fund. The number in the name refers to the approximate year in which participants expect or desire to retire. The Fidelity Freedom 2020 Fund is intended for those on the verge of retiring; the Fidelity 2060 Fund is for Gen Xers.

A participant generally selects one of the plans based on the date that he or she expects to retire and to begin withdrawing assets from the fund. Those investors near retirement pick funds with dates that are not so distant; the young pick funds that with a target-date that is several decades hence. The target-date of the fund is the key factor determining the risk composition of its portfolio. Because it is constructed for a retirement that is many years away, a 2060 fund will have a very high ratio of risky to safe assets. As its participants age, a target-date fund reduces the share of risky assets in its portfolio. These adjustments are automatic and are not controlled by the participants. For example, a 2060 fund might begin with a ratio of risky to total assets of 90% and reduce that ratio by 1½ or 2 percentage points with each passing year. Participants can adjust the risk of their portfolio by picking a fund that does not correspond to their planned retirement date. For example, younger participants can pick a fund with an earlier retirement date if they feel that the fund intended for their age group is overly risky. Target-date funds thus free plan participants from the task of changing the allocation of their investment assets as they approach retirement. The funds automatically shift their asset allocation toward more conservative portfolios as participants approach the target retirement date.

The simplest form of a target-date fund is a fund that provides a mixture of equity and debt by combining a stock index fund with a bond index fund: for example, an S&P500 index and a long-term government bond index. The equity assets provide the portfolio with

greater potential returns but increased risk; the bonds reduce both volatility and expected returns.

The growing use of autoenrollment to increase pension coverage has contributed to the economic importance of target-date funds. In the United States, the Pension Protection Act of 2006¹ authorizes retirement plans in the private sector to use a target-date fund as a default fund—that is, the fund into which a plan participant's investments are allocated if he or she has not selected another option. Increasingly, employers are using target-date funds as the default investment for plan participants who have been autoenrolled in retirement plans. In the U.S. public sector, they are the default option in the Thrift Savings Plan (TSP) for federal government workers, the armed forces, and Congress. The popularity of target-date funds extends further. In the United Kingdom, they are the default option in the National Employment Savings Trust (or NEST), a government-sponsored pension fund and the largest U.K. pension fund by number of participants.

Although target-date funds simplify investment decisions for pension participants, they are not without their critics.² Among other shortcomings, they have been criticized for their one-size-fits-all approach (Dempsey [2013]; Luxenberg [2013]). Simply put, target-date funds do not take into account the fundamental fact that people can differ in both their taste and capacity for bearing risk. Although sophisticated participants can respond to this weakness by selecting a fund with a later or earlier target-date than the one indicated by their

¹Pension Protection Act of 2006, Pub. L. No. 109-280, 120 Stat. 780 (codified as amended in scattered sections of 26 and 29 U.S.C.).

²The well-known paper by Arnott, Sherrerd, and Wu [2013] is a case in point. In the paper's concluding section, the authors stated that: "our simple experiments [with alternative asset allocation rules instead of a glide path] suggest that the current glidepath-based TDFs offer ample room for improvement. Instead of lowering risk by shifting to bonds, especially when bond yields are plumbing near-record lows and exposing our clients to some very dangerous risks should they revert to historical norms, we can rein in the risks that matter (duration risk and beta) without sacrificing return" (Arnott, Sherrerd, and Wu [2013, p. 26]). The editor's letter in the Fall 2013 issue of the *Journal of Retirement* includes a brief discussion of this article. See also Basu and Drew [2009], who argue that by moving to conservative assets in later years, lifecycle strategies sacrifice growth opportunities and may jeopardize the achievement of a participant's target for wealth.

expected retirement date, relying on individual participants to tailor their investment decisions this way negates target-date funds' feature of supposedly identifying the appropriate asset allocation for unsophisticated pension participants.

The premise of the target-date fund model is that that a participant's ability to bear financial risk generally declines over the course of his or her life cycle. The structure assumes that young workers can be exposed to a greater level of market risk (and enjoy the greater expected returns associated with bearing that risk) because they have time to make up a shortfall in their retirement assets if the market takes a downturn. As a worker approaches retirement, he or she has less time to make up a shortfall and thus requires a less risky portfolio. Similarly, individuals already in retirement have a limited ability to adjust consumption if their retirement savings decrease dramatically due to a decline in the stock market.

In order to reflect these differences, target-date funds construct portfolios in which the asset allocation is adjusted in a predetermined way as the target-date of retirement approaches. Target-date funds are designed to address participants' lack of knowledge as to the appropriate allocation of their assets. They are also designed to provide sufficient diversification and to minimize the cost of investing. Because many pension participants often fail to adjust their asset allocations over time, the target-date funds automatically change the portfolio allocation as the target-date approaches.

Target-date funds try to achieve the right balance between two competing goals—wealth maximization, which involves investment in high-risk stock, versus declining volatility as retirement approaches, which involves moving into fixed-income securities such as bonds (Pfau [2011]).

The predetermined glide path of a target-date fund's portfolio gradually shifts the fund's investment portfolio toward less risk. While this approach simplifies the decision process, it implicitly assumes that everyone with a given target-date, which is closely correlated with age, has the same level of risk preference. This failure of target-date funds to take into account heterogeneity in the risk aversion of plan participants of a given age is a fundamental weakness.

Target-date funds can differ considerably in their level of portfolio risk, even among funds with the same target-date. Balduzzi and Reuter [2012] found that, in

2009, returns for target-date funds with dates of 2015 or 2020 ranged from 35.4% to 12.0%. Even funds with similar equity ratios can experience substantial variations in rates of return, depending on how aggressive the equity portfolio is.³ Most private employers in the United States do not offer their employees a choice of more than one target-date fund for any specific retirement year, however.

Some employers or plan providers, however, offer employees a greater opportunity to personalize their risk exposure while retaining the advantages of a target-date fund. For example, in the United Kingdom, the People's Pension [2016] offers three choices—a conservative fund, a balanced fund, and an adventurous fund. Workers choose which fund to invest in, with the balanced fund being the default. The target-date aspect of this arrangement is that 15 years from retirement, the pension automatically and gradually structures workers' portfolios to include a fourth more conservative fund. The plan thus provides workers with an element of a target-date fund in which the glide path is flat until age 50.

In the United States, the United Methodist Church [2016] has a similar target-date arrangement, in which workers choose a conservative, moderate, or aggressive investment path. Workers specify their expected retirement date so that if there are 47 possible retirement dates for the current workforce, there are 141 (3 times 47) different possible target-date funds. The plan provides additional individualization; however, because it also takes into account whether the participant will receive Social Security coverage, which is voluntary for members of the clergy. As a result, the plan provides twice that number of actual personalized options.

ROBO ADVISERS

Robo advisers are computer algorithms aimed at helping investors make appropriate asset allocation and tax planning decisions. They are a relatively new development, with the two pioneers in the field—Betterment and Wealthfront—two firms that specialize in this type of product—first marketing to the public in 2010. Based on the same premise that many people need help in managing their investments but also recognizing the importance of

³This point and other related issues are discussed by Blanchett and Kaplan [2018] in this issue.

fees in affecting net investment outcomes, robo advisers use computer algorithms to help investors manage portfolio diversification, tax planning, and other issues in meeting their investment goals, consistent with their risk preferences. Robo advisers offer a level of comparatively personalized investment assistance at a low cost relative to professional investment advisers. Our proposal would extend this service by creating a role for robo advisers in helping pension plan participants select the target-date fund most appropriate for their level of risk aversion.

The growth of robo advisers has led to greater efforts to develop online programs designed to determine the risk preferences of participants. Generally, these programs involve a questionnaire that solicits information about how clients feel about different possible risk scenarios. This financial technology can be enlisted to help pension participants make better choices about target-date funds.

ROBO TARGET-DATE FUNDS AND HETEROGENEITY IN RISK AVERSION

Target-date funds have taken a small step toward personalization by varying portfolios by the age of the participant. Adding robo advisers to assist in the selection of target-date funds would take a further step toward personalization by reflecting the fact that the appropriate level of risk in a person's pension investments is not merely a function of that person's planned retirement date.

Workers of the same age or with the same intended retirement date can differ as to their levels of risk aversion for many reasons. Studies have shown in addition to varying with age, risk aversion also varies by gender, wage level, skill and education level (human capital), the riskiness of a person's wage income (including risk of unemployment), amount of wealth, marital status, and personality traits (e.g., Pratt and Zeckhauser [1987]; Guiso, Jappelli, and Terlizzese [1987]; Shane [2005]; Guiso and Paiella [2007]; Borghans et al. [2009]; Bagliano, Fugazza, and Nicodano [2015]). Risk aversion relating to pension investments may vary with the ability to bear risk or with the degree of other risks the person faces. Risk aversion relating to pension investments can also be affected by the riskiness of a person's wage income stream, the riskiness of other assets the person or the person's spouse owns, or perceptions as to the future direction of stock market prices.

OUR PROPOSAL

This proposal argues that robo advisers could be used to assist pension plan participants in selecting target-date funds. In particular, robo advisers could use computer algorithms tied to participant questionnaires to determine participants' risk preferences. Doing so would improve investment outcomes for many defined contribution plan participants by providing investment portfolios better tailored to individual participants' risk preferences.

This proposal has three parts. First, a step toward greater personalization would be for each target-date fund (i.e., for each target-date) to offer a conservative, moderate, and risky version. Rating target-date funds in this way would help participants make better choices. Arguably, the rating should be standardized, using a metric such as Sharpe ratio⁴ so that it would be comparable across target-date funds. Thus, all target-date funds with the same rating would have similar risk characteristics.

Second, pension plans would incorporate robo advisers to help participants evaluate the appropriate level of risk for their personal circumstances and choose the fund most appropriate for their needs. The information needed to make the risk assessment would be acquired by the participant answering an online questionnaire, with that information supplemented by information provided by the plan sponsor and record keeper. An example of a questionnaire can be found at Betterment [2018]. This would be a low-cost intervention that would not require continuous monitoring but that could be reassessed periodically if the person wished to do so.

Third, in connection with this decision-making process, we propose that robo advisers supplement the risk assessment by providing plan participants with financial education about the nature and role of risk in a retirement portfolio. We propose that the robo adviser determine an individualized default, based on the participant's risk preferences, but supplement that default with financial education as to the implications of the default option chosen, relative to a more conservative option, for those taking the risky approach, and relative to a more aggressive option, for those

⁴The Sharpe ratio, named for Nobel Laureate William F. Sharpe, is a measure of risk-adjusted returns.

taking the conservative approach. The proposal would enable the participant, based on this information, to modify the default option or recommendations provided by the robo advisor.

Neither robo advisers nor target-date funds generally attempt to provide financial education relating to the financial consequences of the role of risky assets in a retirement portfolio and, in particular, the relationship between risk and return. Indeed, the automated aspect of both is designed to relieve a person from the task of understanding his or her level of risk aversion and reflecting that level in his or her investment decisions. We believe that this represents a critical weakness of the existing approach.

Investor education about the nature of risk in investing responds to several important limitations. First, because of the correlation between risk and return, plan participants who invest in an excessively conservative portfolio can expect less growth from their investments. This effect is magnified by the long-term nature of retirement investing. Consequently, risk-averse investors should be made aware of the typical consequences of a cautious approach to investing for their expected income in retirement. Second, investment advisors should not necessarily take investor risk preferences as given. If investors are better informed, their risk preferences could change. Third, existing evaluations of investor risk preferences focus largely on the investor's response to short-term volatility. Retirement assets, however, are invested for the long term, and it is unclear that investors appreciate the long-term economic implications of minimizing the short-term volatility of their retirement portfolios.

CONCLUSIONS

Based on insights from robo advisers, we propose a robo target-date fund that would simplify the task of investing for many pension participants and would be more personalized than current target-date funds provided by 401(k)-type pension plans. In particular, our proposal would provide for employee-sponsored retirement plans to use the methodology and technology available through robo advisers to personalize investment portfolio recommendations for participants. As robo advisers show, this change in computer technology enables this personalization to be done simply and at a low cost. Investors would provide information on risk

preference through an online questionnaire, and the robo adviser would then identify the target-date fund that most closely matches the appropriate level of risk for each plan participant. Further, we propose that this new arrangement would include financial education about the effects of risk aversion on the future mean and variance of pension assets.

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