Assessing the retirement readiness of participants

- Saving rates are fundamental to retirement wealth accumulation. In this paper, we assess whether Vanguard full-career plan participants are projected to achieve sufficient retirement income replacement ratios.

- Projected retirement income is displayed prominently on participants' retirement plan websites. Using Vanguard's online Retirement Readiness tool, participants are able to modify the default assumptions. We found that engaged participants, those who modify the tool's assumptions, make a variety of adjustments. Most commonly, they adjust their target retirement age from the default age of 67 to either age 65 or 62.

- We found that 64% of full-career participants are projected to achieve a retirement income replacement ratio of 65% or higher. Of those participants saving effectively, 85% are projected to achieve a 65% or higher replacement ratio.

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Introduction

Retirement readiness is of interest to policymakers, academics, consultants, plan sponsors, and the media. Several assessments of retirement readiness in the U.S. have emerged over the years, ranging from there being no retirement crisis in the U.S. to half of workers facing a retirement crisis in the future. Among the assessments:

- The National Retirement Risk Index (NRRI), developed by Boston College's Center for Retirement Research, (Munnell, Chen, and Siliciano, 2021), projects that about half of households are at risk of not being able to maintain their pre-retirement standard of living in retirement as measured by a target replacement ratio. Since the 2008 global financial crisis, the NRRI, published every three years, has hovered around the half mark. The NRRI assumes that all wealth is annuitized.

- The Employee Benefit Research Institute (EBRI) developed a model that estimates that 41% of households are at risk of not being able to maintain their pre-retirement standard of living in retirement as measured by a target replacement ratio (VanDerhei, 2019).

- Federal Reserve data (2022) reports that a quarter of American adults have no retirement savings. And of those with savings, only 40% think they're on track for retirement.

- RAND Corporation, a global nonprofit research organization, models a consumption-based measure of retirement readiness that estimates that 81% of couple households are economically prepared for retirement (Hurd and Rohwedder, 2015).

- Scholz and Seshadri (2008) use a life-cycle model to show that 90% of early boomers (born between 1946 and 1955) are saving optimally for retirement but that with each successive generation, the proportion saving optimally declines.

Estimating retirement readiness from a current retirement plan account balance is nearly impossible. **Figure 1** shows how one retirement plan typically represents only a portion of retirement wealth—even for long-tenured full-career workers. In addition, as more than one-half of workers enter retirement with a spouse, the household wealth scenarios become even more complex (Roberts et al., 2018). Assessing retirement readiness requires a full understanding of household wealth.

FIGURE 1.
A broader conception of retirement security

Your wealth		Spouse/partner wealth	
Current DC account balance	Personal savings and investments	**Current DC account balance**	Personal savings and investments
Accrued DB benefit	Education savings	Accrued DB benefit	Education savings
Health savings accounts	House	Health savings accounts	House
Other employer compensation	Mortgage debt	Other employer compensation	Mortgage debt
Prior employer DB/DC benefits	Education debt	Prior employer DB/DC benefits	Education debt
IRA rollover accounts	Credit card and other debt	IRA rollover accounts	Credit card and other debt
Social Security and Medicare		Social Security and Medicare	

Note: The size of the boxes is not meant to represent proportional wealth or debt. *DC* is defined contribution plan; *DB* is defined benefit plan.
Source: Vanguard, 2022.

Vanguard's digital participant experience provides plan participants with a Retirement Readiness tool that enables them to assess their personal projected retirement readiness. Prominently displayed on the website landing page, the tool uses what we know about each participant to estimate monthly income in retirement given current employee behaviors.

The tool uses the following inputs to estimate retirement savings:

- Retirement plan balances at Vanguard.
- Vanguard IRAs® and/or nonretirement accounts.
- Additional household retirement savings.
- Estimated retirement plan contributions (employer and employee).
- Current age.
- Retirement age (default age is 67).
- Current plan contribution rates.
- Vanguard Capital Markets Model® for investment return and inflation forecasts.
- Current income.
- Social Security benefits.

Participants can also customize and add non-Vanguard assets and spousal information. See **Appendix A** for the methodology as displayed to plan participants on the website.

Participant population

We analyzed approximately 915,000 eligible employees and 725,000 actively contributing participants in approximately 320 plans for which the tool had key plan provisions populated, such as the value of the match and any other employer contributions.[1] Only actively contributing participants with at least one year of tenure are able to use the tool. We excluded individuals earning less than $15,000, as these wages are below the poverty level. We also excluded individuals earning more than $162,500.

Because of regulatory limits on annual contributions, these workers cannot save at levels high enough (15% or more) to attain a 75% replacement ratio (Clark and Young, 2022). The retirement readiness tool participant profiles were extracted as of March 31, 2022.

We further categorized participants into three groups: full-career participants, partial-career participants, and engaged participants:

Full-career participants are individuals hired at age 32 or younger and who, therefore, have at least a 35-year saving horizon to full retirement age (age 67).

Partial-career participants are those hired at age 33 or older and who, therefore, will not have a full 35-year saving horizon to full retirement age.

Engaged participants are individuals who have modified one or more tool assumptions: retirement age, Social Security-claiming age, target retirement replacement ratio, additional income, additional assets, defined benefit pension benefits, or spouse/partner information. Engaged participants come from both the full- (42% of engaged participants) and partial-career (58%) categories.

Vanguard Participant Retirement Readiness Assessment

Summary results for the Vanguard Participant Retirement Readiness Assessment are highlighted in **Figure 2**. Forty-one percent of participants were full-career participants with an average projected replacement ratio of 74% (72% is the median).

Many studies have shown that the most commonly suggested replacement ratios fall between 70% and 85% of pre-retirement income (U.S. Government Accountability Office, 2016). Vanguard's tool uses a default replacement ratio of 75%. Target replacement ratios are useful in setting target saving rates, particularly for workers who are decades from retirement and would have difficulty predicting their consumption at age 67.

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1 No single plan's population exceeds 5% of the total observed population by plan design type; this is to prevent very large plans from skewing our results. See **Appendix B** for sample characteristics.
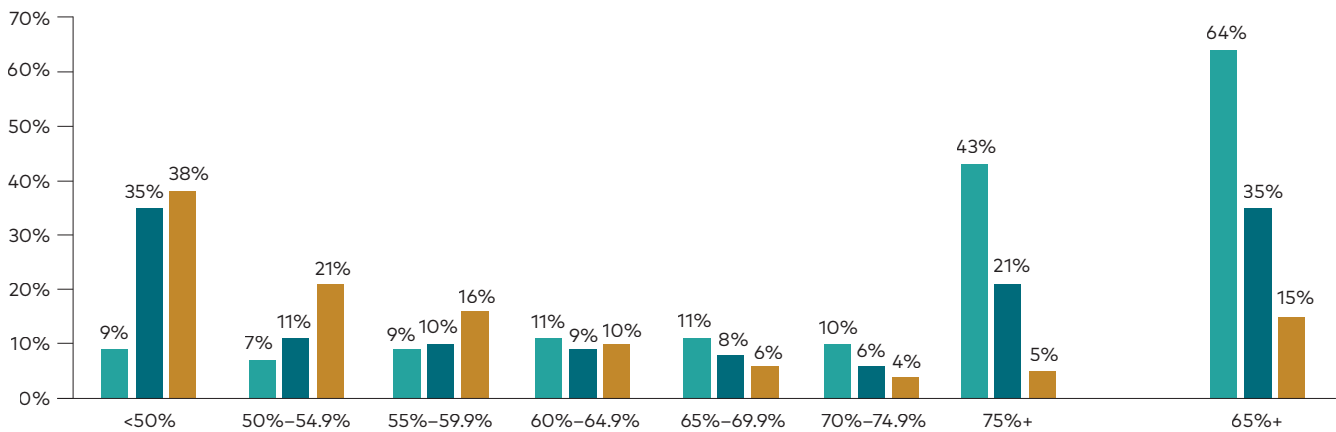
FIGURE 2.
Summary results

	Full-career participants	Engaged participants	Partial-career participants
Percentage of population	41%	16%	43%
Average participant-weighted replacement ratio	74%	61%	54%
Median age	32	45	51
Median tenure	6	9	5

Source: Vanguard, 2022.

Figure 3 provides a distribution of projected replacement ratios. Forty-three percent of full-career participants have projected replacement ratios of 75% or higher. For a worker earning $50,000, a 75% replacement ratio translates to $37,500, and a 65% replacement ratio translates to $32,000. The average annual expenditures for one-person households in which the householder is 65 or older are $34,443 (U.S. Bureau of Labor Statistics, 2021). This suggests that a target replacement ratio of 65% could enable workers to approximately maintain their pre-retirement standard of living. Nearly two-thirds of full-career participants have replacement ratios of 65% or higher.

FIGURE 3.
Distribution of projected retirement income replacement ratios

Source: Vanguard, 2022.

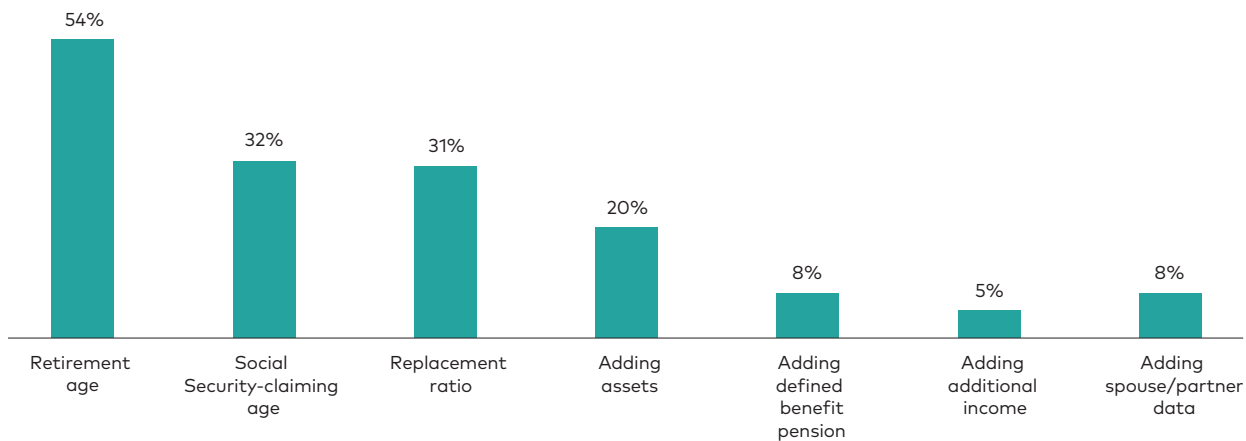## What modifications do engaged participants make?

Figure 4 summarizes the modifications engaged participants made within the retirement income projection tool. Most commonly, participants adjust their planned retirement age, Social Security-claiming age, and desired income replacement ratio and add outside assets. However, the range of changes varies significantly.

The modifications made by engaged participants are heterogeneous. **Figure 5** shows the changes made by engaged participants for the top four tool modifications. **Panel A** depicts changes made to the planned retirement age where the tool default is age 67. Both full- and partial-career engaged participants are most likely to select age 65, followed by age 62.

Partial-career participants are more likely than full-career participants to select a retirement age under age 60.

Planned Social Security-claiming ages somewhat mirror retirement ages (**Panel B**), with age 65 and 62 most frequently chosen. However, about 1 in 5 participants anticipate deferring Social Security claiming to age 70. The default retirement income replacement ratio in the tool is 75%. Partial-career engaged participants are more likely to choose a lower replacement ratio target, and full-career engaged participants are more likely to choose a higher target (**Panel C**). Partial-career engaged participants add additional assets at higher levels (measured as assets added as a percentage of Vanguard assets) than full-career participants (**Panel D**). Partial-career workers likely have retirement assets from prior employers.
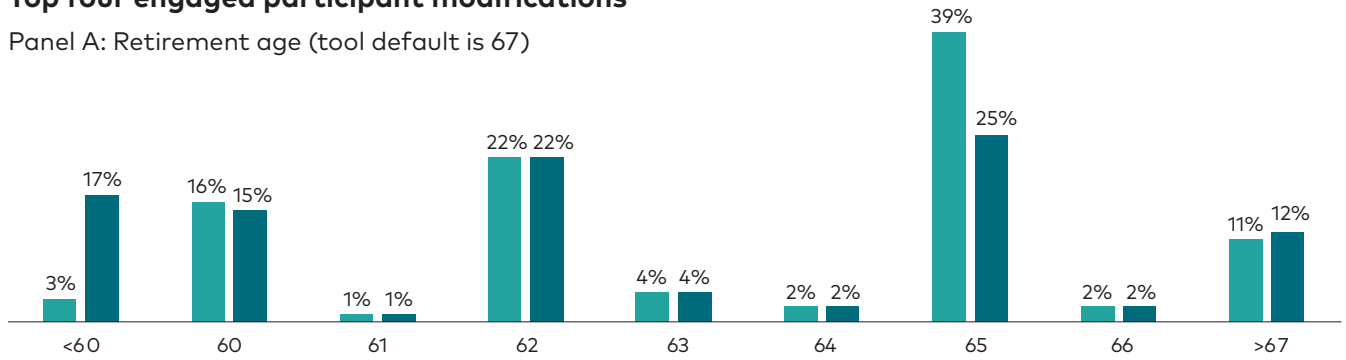
FIGURE 4.
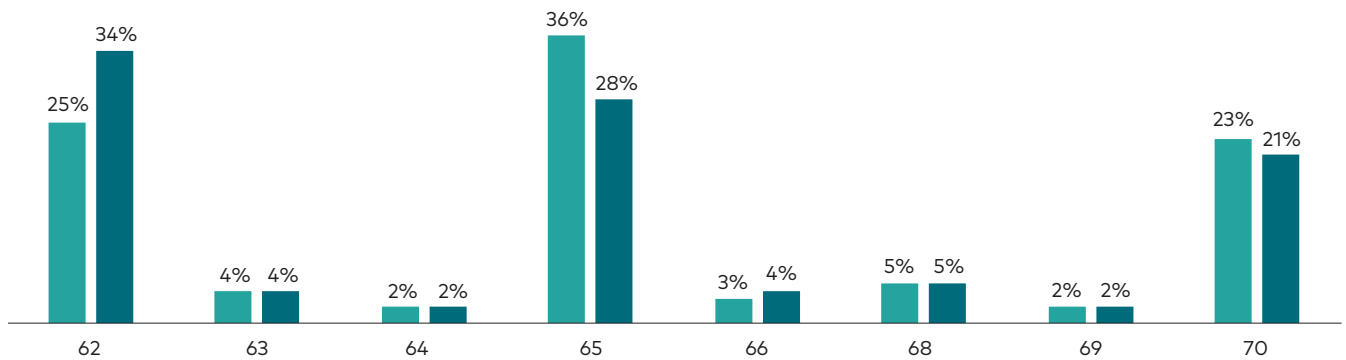## Engaged participant modifications to tool

Source: Vanguard, 2022.

FIGURE 5.
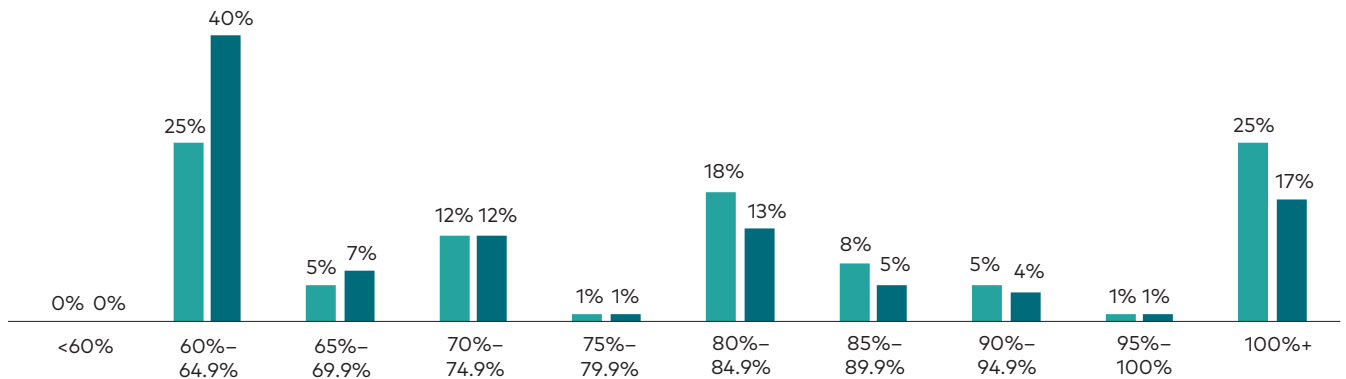## Top four engaged participant modifications

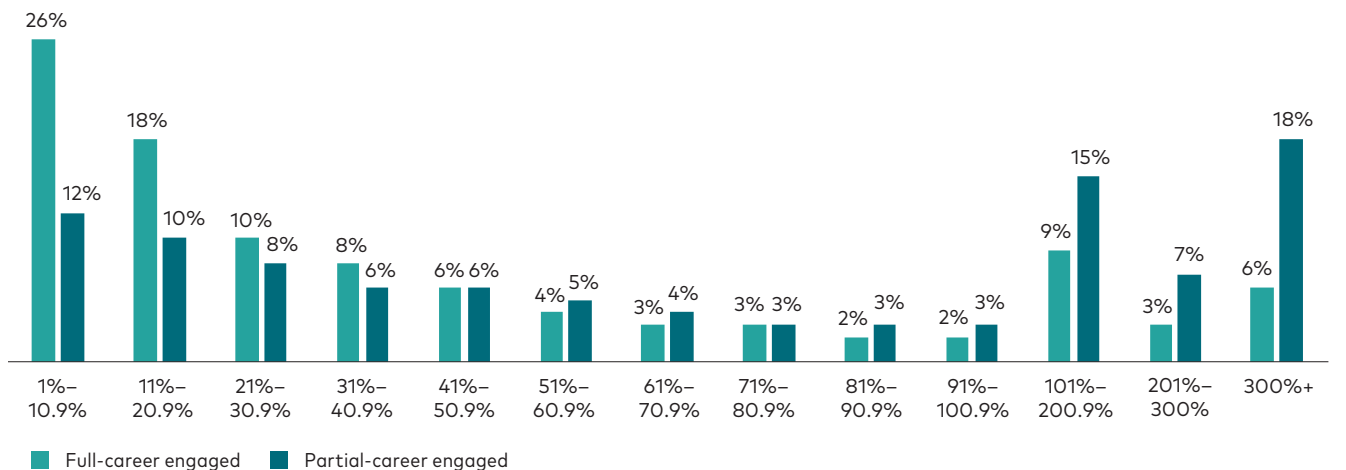Panel A: Retirement age (tool default is 67)

Panel B: Social Security-claiming age (tool default is 67)

Panel C: Replacement ratio (tool default is 75%)

Panel D: Adding outside assets as a percentage of Vanguard assets

■ Full-career engaged   ■ Partial-career engaged

Source: Vanguard, 2022.

Are participants saving effectively?

Seven in 10 Vanguard plan participants appear to be saving effectively in their current workplace retirement plan in order to replace 65% of their income (Clark and Young, 2022). **Figure 6** shows that 67% of full-career participants are projected to achieve retirement income replacement ratios of 75% or higher—and 85% retirement income replacement ratios of 65% or higher.[2]

What predicts replacement ratios greater than 65%?

Regressions were run to understand what plan design features and demographic variables are correlated with replacement ratios greater than 65%. Plan design—namely, automatic enrollment—and the generosity of employer contributions predict retirement readiness (**Figure 7**).
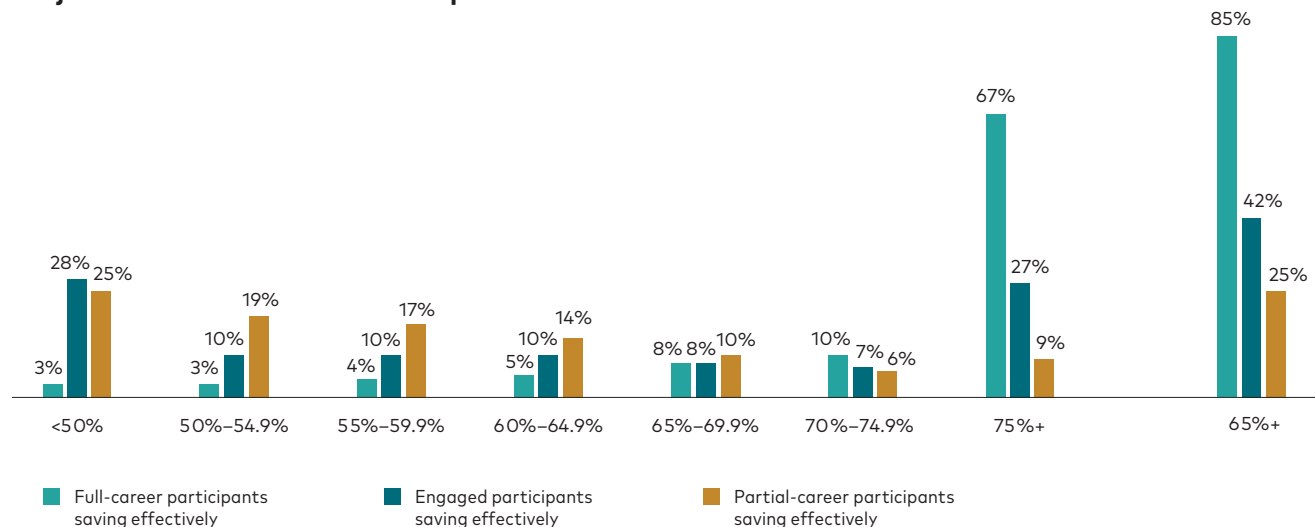
As of year-end 2021, 56% of plans (and 75% of plans with 1,000 or more participants) had adopted automatic enrollment. Over the past 15 years, plan adoption of automatic enrollment has steadily increased (Vanguard, 2022). In addition, while more plans continue to offer this design, many plan sponsors are considering higher initial default percentages to encourage stronger savings. As of year-end 2021, 58% of plans default at a rate of 4% or higher, nearly twice as high as ten years ago.

Employer contributions, both matching and nonmatching, of 7% or more were the strongest predictor of participants achieving an income replacement ratio of 65% or higher.[3] An automatic enrollment default of 6% or higher was the next strongest predictor of participants achieving an income replacement ratio of 65% or higher.

And while high automatic enrollment defaults led to higher replacement ratios, automatic enrollment designs where the default was lower, 1% or 2%, led to fewer participants achieving an income replacement ratio of 65% or higher than when the default deferral design is 0%, as it is under voluntary enrollment.
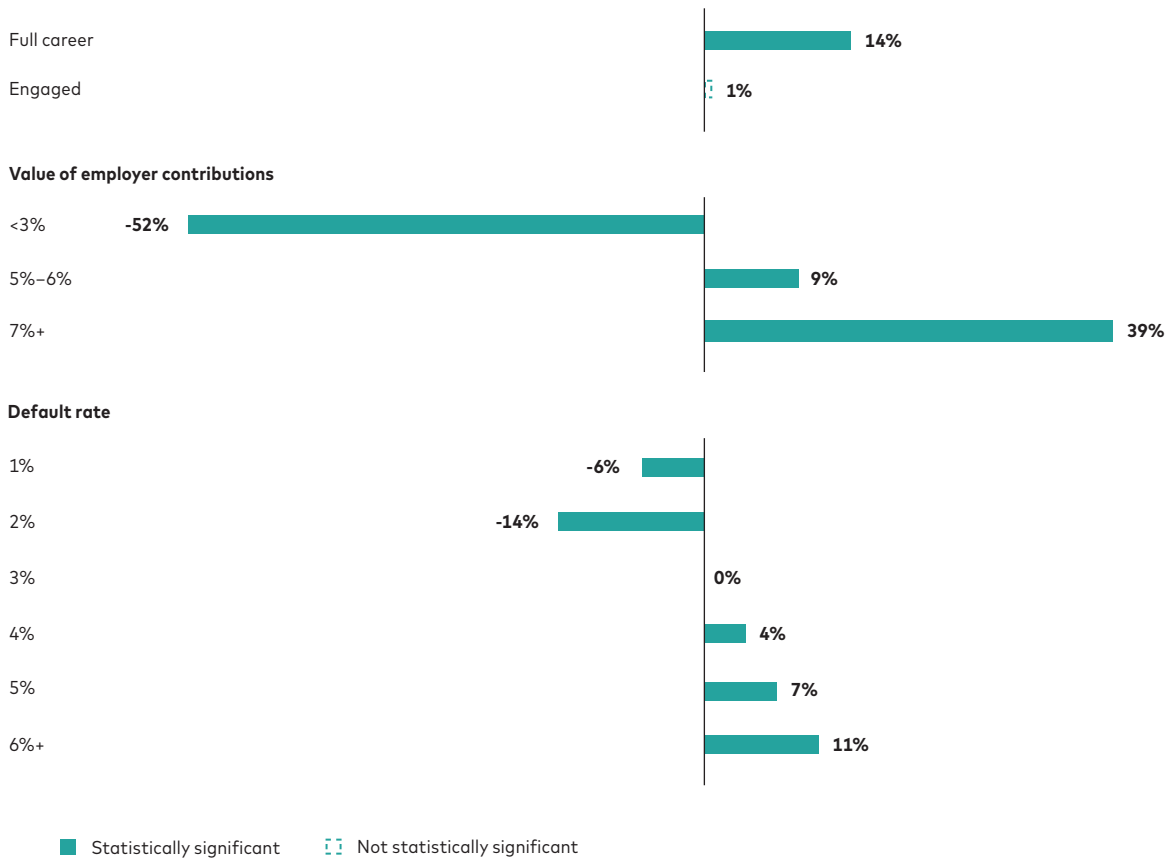
Therefore, while participation rates in all automatic enrollment plans are higher than those in the typical voluntary enrollment plan, when focusing on participant total saving rates (excluding nonparticipants), setting low enrollment defaults can underserve many participants who would be more likely to save at higher levels in a voluntary enrollment plan. It might be expected that higher default rates could lead to more employees deciding not to save; however, research supports that opt-out rates do not vary in response to a default rate (Clark and Young, 2021). Additionally, as plans are increasingly setting higher default rates, few plans have default rates of 1% or 2%. As of year-end 2021, only 6% of plans default at 1% or 2%.

FIGURE 6.
Projected retirement income replacement ratios

Legend:
- Full-career participants saving effectively
- Engaged participants saving effectively
- Partial-career participants saving effectively

2 Saving effectively equates to aggregate employee plus employer contribution of 9% where income is less than $50,000, 12% where income is between $50,000 and $100,000, and 15% when income is greater than $100,000 (Clark and Young, 2022).

3 We recordkeep more than 100 unique combinations of match formulas and/or other nonmatching employer contributions. Accordingly, we add together the value of any matching and nonmatching contributions for comparison purposes.

FIGURE 7.

What predicts replacement ratios greater than 65%?

Full career	14%
Engaged	1%

Value of employer contributions

<3%	-52%
5%–6%	9%
7%+	39%

Default rate

1%	-6%
2%	-14%
3%	0%
4%	4%
5%	7%
6%+	11%

■ Statistically significant   ⸬ Not statistically significant

Note: Regression fixed effects include employer, age, tenure, compensation, and gender (see **Appendix C**). Solid bars are statistically significant at the 95% level. Dashed bars are not statistically significant. Plan design features are measured against a reference of 4% for employer contributions and voluntary enrollment for defaults. In a voluntary enrollment design, the default is zero. Engaged and full-career are measured against a reference of partial-career. Predicted probability of greater than 65% replacement ratio is 35%. See **Appendix D** for model specification.

Source: Vanguard, 2022.

Implications

A participant's total saving rate is critical to future retirement wealth accumulation. Sixty-four percent of full-career participants are projected to achieve income replacement ratios greater than 65%. Of full-career participants who are saving effectively, 85% are projected to achieve income replacement ratios greater than 65%.

As plan sponsors consider how to help participants reach strong saving rates, plan design remains the most powerful predictor of participant saving rates. Higher automatic enrollment defaults and generous employer contributions increase the probability that participants will save effectively.

Participants should target a total saving rate of 12% to 15%. Plan sponsors should consider their employer contributions, the plan's automatic enrollment default, and any subsequent annual escalation feature to design a plan that helps participants reach these target saving rates as quickly as possible.

Appendix A: Retirement Readiness tool methodology

Participant website disclosure[4]: How your estimate is created

This tool projects your monthly income at retirement based on your savings at Vanguard, estimated Social Security, other benefits provided by your employer, additional information you enter about your outside retirement assets and benefits, and investment return projections. All figures are shown in today's dollars.

Please note: The investment return projections are hypothetical in nature and based on historical data. Your future investment growth is simulated thousands of times to produce your estimate. In 85% of these simulations, your investments achieve returns that provide at least the level of income shown in your estimate.

Your estimate is provided for educational purposes only and is not intended to provide a guarantee of attaining individual retirement goals.

The information that you provide for your estimate is also used for educational purposes and is retained by Vanguard for a limited period of time. If you decide to return for a new estimate, or plan to use your estimate in your own retirement planning, please ensure that you are using the most up-to-date information available. Please print a copy of your estimate should you wish to keep it for your records.

What you may have

Simply put, your monthly retirement income estimate is created in three steps:

1. Project your total savings at retirement.

2. Assume you will withdraw a percentage of your savings each year in retirement. The fixed withdrawl percentage is determined at your retirement age based on a graded scale from 3.3% at age 50, increasing to 4.3% at age 70.

3. Add your estimated Social Security benefit and any pension or Railroad Retirement benefits you enter.

The tool uses a combination of information Vanguard has about your savings and information that you provide.

How your total retirement savings is estimated

The tool uses the following factors to estimate your total savings at retirement:

- Your total retirement plan balance (including any nonvested money) at Vanguard as of the most recent market close.

- Your Vanguard IRAs and/or nonretirement accounts as of the most recent market close.

- Other retirement assets and health savings account amounts.

- Your estimated retirement plan contributions.

- Your employer's contributions to your retirement plan, if any.

- Your current age.

- Your expected retirement age. You can enter a retirement age between 50 and 70. If you do not, the tool will use age 67 unless your plan specifies a different age.

- Your benefits that may be provided by your employer.

- Any spouse/partner information that you enter.

- Investment return and inflation forecasts from the Vanguard Capital Markets Model.*

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4   Downloaded July 21, 2022.

The tool assumes that you will be fully vested in your retirement plan balance and that you can access any other benefits or balances you enter without restriction. Any pension benefits you enter will start in the year you retire. Nonqualified benefits will be converted to a monthly income stream and begin at your expected retirement age. Your Social Security benefit is estimated using your current age, current income, and the age you've indicated that you plan to start taking Social Security, which can be no earlier than your expected retirement age.

Investment returns

The tool uses forecasts from the Vanguard Capital Markets Model (VCMM) to project how your savings will grow between now and retirement. The VCMM employs sophisticated statistical analysis of past economic data to create its forecasts.

Your mix of stocks and bonds at Vanguard is automatically loaded. Where appropriate, we will use the assets (stocks and bonds) provided by your employer. You will need to specify the mix of stocks and bonds for any other savings you enter. The tool uses a weighted average mix of stocks and bonds for all of your savings to create your estimate.

Within this weighted average investment mix, the tool assumes 60% of your total stock investments are in U.S. stocks and 40% in international stocks. For bonds, the tool assumes 70% in U.S. bonds and 30% in international bonds. The tool does not automatically load what kinds of stocks and bonds your Vanguard accounts are invested in, and you cannot enter this information for your outside investments. The tool assumes an average expense ratio of 0.25% for all of your investments.

Certain investments can impact the diversification of your portfolio, such as a sizable investment in a single company stock. Such nondiversified asset classes in your portfolio may not be reflected in the returns of the historical analyses used to calculate your estimate and thus can disrupt the reliability of your estimate.

For example, investments in a single company's stock will have risk and return characteristics that may vary substantially from diversified markets. If you have sizable investments in individual company stock, your projections will be based on assumptions that do not accurately reflect the risk and return characteristics of your portfolio.

The tool uses a weighted average of each asset class with subaverages within each asset class to formulate representative returns based on your holdings. Your estimate may not represent significant holdings outside these averages.

All investing is subject to risk, including the possible loss of the money you invest.

What you may need

The following factors are used to estimate your monthly income needs in retirement:

- Your compensation, which is provided by your current employer, estimated using your contribution history and paycheck deduction, or entered by you. The tool assumes your income will increase at an annual rate of 1% over inflation.

- Any bonus or additional income you enter.

- The percentage of current income you would like in retirement. You can enter a percentage between 60% and 110%. If you do not, the tool will use 75% unless your plan specifies a different ratio.

As a general rule, experts say you should plan to replace 75% to 85% of your income in retirement. Depending on your situation, you may need more or less.

Limitations

Your retirement income estimate is based on a single snapshot of your retirement savings at the time you use the tool. You may see different results each time you use the tool because of changes to your investment mix, revisions to the VCMM, and other factors.

Information for your retirement plan(s) at Vanguard will update automatically, as will information for any Vanguard IRAs and/or nonretirement accounts you include in your estimate. You must manually update information on your other retirement savings and income sources to maintain accuracy. The tool assumes that any information you enter is accurate.

Benefits provided by your employer may be understated or overstated when a benefit amount has not been provided at your selected retirement age. This estimate is nonbinding and makes several assumptions, including that you will continue to work at your current employer until your retirement age.

You or your employer may change or stop contributing to your current retirement plan at any time, which would impact the accuracy of your estimate. Any withdrawals from your retirement savings at Vanguard or elsewhere exceeding your retirement income estimate will also impact the estimate's accuracy.

This tool does not consider any taxes you may owe on withdrawals from your retirement savings or required minimum distributions from your retirement savings mandated by the IRS when you reach age 72. Withdrawals taken from tax-advantaged accounts prior to age 59½ are generally subject to a 10% federal tax penalty. You may want to consult a tax advisor.

The tool estimates your Social Security benefits payable at the age you specify in current dollar values. Any pension or Railroad Retirement benefits you enter are assumed to be the amounts payable at retirement and will not be adjusted for inflation by the tool.

The tool does not consider any loans from your retirement plan. A loan balance could reduce your savings if you leave the plan.

*IMPORTANT: The projections and other information generated by the Vanguard Capital Markets Model regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. VCMM results will vary with each use and over time.

The VCMM projections are based on a statistical analysis of historical data. Future returns may behave differently from the historical patterns captured in the VCMM. More importantly, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based.

The Vanguard Capital Markets Model® is a proprietary financial simulation tool developed and maintained by Vanguard's primary investment research and advice teams. The model forecasts distributions of future returns for a wide array of broad asset classes. Those asset classes include U.S. and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, U.S. money markets, commodities, and certain alternative investment strategies. The theoretical and empirical foundation for the Vanguard Capital Markets Model is that the returns of various asset classes reflect the compensation investors require for bearing different types of systematic risk (beta). At the core of the model are estimates of the dynamic statistical relationship between risk factors and asset returns, obtained from statistical analysis based on available monthly financial and economic data from as early as 1960. Using a system of estimated equations, the model then applies a Monte Carlo simulation method to project the estimated interrelationships among risk factors and asset classes as well as uncertainty and randomness over time. The model generates a large set of simulated outcomes for each asset class over several time horizons. Forecasts are obtained by computing measures of central tendency in these simulations. Results produced by the tool will vary with each use and over time.

Your future investment growth is simulated thousands of times by the VCMM to produce your retirement income estimate. In 85% of those simulations, your investments achieve returns that provide at least the level of income shown in your estimate.

Bond funds are subject to the risk that an issuer will fail to make payments on time and that bond prices will decline because of rising interest rates or negative perceptions of an issuer's ability to make payments. Investments in stocks or bonds issued by non-U.S. companies are subject to risks including country/regional risk and currency risk.

Disclosures

This tool is used to provide estimated income and retirement benefit values which are not to be considered final values under any circumstances. The tool utilizes data and assumptions entered by the user when determining the various scenario estimates. Certain personal demographic information and employer retirement benefit plan information is pre-populated for simplicity of use. Any variations in the data utilized by this tool as compared with actual experience will result in discrepancies between the estimated values presented here and the final values calculated at retirement. The methodology and functionality in the tool are intended to provide illustrative results and may vary from the methodology actually used by the plan to calculate final retirement benefit values. While great care has been taken to review the methodology and functionality in the tool, Vanguard accepts no responsibility for any errors it may contain, or for any losses, however caused, sustained by any person who relies on it. For an official plan benefit estimate, please contact the plan administrator for a particular plan.

If a discrepancy exists between any estimates provided by this tool and any benefit to which you are actually entitled under the terms of any of your employer plans, the official plan documents (as interpreted by the plan administrator in its sole discretion) and laws that govern each plan will be followed in determining your rights and benefits under each plan. Your employer reserves the right to amend, modify, suspend, or terminate the plans, in whole or in part, at any time without prior notice, to the extent allowed by law. This means your employer has the right to change plan terms (including eligibility for benefits) or to discontinue any part or all of the benefits described herein at any time.

The information provided in this tool is general and is not intended to be a substitute for specific advice regarding individual tax, legal, wealth planning, or investment planning matters. This tool does not constitute tax or other advice from, or reflect the views of, the employer, which assumes no responsibility with respect to assessing or advising the individual as to tax or other consequences arising from the user's particular situation. Users should consult their own professional advisors with regard to their individual circumstances.
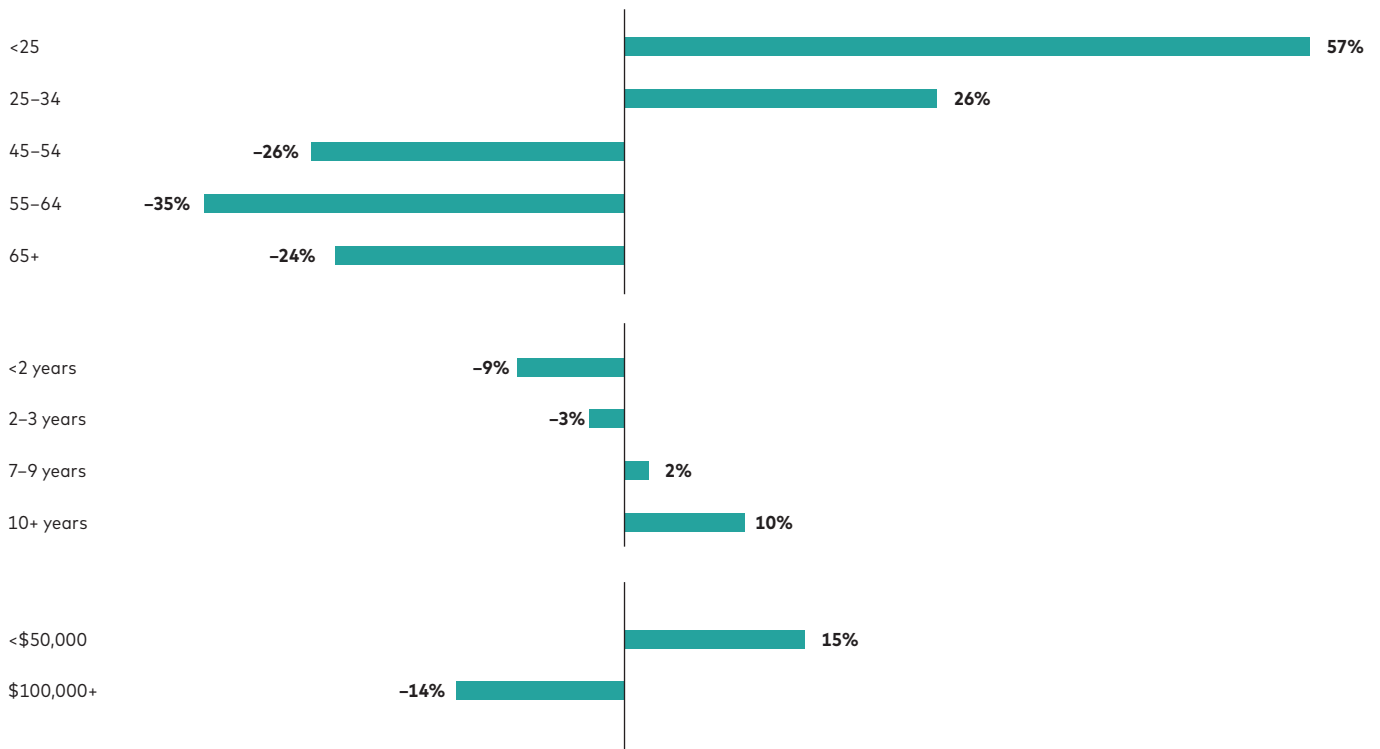
Appendix B: Sample characteristics

	Full-career participants	Engaged participants	Partial-career participants
Median age	32	45	51
Median tenure	6	9	5
Median income	$63,855	$87,623	$61,998
Median total saving rate	12.0%	15.0%	12.0%
Percentage female	41%	38%	44%
Percentage male	59%	62%	56%
Percentage with balanced portfolios	81%	76%	85%
Average equity allocation	83%	77%	73%
Median equity allocation	89%	85%	74%

Source: Vanguard, 2022.

Appendix C: Demographic factors and saving effectively

Demographic factors and replacement ratios >65%

<25	57%
25–34	26%
45–54	–26%
55–64	–35%
65+	–24%
<2 years	–9%
2–3 years	–3%
7–9 years	2%
10+ years	10%
<$50,000	15%
$100,000+	–14%

Note: Regression fixed effects include employer, age measured against a reference of 35-44, tenure measured against a reference of 4-6 years, compensation measured against a reference of $50,000–$100,000, and gender (omitted, as not significant). Solid bars are statistically significant at the 95% level. Slashed bars are not statistically significant. Plan design features include employer contributions and plan design defaults. We also include full-career, engaged, and partial-career controls. In a voluntary enrollment design, the default is zero (see Figure 7). Predicted probability of replacement ratio greater than 65% is 35%. See **Appendix D** for model specification.

Source: Vanguard, 2022.

Appendix D: Regression model

For the predicting retirement readiness model, a fixed effect logistic regression model (clustered on plans) was generated to determine the probability of participants reaching a replacement target of 65%.

Retirement readiness is a binary variable. Categorical variables included in the model (along with their corresponding reference group) are as follows:

Demographic
- Age (35–44).
- Tenure (4–6 years).
- Compensation ($50,000–$100,000).
- Gender (male).
- Projected service at retirement (<35 years).

Plan design
- Employer contribution (3%–4%).
- Employer match (Yes).
- Default rate (0%–voluntary).

Probability of retirement readiness = log [p/(1-p)] = $B_0 + B_1$*(age) +B_2*(tenure) + B_3*(compensation) + B_4*(gender) + B_5*(employer contribution) + B_6*(employer match) + B_7*(default rate)

Appendix E: About the Vanguard Capital Markets Model

IMPORTANT: The projections and other information generated by the Vanguard Capital Markets Model regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. VCMM results will vary with each use and over time.

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