Forecasts to Feel Good About

How Ellevest Calculates Expected Returns

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We received a tremendous amount of feedback from women after we introduced Ellevest. Some of our mathematically inclined users put themselves through the paces of trying to calculate what we're projecting for portfolio returns based upon our forecasts. Some have then asked why our numbers might appear lower than they may have expected.

After all, investment professionals are forecasting global equities to return 4.5−7.1% in the long term,[1] and our forecasts appear to project returns closer to 3−5% over a long horizon. So that begs the question:

How are Ellevest's forecasts different?

Why are Ellevest's forecasts different from those of other digital advisors, or from what investment professionals are predicting in the press?

It's not because we are pessimists, or claim to know where markets are headed. And it's *certainly* not because we think our recommended portfolios will underperform other low-cost portfolios with similar asset allocations.

Yes, our forecasts are different. That's because, unlike other digital advisors who show forecasts, **we account for realities such as taxes and fund fees, and build layers of conservatism into the projections we provide to you.**

Specifically, our forecasts:

- **Show a higher likelihood of achievement.** We shoot to get you to your goals in 70% of markets, while other digital advisors who show forecasts shoot for 50%
- **Account for the sequence and magnitude of investment returns,** known as compounding (averages published in the press aren't usually compounded)
- **Include more poor market scenarios**, which is more consistent with what has been seen historically

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[1] From 2019 global economic and investment outlook publications from The Vanguard Group and BlackRock Investment Institute.

- **Integrate a time-varying capital market model,** which recognizes that future expected asset returns are driven by current valuations (that is, where asset prices are today) and are mean reverting (meaning asset prices eventually return to their long-run averages)
- **Account for real-world realities** such as taxes, fund fees, and inflation
- **Account for regular cash flows,** such as monthly deposits
- **Include glide paths,** which are intended to reduce the risk of your portfolio as you near the end of your goal's time horizon

Rather than follow what other advisors do, we acted on feedback and insights from hundreds of hours of interviews with women. The result? **Forecasts that are more representative of what we believe investors may experience, and forecasts that have a higher likelihood of achievement.**

While we could simply do what everyone else is doing, we prefer to bring a high level of transparency to what we do at Ellevest — even if the news isn't as rosy. We believe that our clients make important savings and investment decisions based on the outcomes that we show in our Ellevest plans. Showing outcomes that may be more optimistic by ignoring taxes and/or fund fees may lead our clients to make decisions that could result in a shortfall under realistic market conditions. We believe our clients should understand what they could realistically expect when investing under uncertainty.

This paper explains why our forecasts are intended to more realistically reflect investing in a world where taxes and fund fees are certain, but future outcomes … not so much.

A higher likelihood of achievement

At Ellevest, our recommendations are intended to help you reach your financial goals in the majority of market scenarios — specifically, in 70% of market scenarios. Most digital advisors who provide forecasts show outcomes with just a 50% likelihood of achievement; they might argue that, after all, that's what you are likely to achieve on average. But "on average" doesn't cut it for us. Our forecasts show you outcomes with a higher-than-average likelihood so you can plan with greater confidence to reach the financial goals that we project for you.

Charts A, B, and C below illustrate this difference. Chart A shows the distribution of possible outcomes for a $100,000 investment in a high-equity portfolio at the end of 20 years.[2] The far left column shows a small number of instances where you may end up close to where you started if markets perform well below average. Over toward the far right, you can see a few instances where your $100,000 could grow to $1.5 million or more, although the frequency of those outcomes is very low, as illustrated by the very short height of those columns. The tallest columns are where your portfolio is most likely to end up, from $300,000 to $500,000.

CHART A

Ending Wealth Distribution

ENDING WEALTH OF $100,000 INVESTED OVER 20 YEARS

As illustrated above, the final outcome of a 20-year investment of $100,000 (in a high equity portfolio) can vary widely, depending upon stock market performance.

Chart B below is the same chart, showing that you may have $464,672 at the 50% likelihood or "on average." That means that your portfolio is equally likely to be above $464,672 (light green columns) or below $464,672 (dark green columns). Hence, you have a 50-50 chance of ending up somewhere in the light green regions or dark green

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[2] These results were provided by Morningstar, Inc., using a Monte Carlo simulation— a forward-looking, computer-based calculation in which we run portfolios through a thousand different economic scenarios to determine a range of possible outcomes.

regions. This 50% forecast, $464,572, is the projection that most digital advisors (who show forecasts) use.

CHART B

Ending Wealth Distribution

50% FORECAST
OF $464,672
OR LOWER

50% FORECAST OF $464,672 OR HIGHER

ENDING WEALTH OF $100,000 INVESTED OVER 20 YEARS

Chart C illustrates the forecast that we show in your Ellevest plan. The forecast that we show has a 70% likelihood of being in the light green columns, and a 30% likelihood of ending up in the dark green columns. The 70% likelihood forecast, $350,652, is clearly lower than the forecast at the 50% likelihood, but carries a higher likelihood of achievement (or better). Because our clients prefer greater likelihood to less, we developed our recommendations to maximize the chances of your portfolio ending up in the light green region. Note that although we show you a forecast of $350,652, there is a 70% chance it could be higher, and in some cases, very much higher.

CHART C

Ending Wealth Distribution

ENDING WEALTH OF $100,000 INVESTED OVER 20 YEARS

At Ellevest, we choose to project a lower forecast with a higher probability of achievement over a higher forecast with a lower probability, even if that's less-compelling marketing on our part.

The algorithms that drive our portfolio and savings recommendations seek to help you achieve your goal with a 70% likelihood. In practical terms, that means that our Ellevest plans are more likely to recommend that you save more, as compared to other digital advisors that aim for achievement at only a 50% likelihood. We believe our recommendations give you a higher prospect of reaching your goal, and seek to mitigate the potential for falling short.

The impact of compounding

Many reputable investment firms publish forecasts for US and global equities based upon extensive analyses and modeling of economic data. We are no exception. At Ellevest, we partner with global investment research firm Morningstar Investment

Management, LLC[3] to estimate economic assumptions such as expected returns on global equities and the rate of long-term inflation. These capital market assumptions (CMAs) are important because they drive the forecasting and advice algorithms that underlie the recommendations in your Ellevest plan. Our return expectations over a 20-year period are 6.2–9.8% for global equities, depending upon market capitalization and geographic region.

That all sounds pretty good. That must mean that if these estimates come to fruition, we can all expect our global equity portfolios to return annually over the next 10 to 20 years, right? The answer is, "well ... not exactly." That's because of the differences between how these figures are determined and how your personal investment returns are calculated. Neither is right nor wrong, but it's important to understand the differences between what's commonly published and what is included in our forecasts of your portfolio and the likelihood of achieving your goals.

Most estimated annual returns you read about in the paper, the 6% or 9%, are simple arithmetic averages; they are commonly used to help facilitate apples-to-apples comparisons among different types of investments. Arithmetic averages are calculated by adding up each year's expected returns and dividing by the number of years. They don't include any cash flows (like regular savings or withdrawals) or taxes, or account for the compounding of returns.

Many investors erroneously assume that on average, over their investment horizon, they can expect to earn these average returns annually. However, the returns an investor will actually experience can be very different from these average annual returns. A portfolio that went up 20% one year and down 20% the next has an average annual arithmetic return of 0% — but in reality, you would actually be down 4%. This is due to the impact of compounding, or more specifically, how each individual year's return is tied to the return of the prior year.

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[3]Morningstar Investment Management, LLC is a registered investment adviser and subsidiary of Morningstar, Inc. Morningstar Inc.is a leading provider of independent investment research in North America, Europe, Australia, and Asia.

Here's an example to illustrate the difference:

Each of the four scenarios below is a hypothetical scenario of market returns over five years. The simple arithmetic average return for all four scenarios is 10%.

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
SCENARIO 1	10.00%	10.00%	10.00%	10.00%	10.00%
SCENARIO 2	20.00%	20.00%	–10.00%	10.00%	10.00%
SCENARIO 3	40.00%	20.00%	30.00%	10.00%	–50.00%
SCENARIO 4	70.00%	20.00%	20.00%	30.00%	–90.00%

AVERAGE ARITHMETIC RETURN CALCULATION:
SCENARIO 1:   (10% + 10% + 10% + 10% +10%) / 5 = 10%

SCENARIO 2:   (20% + 20% – 10% + 10% + 10%) / 5 = 10%

SCENARIO 3:   (40% + 20% + 30% + 10% – 50%) / 5 = 10%

SCENARIO 4:   (70% + 20% + 20% + 30% – 90%) / 5 = 10%

However, the scenarios differ with respect to the order and the magnitude of returns from year to year. Scenario 1 has no volatility, whereas scenario 4 has very high volatility from year to year.

Here's how $100 invested at the beginning of each scenario would turn out at the end of 5 years:

	GROWTH OF $100	COMPOUNDED ANNUAL RETURN
SCENARIO 1	$161.05	10%
SCENARIO 2	$156.82	9%
SCENARIO 3	$120.12	4%
SCENARIO 4	$31.82	–20%

Most investors will do the math using the estimated 10% average annual return, and happily assume they'll see $161 at the end of five years. But 4%? And negative 20%? How is that possible? How can these four scenarios, each with a 10% average arithmetic return, have such wide-ranging outcomes? The answer is ... the power of

compounding. In other words, the order and magnitude of how you experience your returns year to year is a large determinant of your personal rate of return.

There are also cash flows to consider. The arithmetic averages assume you buy and hold your investment each year. However, investing over time — each month, once a quarter, or even annually — impacts your personal rate of return. For example, if you invested $100 and received a return of -20% in year one, and then +10% in year two, you would end up with $88. However, if you invested $20 in year one and $80 in year two, you would end up with $105.60. That's because only $20 of your total $100 investment experienced the down year, and more of your investment ($80) received the benefit of the up year. Investing consistently over time, like many Ellevest clients do, will impact your personal rate of return, and cause it to differ from arithmetic average returns.

At Ellevest, although our underlying models assume a 6.2−9.8% arithmetic (pre-tax) return for global equities, the sequence of returns you experience, as well as any cash flows, will impact your personal rate of return. To get a realistic estimate of what you can expect, we run your portfolio and your cash flows through many, many different market scenarios — good, bad, high volatility, low volatility, etc. And the forecast that we show you in your Ellevest plan projects achieving your goal in 70% of those market scenarios.

More downside scenarios

Every forecasting model, including ours, uses not only economic assumptions and estimates of investment returns, but also models of how markets behave. No model is perfect, but we strive to develop and use models of expected market returns that produce results that match (as closely as possible) the returns we have seen historically. A popular model used by advisors who generate forecasts assumes that stock returns are normally distributed, meaning that equity returns resemble a bell curve. These models are reasonably good predictors in the middle part of the curve, but not so much at the tails. They predict very few extremely low or extremely high returns, when historically, we've seen more of these types of returns, especially on the downside, than a normal bell curve might predict.

Normal distribution models assume that very poor market scenarios[4] have a probability of occurring only one out of every 1,000 instances (in this case, months), or 0.13%. However, history shows that these scenarios actually occur 10 times out of 1,000 instances, or closer to 1%.

Remember October of 1987? The S&P 500 fell more than 21.5% that month. And October of 2008? Down 16.79% for the month. Those are two out of the ten occurrences where equity returns returned lower than -15.0% for the month from 1926 through 2014. Most of us would prefer to forget those episodes, but unfortunately, such events are part of the risks of investing. We can prepare for them by forecasting how our portfolios would perform under such conditions, and then we can invest and save appropriately, so that our goals may be achieved if poor market scenarios occur like they have in the past. Using a normal distribution model, or any model that downplays or ignores the frequency of these poor market scenarios, results in forecasts that may be too optimistic. We hope for great market returns, yet prepare for bad markets —rather than hoping for the best, only to be unpleasantly surprised.
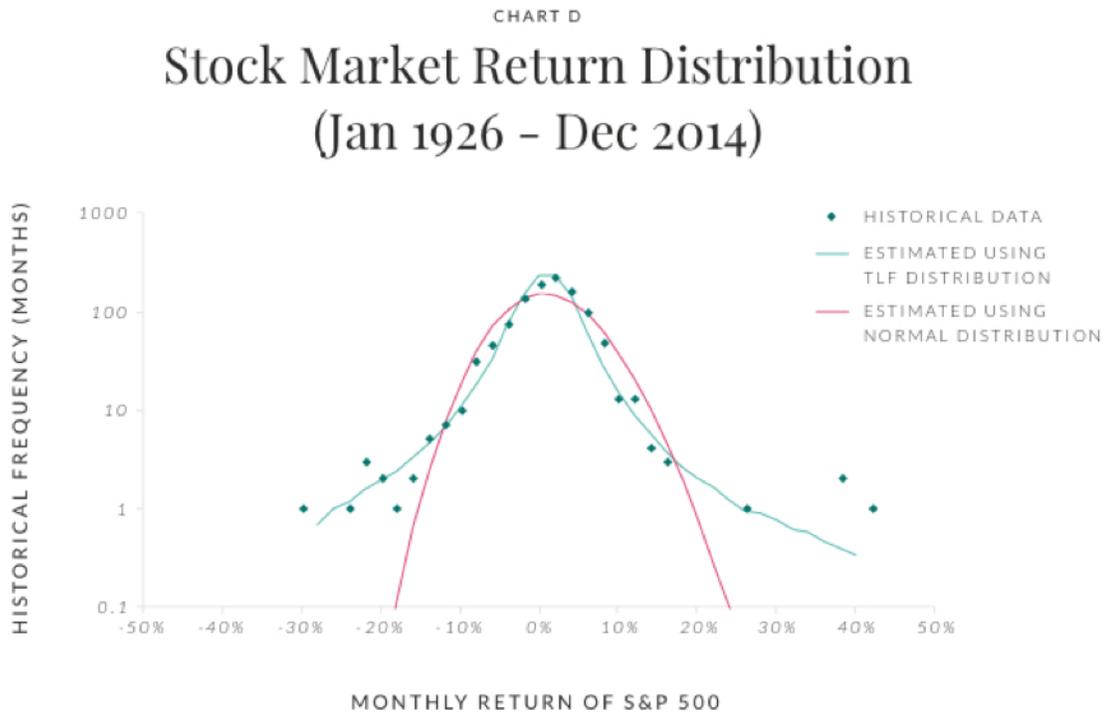
In partnership with Morningstar, we use a model of returns behavior called truncated Lévy flight (TLF).[5] We believe this model describes stock market returns that more accurately reflect how markets have behaved historically, especially on the downside. Chart D[6] below illustrates the difference between using a normal and TLF distribution and how well the models would have predicted market returns historically.

As the chart illustrates, using a normal distribution model (red curve) fails to capture the frequency of poor returns that we have seen historically, and likely results in forecasts that are more optimistic. The TLF model (green curve) more closely matches the historical data (green diamonds) for this period.

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[4] We define very poor market scenarios as those that are 3 standard deviations below the mean.

[5] For more information, see https://bit.ly/2r5dfGP.

[6] Source: Morningstar Investment Management LLC. Used with permission.

CHART D

Stock Market Return Distribution
(Jan 1926 – Dec 2014)

MONTHLY RETURN OF S&P 500

At Ellevest, our models include these bad market scenarios at a frequency that reflects what we've historically experienced: about three October 2008-like events over a horizon of 30 years. Correspondingly, our forecasts may be lower than those of advisors that use models assuming normally distributed returns.

Valuation-based forecasts

An enhancement to our forecasting algorithm is the integration of a valuation model. "Valuation" refers to an estimation of what something is worth. So when experts say something is "overvalued," they typically mean that the current price of that asset is greater than what they believe that asset is truly worth, and vice versa. Over the years, market experts have observed that assets that are over- or under-valued for some period of time tend to move in the opposite direction, toward their historical averages. This behavior is called "mean reversion."

For example, the long run-up we've seen in the prices of US Large Cap growth stocks since the global financial crisis has resulted in what some experts believe are unsustainably high valuations. The chance that these valuations can continue to be

supported or move even higher is probably smaller than the chance that these valuations will begin reverting to their (lower) historical means, or averages. This mean-reverting property, together with current valuations of different asset classes, is important in determining how your portfolio will perform in the future. In other words, the starting point matters!

What also matters is your investment horizon. If your timeline is short (a few years or less) and asset prices are high, your portfolio may have a lower average expected return over that horizon than if your investment horizon were long, say more than 20 years. That's because over shorter periods, with the starting point high, asset prices will tend to revert to their means. But over very long investment horizons, prices will have the opportunity to go through several market cycles of over- and under-valuation.

We believe that integrating a valuation model into our forecasts provides you with a more realistic forecast for your short- and long-term goals. This innovation from Morningstar represents a significant advance in quantitative forecasting.

Taxes matter

The forecasts that we read about in the papers — the 6% or 9% for global equities — are estimated annual pre-tax returns. Generally, most estimated returns you hear from advisors are pre-tax, to help facilitate an apples-to-apples comparison between different types of investments. Our 6.2–9.8% estimated arithmetic annual returns on global equities mentioned earlier are also pre-tax. However, our forecasts of your portfolio in a taxable account *include* the estimated taxes you may pay in the course of investing, based on an estimate of your personal tax rates. For taxable accounts, the impact of including or ignoring taxes incurred from investing can have a significant impact on your forecast and the achievement of your goals. For most of us, paying taxes on dividends and interest earned, as well as realized capital gains, is an annual affair. In a taxable account, these tax liabilities can't be ignored or deferred indefinitely.[7] Ellevest's forecasts include estimates of your personal tax impact, and over long horizons, the amounts can add up.

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[7] Unless you have losses that offset all gains, and/or if the account is passed onto heirs and receives a step up in basis.

Here's an example. Let's suppose you start with $20,000 and invest it for 11 years in a low-cost diversified portfolio of about 80% equities, 20% bonds.[8] Chart E below shows the estimated taxes[9] that would be due each year, based on an estimate of the interest and dividends received, and any realized capital gains from rebalancing the portfolio.

CHART E

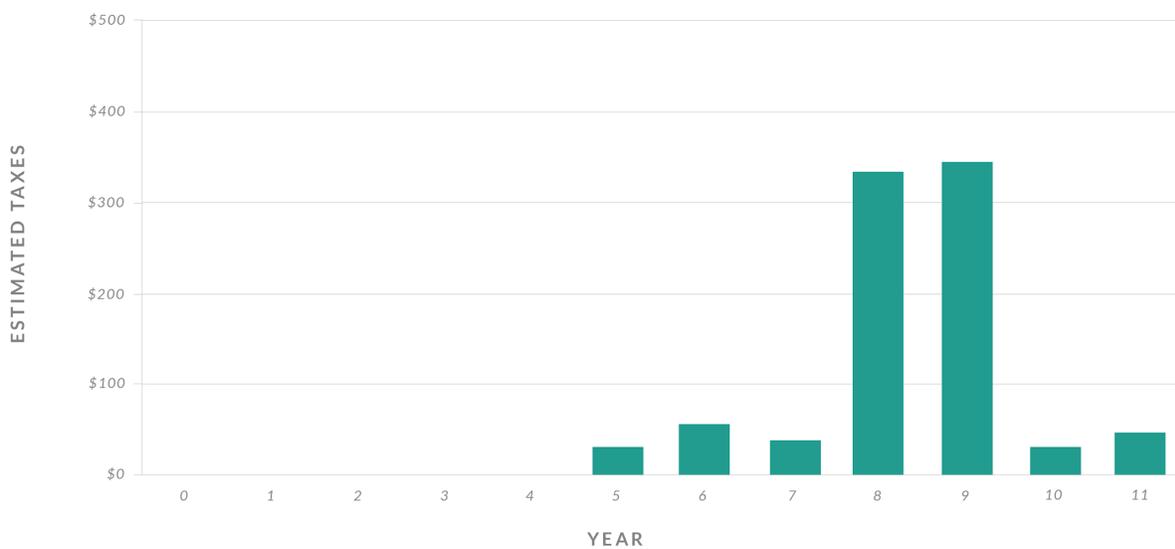## Estimated Taxes from Interest, Dividends, & Realized Capital Gains

Chart F below illustrates the difference in outcomes. The red line shows the simulated growth of the diversified portfolio assuming no taxes. The green line shows the simulated growth under the same assumed market conditions, but including

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[8] These results were provided by Morningstar, Inc., using a Monte Carlo simulation— a forward looking, computer-based calculation in which we run portfolios through hundreds of different economic scenarios to determine a range of possible outcomes.

[9] In this example, the taxes are estimated based upon a single woman earning $80,000 and living in Texas.

estimated taxes and assuming those taxes are paid out of the account each year, as they are due (amounts shown in Chart E). Both projections reflect a 70% likelihood of achievement or better, and both accounts assume an annual advisory fee of $20,[10] which is paid out of the account each year. But the forecast without taxes is 13% greater than the forecast that includes taxes.

CHART F

The Impact of Taxes on Projected Outcomes
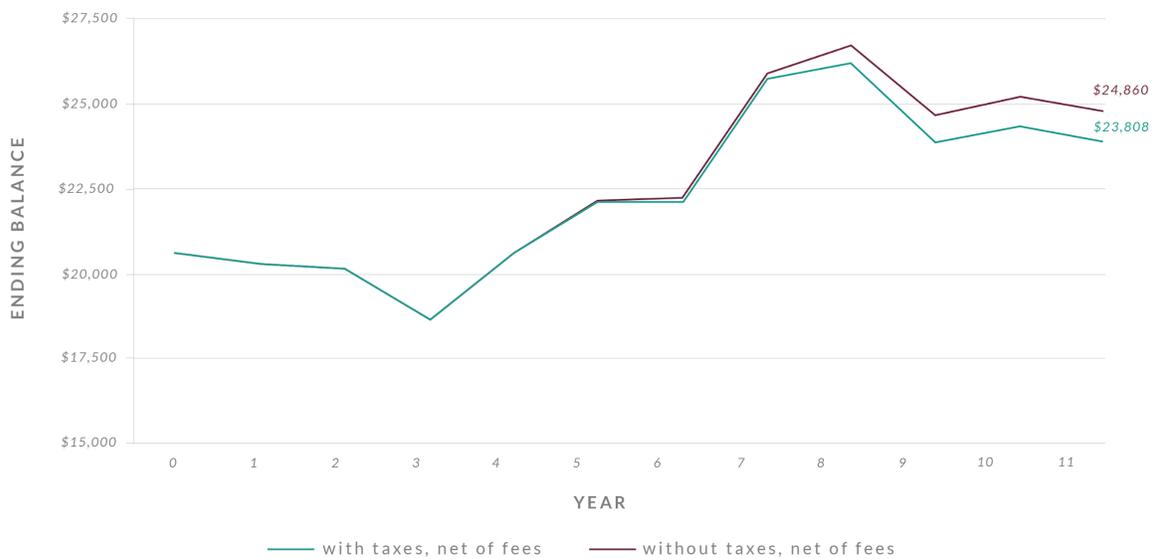
If your financial goal were to save and invest for a $48,000 down payment on a home, you would probably feel pretty confident if your forecast showed you were on track to receive $49,108, as shown in the chart above. However, if you account for the taxes you owe each year for dividends, interest income, and realized capital gains, you would fall short of your goal, netting less than $43,500 after tax. If you reside in a high-tax state (like New York or California) and have income placing you in a high marginal tax bracket, the impact of ignoring taxes will be even more significant.

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[10] We assume one third of the Ellevest Plus membership fee goes toward advisory services.

Some digital advisors' forecasts are pre-tax, but you'll need to read the fine print to know this. And yes, as long as they include a disclosure, showing pre-tax forecasts may not be wrong. However, taxes are a real-world reality, and we believe that not accounting for them in our forecasts would not benefit our clients in helping them achieve their financial goals.

This means that our forecasts, which incorporate taxes, will be lower than those of advisors that show pre-tax forecasts. But we'd rather make it real (and personal to you) than risk having you fall short of your goals.

Glide paths

The portfolios that we recommend at Ellevest begin at a specified equity level, which typically decreases each year as you approach your goal, which is commonly called a "glide path." Especially for goals with shorter horizons, reducing portfolio risk over time helps preserve principal and mitigate large losses as you near your target goal.

Each goal has a glide path specifically designed to reduce risk (and help you achieve your goal), as you get closer to your horizon. For retirement goals, which typically have a long time horizon, we update our analysis and portfolio recommendation annually, which may result in a new portfolio recommendation with a higher equity level, depending upon your personal circumstances.

Some digital advisors who show forecasts do not incorporate a glide path, but instead assume your current or target portfolio is maintained for your entire investment horizon. Other digital advisors will use a glide path in practice, but show forecasts that assume a constant target portfolio. This may potentially lead to a mismatch between how your portfolio is managed over time and the forecasted outcome.

A hint for you math geeks: Because our forecasts are at the 70% likelihood, you can't determine an implied average expected return by dividing our forecast by your initial wealth and then annualizing. The usual calculation for compounded returns doesn't hold at the 70% likelihood!

For example, suppose you start with $10,000 to fund a Build Wealth goal. Over 20 years, we forecast an outcome of $17,910 or better with a 70% likelihood. Dividing this outcome by the original investment of $10,000 and annualizing the return over 20 years results in an implied expected annual return of about 3%. Not terribly

compelling, right? But remember that the forecast we show is at the 70% likelihood — that's not the same as average, it's *better* than average. To determine an outcome at the 50% likelihood, the 70% forecast needs to be adjusted using a volatility correction. Doing so results in an estimated forecast of about $23,090. This estimate is an after-tax estimate that includes the taxes that you incur (and pay) each year, the glide path toward less-risky portfolios, and the simulation of compounded returns with many market scenarios, including bad ones — which are modeled at a frequency consistent with history. For context, the after-tax arithmetic expected returns we use in our underlying model for the Build Wealth goal range from 6.22% at the beginning of the investment period to 4.92%, as the portfolio's risk glides down.

Separating portfolio performance from projected outcomes

Research has shown that a portfolio's asset allocation (stock and bond weightings) determines more than 93% of the variability in a portfolio's returns.[11] That means that portfolios with like asset allocations and fees will perform similarly, regardless of an advisor's belief (or best guess) of how equities and bonds will perform in the future. Whether your forecast is low or high, a low-cost, diversified portfolio of 80% equities and 20% bonds will perform about the same over time, regardless of whether you invest in this portfolio with Ellevest, you choose another advisor, or you create and manage the portfolio yourself.[12] This is portfolio performance, which we won't know until after the fact.

On the other hand, projected outcomes are exactly that — a projection or estimate that is made *before* the fact. It's important to remember that one doesn't necessarily imply the other. At Ellevest, we choose to show more realistic forecasts with higher likelihoods of achievement, but our portfolios will perform similarly to other portfolios with similar asset allocations, fund fees, and rebalancing policies.

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[11] Brinson, Gary P., L. Randolph Hood, and Gilbert L. Beebower. 1986. "Determinants of Portfolio Performance." Financial Analysts Journal, vol. 42, no. 4 (July/August):39–44.
[12] Excluding the deduction of advisory fees.

Disclosures

This whitepaper was last updated in April 2020.

The statements contained herein are the opinions of Ellevest. All opinions and views constitute our judgments as of the date of writing and are subject to change at any time without notice.

Forecasts or projections of investment outcomes are estimates only, based upon numerous assumptions about future capital markets returns and economic factors. As estimates, they are imprecise and hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results.

Information was obtained from third-party sources, which we believe to be reliable but not guaranteed for accuracy or completeness.

The information provided should not be relied upon as investment advice or recommendations, does not constitute a solicitation to buy or sell securities, and should not be considered specific legal, investment or tax advice.

The information provided does not take into account the specific objectives, financial situation, or particular needs of any specific person.

Diversification does not ensure a profit or protect against a loss in a declining market. There is no guarantee that any particular asset allocation or mix of funds will meet your investment objectives or provide you with a given level of income.

The practice of investing a fixed dollar amount on a regular basis does not ensure a profit and does not protect against loss in declining markets. It involves continuous investing regardless of fluctuating price levels. Investors should consider their ability to continue investing through periods of fluctuating market conditions.

Investing entails risk, including the possible loss of principal, and there is no assurance that the investment will provide positive performance over any period of time.

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