Implications of disciplined investing for 529 college-savings plans

Vanguard Research Series on 529 College-Savings Plan Account-Owner Behavior

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As a follow-up to our recent review of investor allocations and risk tolerance in Vanguard-client 529 plans (Stockton, 2015), the current analysis looks at how this behavior varied among various categories of users. Key findings are:

- Investors in 529 accounts had three main categories of accounts: pure glide path, with 100% of assets invested in one glide-path track; self-directed, with 100% of assets invested in individual portfolio option(s) offered in their plan outside the glide path; and mixed-use, with assets invested in either multiple glide-path tracks or a combination of glide-path track(s) and individual portfolio options.
- Self-directed investors had larger equity and less diversified allocations than pure glide-path users in these accounts.
- Mixed-users and self-directed investors maintained larger equity allocations over a longer time period than pure glide-path users.
- These results highlight the discipline and balance that a professionally designed and managed glide path can provide.

Note: The authors thank Michael J. Davison, of Vanguard's Retail Shared Services group, for his assistance with the data used in this analysis.

Vanguard recently analyzed the investment allocations of 529 college-savings account owners in its client plans, representing nearly 1.3 million accounts as of year-end 2014, to assess their risk tolerance and investment behavior (Stockton, 2015). In the first analysis, we reviewed aggregate findings for all account owners. For the current study, we found that investor behavior fell into three main categories: pure glide-path users; self-directed investors; and mixed-users, those who use both glide paths *and* portfolios offered in a plan outside the glide path.[1] This analysis considers how asset allocations and risk tolerance varied across these investor cohorts.[2]

Cohort descriptions and track usage

Pure glide-path users: Accounts with 100% of assets invested in one glide-path track. (See **Figure 1**, for the cohort descriptions and percentage breakdowns among the study's users.)

Self-directed investors: Accounts with 100% of assets invested in portfolios offered in the plan outside the glide path. Although the glide paths in the plans we reviewed each varied somewhat from Vanguard's recommended tracks, all of them offered at least three glide paths, so self-directors made an active decision to build their own portfolios.

Notes on asset-return distributions and risk

The asset-return distributions shown here represent Vanguard's view on the potential range of risk premiums that may occur over the next ten years; such long-term projections are not intended to be extrapolated into a short-term view. These potential outcomes for long-term investment returns are generated by the Vanguard Capital Markets Model® (VCMM—see also the description in Appendix III) and reflect the collective perspective of our Investment Strategy Group. The expected risk premiums—and the uncertainty surrounding those expectations—are among a number of qualitative and quantitative inputs used in Vanguard's investment methodology and portfolio construction process.

IMPORTANT—The projections or other information generated by the VCMM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from the VCMM are derived from 10,000 simulations for each modeled asset class. Simulations are as of June 30, 2015. Results from the model may vary with each use and over time. For more information, see the appendix.

All investments are subject to risk, including the possible loss of the money you invest. Past performance is no guarantee of future returns. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index. There may be other material differences between products that must be considered prior to investing. Diversification does not ensure a profit or protect against a loss. 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.

Be aware that fluctuations in the financial markets and other factors may cause declines in the value of your account. Investments in stocks or bonds issued by non-U.S. companies are subject to risks including country/regional risk, which is the chance that political upheaval, financial troubles, or natural disasters will adversely affect the value of securities issued by companies in foreign countries or regions; and currency risk, which is the chance that the value of a foreign investment, measured in U.S. dollars, will decrease because of unfavorable changes in currency exchange rates. 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.

1 Data for this analysis are based on the following Vanguard-client, direct-sold 529 plans as of December 31, 2014: Vanguard 529 College Savings Plan; CollegeInvest Direct Portfolio College Savings Plan [Colorado]; College Savings Iowa 529 Plan; MOST—Missouri's 529 College Savings Plan; and New York's 529 College Savings Program *Direct Plan*. Data were analyzed at the beneficiary level, one beneficiary per account. Accounts with beneficiaries older than age 21 were eliminated from this analysis because reasonable assumptions about drawdown and time horizon could not be made for those. Note that each plan contains some modifications to Vanguard's recommended age-based glide-path allocations and portfolios, and that each plan also offers self-directed options in addition to the glide path(s). Data for each plan were provided by Ascensus College Savings Recordkeeping Services, LLC.

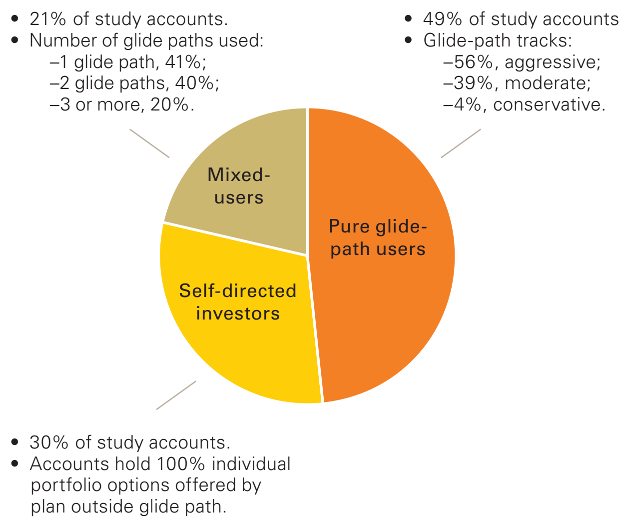
2 This study's analysis is based only on accounts reviewed relative to Vanguard's recommended 529 glide-path methodology. Investors analyzed may have additional college-savings resources, which could affect both their overall college-savings portfolio as well as this paper's findings relative to Vanguard's recommended approach. Similarly, our methodology assumed 529 investors were investing for four years of spending. To the extent that investors had longer time horizons—for example, if they were saving for graduate-level study to be pursued directly following undergraduate study—more aggressive allocations might be appropriate. For instance, *U.S. News & World Report* recently reported that 26% of college graduates had enrolled in a graduate program within one year of graduation (source: http://www.usnews.com/education/best-colleges/the-short-list-college/articles/2015/06/02/10-colleges-that-lead-to-graduate-school).

Mixed-users: Accounts with assets invested in either multiple glide-path tracks or a combination of glide-path track(s) and portfolios offered outside the glide path. Investors in two glide paths could intentionally choose such an allocation to match a risk tolerance between two tracks offered in their plan. For example, an investor who considered himself or herself to be moderately aggressive might invest in both the aggressive and the moderate path. For those invested in three or four glide-path tracks, however, these choices may not have been made with a full understanding of the investment implications, especially if the allocations in each path are evenly distributed. For instance, in many cases an equal investment in conservative, moderate, and aggressive paths could be nearly equivalent to investing in the moderate path alone. Investor education in glide-path construction and its intended use may be helpful here.

Comparing asset allocation across cohorts

How does investor behavior vary with each cohort? Our analysis found that pure glide-path users had more diversified and less extreme asset allocations than self-directed investors in these accounts, as shown in **Figure 2**. Although in some cases, a 100% allocation to a broad asset class is appropriate, in other cases the associated time horizon could risk an allocation mismatch. Reflecting glide-path design (see Appendix I), no pure glide-path user had 100% of assets in fixed income. Similarly, for beneficiaries over age 10, no pure glide-path account owners had 100% of their assets in equities.[3] On the other hand, a larger percentage of self-directed investors had 100% of their assets in one asset class. For example, approximately 24% of self-directed investors with college-age beneficiaries (ages 19–21) had 100% equity allocations, positions that were perhaps too aggressive for the drawdown period of the college-savings time horizon, unless the positions were part of a broader portfolio. And, although most self-directed investors with concentrated equity positions had a mix of international and domestic allocations, a small percentage across age bands had 100% allocations to international equity. Likewise, a small percentage of self-directed investors with longer time horizons (beneficiaries aged 0–5 years) had 100% of their assets in short-term reserves or fixed income, a stance perhaps too conservative over the long term.[4] Mixed-users had the fewest instances of 100% allocation to any asset class. Whether or not that was intentional or just a result of the multi-glide-path usage is unclear.[5]

Figure 1. Cohort descriptions for this study (as of December 31, 2014)



Note: Percentage of tracks or number of paths may not add to 100% because of rounding.

Source: Vanguard.

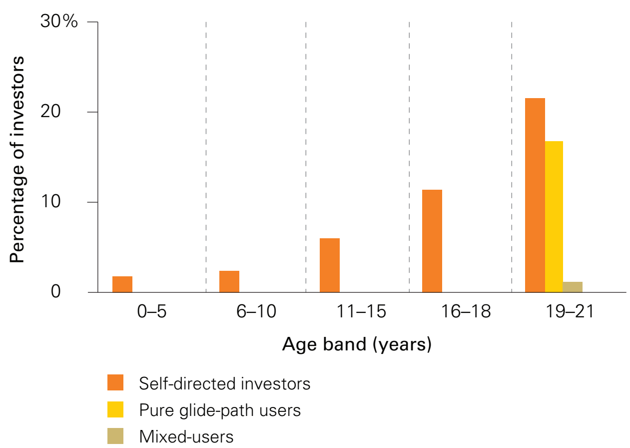
3 Note that the equity allocation includes both international and domestic equity allocations. Vanguard recommends that 40% of the equity allocation be to non-U.S. equity.

4 Again, note that investors with college-bound beneficiaries may have had other college-savings accounts that, when combined with these, could have resulted in a diversified, less extreme college-savings portfolio.

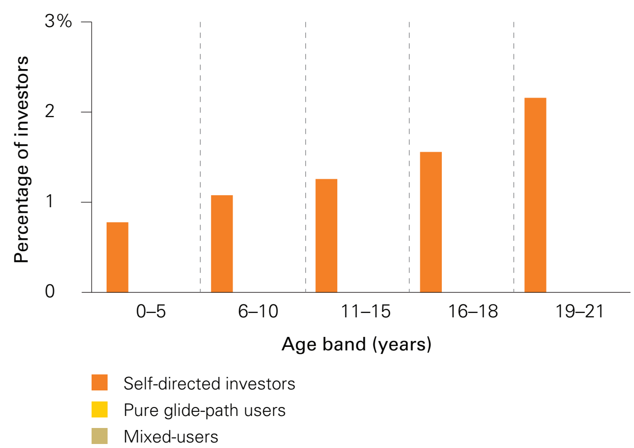
5 Investors with concentrated positions who are attempting to gain the 529 tax benefit should be reminded that to maintain these benefits, assets must be used for qualified college expenses.

Figure 2. Investor behavior as it varied by study cohort (as of December 31, 2014)

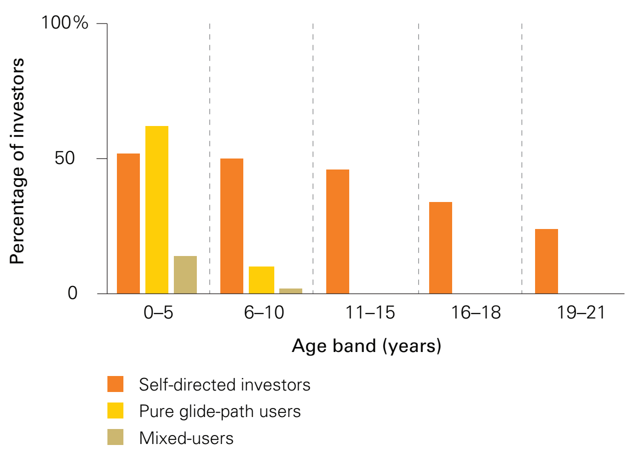
a. 100% of assets in short-term reserves



b. 100% of assets in bonds



c. 100% of assets in equity

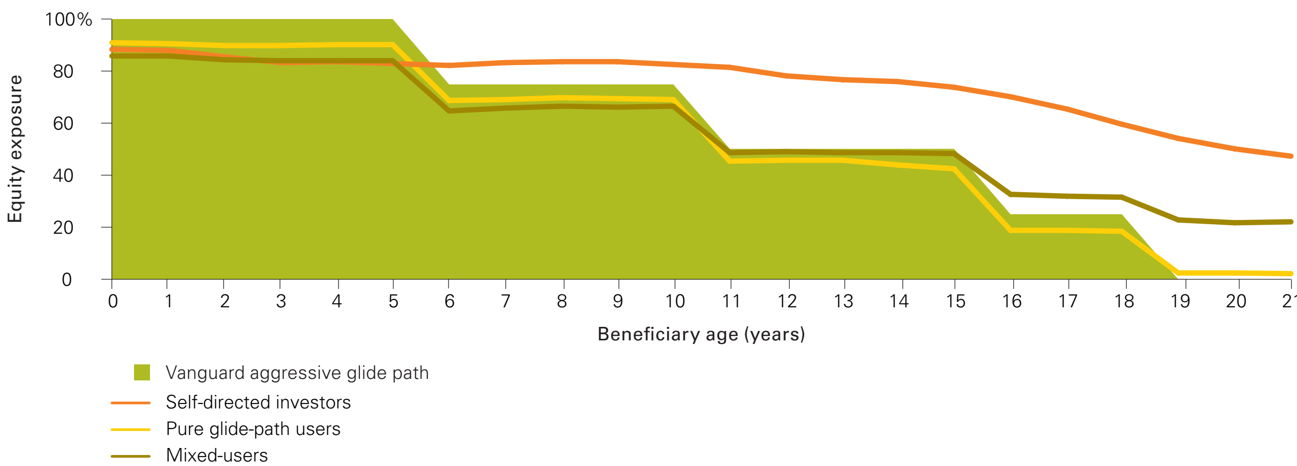


Notes: "Equity" includes both domestic and international equity allocations. "Bonds" includes domestic and international bond allocations.
Source: Vanguard.

Glide-path discipline

Overall, because account-holder average equity allocations in our study were closest to those of Vanguard's aggressive glide-path recommendations (see **Figure 3**), we used the aggressive glide path as our primary point of comparison (see Appendix I for Vanguard's complete recommended glide-path allocations). Figure 3 illustrates two key findings about discipline in account-holder asset allocation decisions. First, in general, the self-directed investors had the largest average equity allocations in these accounts, followed by mixed-users, and then pure glide-path users. Starting with the pure glide-path users, average equity allocations were below those of Vanguard's aggressive track glide path until beneficiary age 19, at which point they were only slightly above that glide path.[6] Next, with respect to mixed-users, average equity allocations were below and within 6 percentage points of pure glide-path users until beneficiary age 10, at which point averages for mixed-users were higher, with the difference peaking in the final stages of the glide path. Finally, self-directed investors had larger average equity allocations than the other two cohorts after beneficiary age 5, with the largest difference being that for accounts with beneficiaries aged

Figure 3. Average equity allocations by study cohort, relative to Vanguard aggressive glide path (as of December 31, 2014)



Notes: Data are as of December 31, 2014. Chart displays average allocations. For the full distribution of asset allocations, see Appendix II.
Source: Vanguard.

6 These results reflect variation in some of the plans' glide paths from Vanguard's recommended glide paths.

19-plus. For example, the Vanguard-recommended aggressive glide path at age 19 has a zero equity allocation; the average equity allocation for self-directed investors at this point is 54%. Finally, although not shown in Figure 3, we also reviewed the entire distribution of equity allocations for each cohort. The self-directed investors had more than 78% of accounts with larger equity allocations than the Vanguard aggressive track—nearly two times more than accounts of mixed-users and more than three times the accounts of glide-path purists.[7]

Our study's second major finding about account-holder discipline was highlighted in the steeper decline in the pure glide-path user equity allocation line relative to mixed-users and self-directed investors. This pronounced difference highlights the discipline that is a key benefit of Vanguard's age-based glide path. Whether for lack of time, interest, or knowledge, investors going it alone may not appropriately reduce the risk exposure in their portfolio as they approach the drawdown period. The end result could be a portfolio with a high-risk allocation that is subject to excessive market volatility at exactly the time when college savers most need stability—when they are spending their savings. Glide paths provide investors the discipline to help ensure appropriate, timely derisking as college approaches.

Risk considerations

Vanguard believes that in the earlier stages of college saving, when time horizons are longer, a strategy emphasizing assets with historically higher real returns may produce growth sufficient for protection in case the inflation-adjusted value of the college liability is underestimated. During the near-college/college years, however, the volatility risk associated with higher-returning assets begins to outweigh their potential for offsetting inflation. Investors at that stage should balance the need to preserve capital with the need to preserve purchasing power. Equities are simply too volatile at this stage of the glide path where time horizons are short. Vanguard analysis has found that savers in 529 college plans typically begin to draw down at age 18, and that the median time horizon at this point is three years, meaning that 50% of account holders withdrew 100% of their account within three years.[8] As such, we suggest that the majority of the asset allocation at the end of the glide path be fixed income and cash, depending upon investor risk tolerance. And, as mentioned, even for its aggressive glide path, Vanguard recommends a 0% equity allocation for college savers with beneficiaries aged 19 or older. Likewise, the average glide-path equity allocation across the industry for beneficiaries aged 19-plus is small, at 10%.[9]

To illustrate the higher risk of equities relative to fixed income, using Vanguard's proprietary asset simulation model—the Vanguard Capital Markets Model (VCMM)—we generated five-year forward-looking return distributions for four hypothetical portfolios with equity allocations ranging from 0% to 100%.[10] As shown in **Figure 4**, annual downside return risk, measured as first-percentile results,[11] was –12.0% for a 100% equity portfolio and –0.2% for a 100% fixed income portfolio. Note also the large range of results around the portfolios with more equity, another indication of greater risk relative to fixed income. Finally, we forecast the probability of a negative return over a five-year period, which ranged from 21% for a 100% equity portfolio to 1% for a 100% bond portfolio.

7 See Appendix II for the full distribution of equity allocations for each cohort and relative to Vanguard's aggressive, moderate, and conservative glide paths.

8 The same Vanguard analysis found that although the majority of account balances were withdrawn within four years, the time horizons for withdrawal periods have increased over the past decade, so that it could take much longer than four years for account owners to withdraw 100% of their balance.

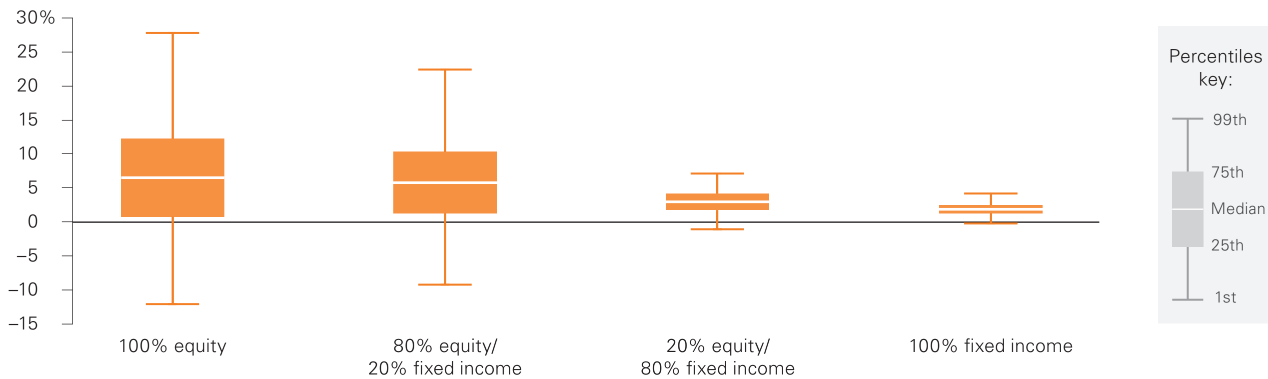
9 According to Morningstar's *529 College-Savings Plans Industry Survey* (2014), the industry average glide path had a 10% allocation to equity for beneficiaries aged 19 as of 2013.

10 The VCMM employs a regression-based Monte Carlo simulation approach. For more information on the VCMM, and our methodology, see Appendix III.

11 The first percentile does not delineate the maximum risk; more extreme results are possible, but have a low probability based on the VCMM's results.

Figure 4. Five-year forward-looking return distributions for four hypothetical portfolios

Five-year return distribution



Notes: These hypothetical results do not represent the return of any specific portfolio. Equity allocation is 60% U.S. stocks/40% non-U.S. stocks; fixed income allocation is 70% U.S. bonds/30% non-U.S. bonds. Forecasts are as of June 30, 2015.

Source: Vanguard, from VCMM forecasts.

Conclusion

Our study analysis has shown a clear difference in investor behavior among pure glide-path users relative to self-directed investors or mixed-users. First, we found that self-directed investors had less diversified, more concentrated allocations than pure glide-path users. Second, we found that mixed- and self-directed investors maintained larger equity allocations than pure glide-path users across most of the glide path, with the largest differences occurring at the latest stage of the glide path. These results highlight the benefits of a professionally designed and managed glide path, which provides discipline. Some investors, whether for lack of time, interest, or knowledge, are not strongly engaged in the college-savings investment decision-making process. Even self-directed investors, who chose to build their own portfolios initially, may not appropriately derisk or even rebalance as their beneficiaries age, with a potential end result being too much risk and market exposure in the drawdown years.

References

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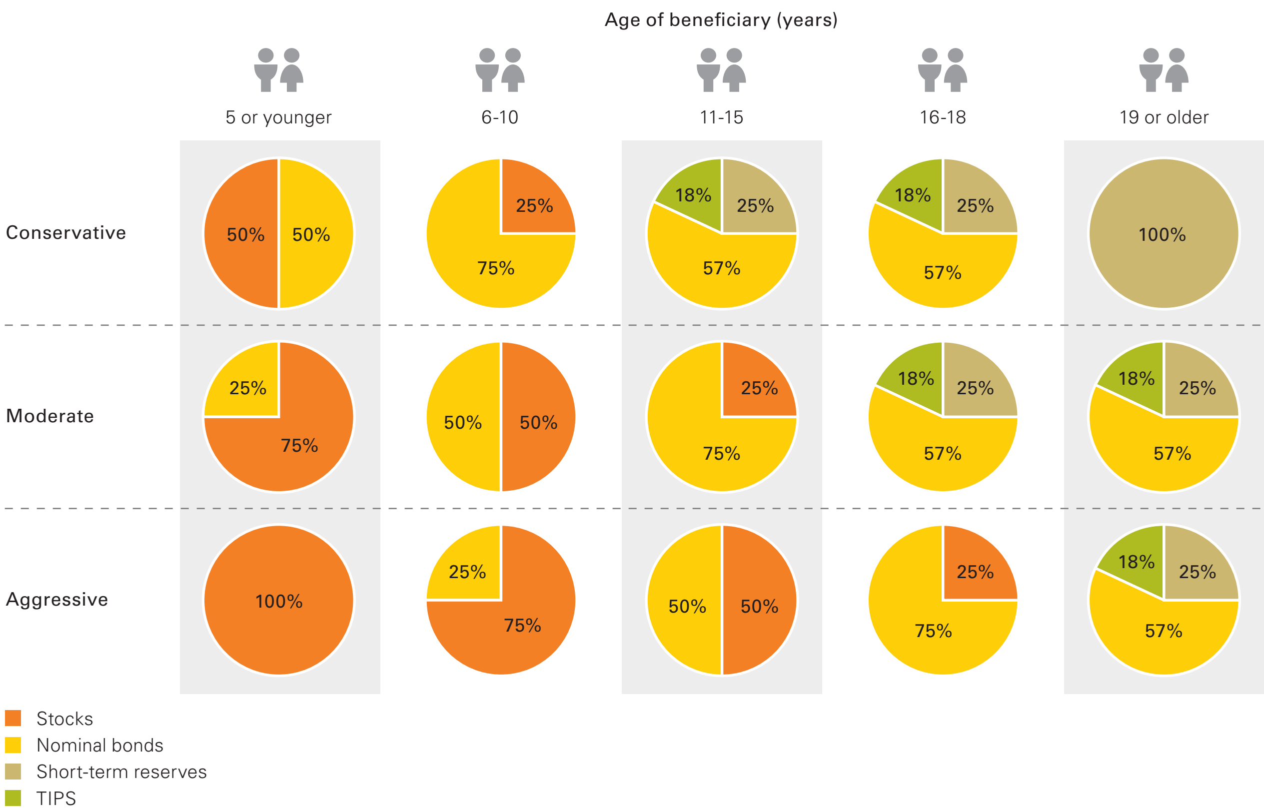
Appendix I. Vanguard's 529 glide-path methodology

Our analysis of account-owner behavior was based upon Vanguard's recommended glide paths for 529 plans. Vanguard suggests three age-based savings tracks: conservative, moderate, and aggressive (see **Figure A-1**). With each track, an investor's account moves through a set of progressively more conservative investment portfolios.

Figure A-1. Vanguard-recommended glide paths



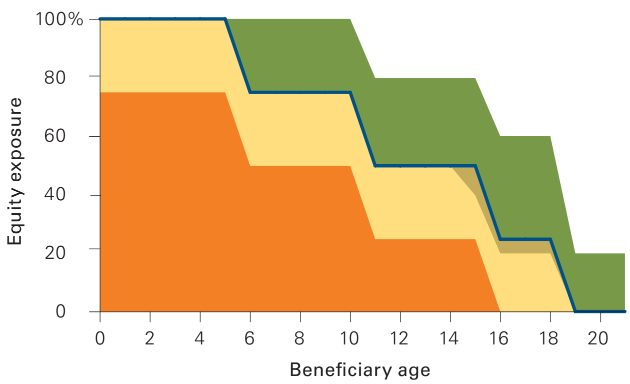
Note: TIPS = Treasury Inflation-Protected Securities.
Source: Vanguard.

Appendix II. Full distribution of actual equity allocations relative to Vanguard's aggressive glide path

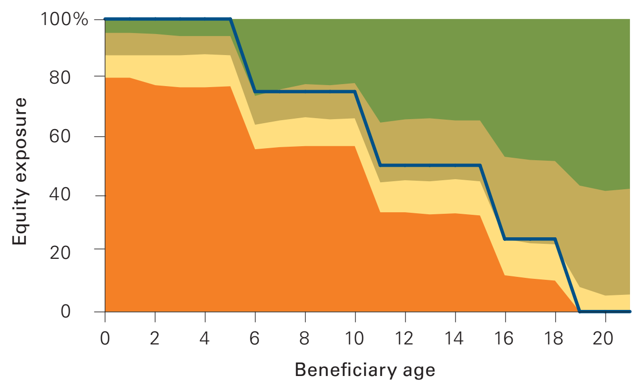
Here, we compare each cohort's entire distribution of equity allocations to Vanguard's aggressive glide-path track recommendation. In general, self-directed investors had the most aggressive allocations, followed by mixed-users, and then pure glide-path users. These results are shown in **Figure A-2**. Starting with the pure glide-path users (Figure A-2a), about 75% of these accounts had equity allocations at or less than those of Vanguard's recommended aggressive track; 25% of this cohort had larger equity allocations than that, indicating that those *plans* had a more aggressive glide path. But, note the lack of extreme equity allocations. For example, for

Figure A-2. Equity allocations by cohort relative to Vanguard glide paths

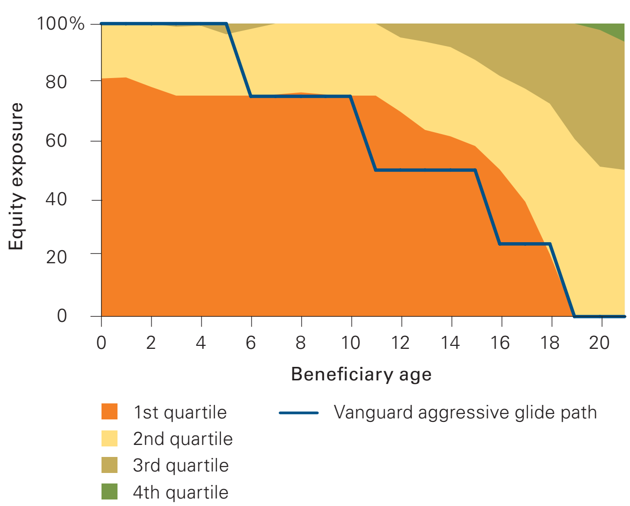
a. Pure glide-path users



b. Mixed-users



c. Self-directed investors



Notes: Charts represents equity allocations of all account owners analyzed, segmented into quartiles by size of allocation. For example, first quartile represents the 25% smallest equity allocation.

Source: Vanguard.

beneficiaries aged 19 years or older, the equity allocation maximum was 20%. Next, consider the mixed-users (Figure A-2b). Their equity allocations were generally larger than those of the pure glide-path users. Nearly 40% of mixed-users with beneficiaries aged 6 or older had higher equity exposure than Vanguard's aggressive track recommendation; 25% had equity allocations greater than 45% for beneficiaries aged 19-plus. Finally, self-directed investors (Figure A-2c) had the most aggressive asset allocations. This group had more than 78% of accounts with larger equity allocations than the Vanguard aggressive track recommendation, nearly two times that of mixed-users and more than three times that of pure glide-path users.

Appendix III. About the Vanguard Capital Markets Model

IMPORTANT: The projections or 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 important, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based.

The VCMM is a proprietary financial simulation tool developed and maintained by Vanguard's Investment Strategy Group. 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. 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.

The primary value of the VCMM is in its application to analyzing potential client portfolios. VCMM asset-class forecasts—comprising distributions of expected returns, volatilities, and correlations—are key to the evaluation of potential downside risks, various risk–return trade-offs, and the diversification benefits of various asset classes. Although central tendencies are generated in any return distribution, Vanguard stresses that focusing on the full range of potential outcomes for the assets considered is the most effective way to use VCMM output.

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