How America Saves 2017

Vanguard 2016 defined contribution plan data

Vanguard®

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Defined contribution (DC) retirement plans are the centerpiece of the private-sector retirement system in the United States. More than 94 million Americans are covered by DC plan accounts, with assets now in excess of $7 trillion.[1]

Vanguard is among the leaders in the DC marketplace with more than $1 trillion in DC assets under management as of March 31, 2017. In our DC recordkeeping business, we serve more than 8,500 plan sponsors and more than 4.6 million participants. As an industry leader, Vanguard recognizes the importance of having a detailed understanding of DC plans and the role they play in the U.S. retirement system. Accordingly, we are pleased to present *How America Saves 2017: A report on Vanguard 2016 defined contribution plan data.* In this 16th edition of *How America Saves*, we update our analysis of DC plans and participant behavior based on 2016 Vanguard recordkeeping data.

Participants' adoption of professionally managed allocations continues to grow. In 2016, more than half of all Vanguard participants had their entire account balance invested in either a single target-date fund, a single target-risk or traditional balanced fund, or a managed account advisory service. These professionally managed investment options have the potential to reshape retirement savings outcomes for these participants. They signal a shift in responsibility for investment decision-making away from the participant and back to employer-selected investment and advice programs.

The first edition of *How America Saves* was published in 2000. In 2011, we introduced a series of benchmark data supplements for selected industry sectors. These industry sector supplements have been very well received and a list of the sectors covered is on page 106.

In 2014, we introduced a supplement dedicated to Vanguard Retirement Plan Access™ (VRPA) clients and are pleased to present our analysis of these small business plans again in 2017. Vanguard Retirement Plan Access is a comprehensive service for retirement plans with up to $20-plus million in assets.

We are confident this report will continue to serve as a valuable reference tool and that our observations will prove useful as your organization continues to develop its retirement programs.

Sincerely,

Martha

1 U.S. Department of Labor, Private Pension Plan Bulletin Historical Tables and Graphs, September 2016; and Investment Company Institute, Quarterly Retirement Market Data, Fourth Quarter 2016, March 2017.

Contents

Executive summary

In 2006, Congress passed the Pension Protection Act (PPA), which introduced fiduciary and tax incentives to encourage broader adoption of automatic enrollment, automatic savings increases, and balanced investment approaches. Over the past decade plan sponsors have increasingly turned to plan design to influence employee retirement savings behavior. As a result, plan participation rates have improved and participant portfolio construction has also improved. However, as we look to the future, the main concerns affecting retirement savings plans still remain largely the same—improving plan participation and contribution rates even further and continuing to enhance portfolio diversification—enabling more individuals to retire with sufficient assets.

Professionally managed allocations

Underlying the improvements in portfolio construction is the rising prominence of professionally managed allocations. Participants with professionally managed allocations are those who have their entire account balance invested in a single target-date or balanced fund or a managed account advisory service. At year-end 2016, over half of all Vanguard participants were solely invested in an automatic investment program—compared with just 17% at the end of 2007. Forty-six percent of all participants were invested in a single target-date fund; another 3% held one other balanced fund; and 4% used a managed account program. These diversified, professionally managed investment portfolios dramatically improve portfolio diversification compared with participants making choices on their own. Among new plan entrants (participants entering the plan for the first time in 2016), 85% were solely invested in a professionally managed allocation.

Because of the growing use of target-date options, we anticipate that by 2021 three-quarters of Vanguard participants will be solely invested in an automatic investment program.

Growth in use of target-date funds

Use of target-date strategies in DC plans continues to grow. Nine in 10 plan sponsors offered target-date funds at year-end 2016, up over 50% compared with year-end 2007. Nearly all Vanguard participants (97%) are in plans offering target-date funds. Seventy-two percent of all participants use target-date funds. Two-thirds of participants owning target-date funds have their entire account invested in a single target-date fund. Forty-six percent of all Vanguard participants are wholly invested in a single target-date fund, either by voluntary choice or by default.

An important factor driving use of target-date funds is their role as an automatic or default investment strategy. The qualified default investment alternative (QDIA) regulations promulgated under the PPA continue to influence adoption of target-date funds. That said, voluntary choice is still important, with half of single target-date investors choosing the funds on their own, not through default.

High-level savings metrics

High-level metrics of participant savings behavior were mixed in 2016. The estimated (see Methodology on page 106) plan-weighted participation rate was 81% in 2016 unchanged from 2015. The participant-weighted participation rate was 79% in 2016, up 16% compared with 2007. Plans with automatic enrollment have a 90% participation rate.

The average deferral rate was 6.2% in 2016, down from 6.9% in 2015. The median deferral rate was 5% in 2016 compared to 6% in 2015. The decline in average deferral rates is attributable to increased adoption of automatic enrollment. While automatic enrollment increases participation rates, it also leads to lower contribution rates when default deferral rates are set at low levels, such as 3% or lower.

These statistics reflect the level of employee-elective deferrals. Most Vanguard plans also make employer contributions. Taking into account both employee and employer contributions, the average total participant contribution rate in 2016 was 10.9% and the median was 10.0%. These saving rates have remained fairly stable for the past few years.

Growth of automatic savings features

The adoption of automatic enrollment has grown by 300% since year-end 2007. At year-end 2016, 45% of Vanguard plans had adopted automatic enrollment, up four percentage points from 2015. In 2016, because larger plans were more likely to offer automatic enrollment, 64% of new plan entrants in 2016 were enrolled via automatic enrollment.

Slightly more than 60% of all contributing participants in 2016 were in plans with automatic enrollment. The automatic enrollment feature, while initially applied only to new hires, has now been applied to eligible nonparticipants in half of Vanguard plans with the feature. Slightly more than one-third of contributing participants in 2016 joined their plan under automatic enrollment.

Two-thirds of automatic enrollment plans have implemented automatic annual deferral rate increases. In 2016, automatic increases narrowed the spread between deferral rates for participants in voluntary enrollment plans as compared to automatic enrollment plans to 0.2 basis points. Participants in voluntary plans had a deferral rate of 6.3% compared to participants in automatic plans where the deferral rate was 6.1%. In the past five years this spread has ranged from 0.6 percentage points in 2015 to 2.2 percentage points in 2012.

Ninety-nine percent of all plans with automatic enrollment default participants into a balanced investment strategy—with 97% choosing a target-date fund as the default.

Roth 401(k) adoption

At year-end 2016, the Roth feature was adopted by 65% of Vanguard plans and 13% of participants within these plans had elected the option. We anticipate steady growth in Roth adoption rates, given the feature's tax diversification benefits.

Account balances and returns

In 2016, the average account balance for Vanguard participants was $96,495; the median balance was $24,713. In 2016, Vanguard participants' average account balances were flat compared to 2015 and median account balances fell by 6%. Two factors are driving the changes in participant account balances. The first is changing business mix—new plans converting to Vanguard in 2016 had lower account balances. The second is the rising adoption of automatic enrollment which results in more individuals saving, but also a growing number of smaller balances. As noted above, by the end of 2016 more than one-third of participants had joined their plan under automatic enrollment. Since 2007, median balances declined by 2% and average balances rose by 23%.

The median one-year participant total return was 8.4%. Five-year participant total returns averaged 9.1% per year. Among continuous participants—those with a balance at year-end 2011 and 2016—the median account balance rose by 121% over five years, reflecting both the effect of ongoing contributions and strong market returns during this period. More than 90% of continuous participants saw their account balance rise during the five-year period ended December 31, 2016.

Presence of index core options

Given the growing focus on plan fees, there is increased interest among plan sponsors in offering a wider range of low-cost passive or index funds. A "passive core" is a comprehensive set of low-cost index options that span the global capital markets. In 2016, 57% of Vanguard plans offered a set of options providing an index core. Over the past decade the number of plans offering an index core has grown by more than 70%. Because large plans have adopted this approach more quickly, 70% of all Vanguard participants were offered an index core as part of the overall plan investment menu. Factoring in passive target-date funds, 8 in 10 participants hold index equity investments.

Shift in participant investment allocations

The percentage of plan assets invested in equities was 71% in 2016, unchanged from 2015. Equity allocations continue to vary dramatically among participants. One in 10 participants has taken an extreme position, holding either 100% in equities (6% of participants) or no equities (4% of participants). These extreme allocations have fallen in recent years as a result of the rise of target-date funds and other professionally managed allocations.

Participant contributions to equities were unchanged in 2016 at 74%. In 2016, nearly half (49%) of all new contributions to these plans were directed to target-date funds.

Participant trading muted

During 2016, only 8% of DC plan participants traded within their accounts, while 92% did not initiate any exchanges. On a net basis, there was a shift of 1.5% of assets to fixed income in 2016, with most traders making small changes to their portfolios. Less than 1% of all participants abandoned equities during the year—that is, shifted from a portfolio with some equity exposure to a portfolio with no equity exposure.

Over the past decade we have observed a decline in participant trading. The decline in participant trading is partially attributable to participants' increased adoption of target-date funds. Only 2% of participants holding a single target-date fund traded in 2016.

Drop in company stock exposure

A shift away from company stock holdings first observed in 2006 continued into 2016. Among plans offering company stock, the number of participants holding a concentrated position of more than 20% of their account balance fell from 32% in 2007 to 24% in 2016. In addition, the number of plans actively offering company stock to participants declined to 9% in 2016 from 11% in 2007. As a result, only 6% of all Vanguard participants held concentrated company stock positions in 2016, compared with 12% at the end of 2007.

Loan activity flat

There was no change in new loans issued in 2016. In 2016, 16% of participants had a loan outstanding compared to 16% of participants in 2015. The average loan balance was $9,700. Only about 2% of aggregate plan assets were borrowed by participants.

In-service withdrawals

During 2016, 3% of participants took an in-service withdrawal, withdrawing about one-third of their account balances. All in-service withdrawals during 2016 amounted to 1% of aggregate plan assets.

Assets largely preserved for retirement

Participants separating from service largely preserved their assets for retirement. During 2016, about 30% of all participants could have taken their account as a distribution because they had separated from service in the current year or prior years. The majority of these participants (82%) continued to preserve their plan assets for retirement by either remaining in their employer's plan or rolling over their savings to an IRA or new employer plan. In terms of assets, 97% of all plan assets available for distribution were preserved and only 3% were taken in cash.

Estimated data

Some charts in this edition contain "2016 estimated" data. For an explanation, please see the "Methodology" section on page 106.

Defined contribution (DC) retirement plans are the centerpiece of the private-sector retirement system in the United States. More than 94 million Americans are covered by DC plan accounts, with assets now in excess of $7 trillion.

Figure 1.	Highlights at a glance

Vanguard recordkeeping statistics	*How America Saves 2017* Reference	2012	2013	2014	2015	2016
Number of participant accounts (millions)		3.4	3.4	3.6	3.9	4.4
Number of plans (thousands)		2.0	1.9	1.9	1.9	1.9
Median participant age		46	46	46	46	45
Median participant tenure		8	8	7	7	6
Percentage male		59%	59%	59%	59%	58%
Median eligible employee income (thousands)		$61	$63	$63	$66	$52
Median participant income (thousands)		$67	$70	$70	$73	$65
Median nonparticipant income (thousands)		$46	$45	$45	$44	$33

1. Accumulating

Plan design—page 13						
Plans offering immediate eligibility for employee contributions	Figure 3	58%	61%	65%	66%	67%*
Plans requiring one year of service for matching contributions	Figure 3	26%	26%	24%	23%	23%*
Plans providing an employer contribution	Figure 6	92%	91%	94%	95%	94%*
Plans with automatic enrollment	Figure 15	32%	34%	36%	41%	45%
Plans with automatic enrollment with automatic annual increases	Figure 18	69%	69%	70%	70%	67%
Plans offering catch-up contributions	Figure 37	97%	97%	97%	97%	98%
Plans offering Roth contributions	Figure 38	49%	52%	56%	60%	65%
Plans offering after-tax contributions	Figure 39	19%	19%	18%	18%	18%

Participation rates—page 27						
Plan-weighted participation rate	Figure 21	78%	78%	79%	81%	81%*
Participant-weighted participation rate	Figure 21	74%	75%	77%	78%	79%*
Voluntary enrollment participant-weighted participation rate	Figure 27	71%	70%	64%	64%	63%*
Automatic enrollment participant-weighted participation rate	Figure 27	88%	89%	91%	92%	90%*
Participants using catch-up contributions (when offered)	Figure 37	13%	14%	14%	15%	12%
Participants using Roth (when offered)	Figure 38	10%	12%	12%	13%	13%
Participants using after-tax (when offered)	Figure 39	7%	7%	8%	8%	8%

Employee deferrals—page 33						
Average participant deferral rate	Figure 29	6.9%	7.0%	6.8%	6.9%	6.2%
Median participant deferral rate	Figure 29	6.0%	6.0%	6.0%	6.0%	5.0%
Percentage of participants deferring more than 10%	Figure 30	20%	20%	19%	20%	18%
Voluntary enrollment plan average participant deferral rate	Figure 35	7.3%	7.5%	7.3%	7.3%	6.3%
Automatic enrollment plan average participant deferral rate	Figure 35	5.1%	5.6%	6.5%	6.7%	6.1%
Participants reaching 402(g) limit ($18,000 in 2016)	Figure 36	10%	11%	11%	13%	10%
Average total contribution rate (participant and employer)	Figure 40	10.8%	10.9%	10.9%	10.8%	10.9%*
Median total contribution rate (participant and employer)	Figure 40	10.0%	10.0%	10.0%	10.0%	10.0%*

Account balances—page 42						
Average balance	Figure 43	$86,212	$101,650	$102,682	$96,288	$96,495
Median balance	Figure 43	$27,843	$31,396	$29,603	$26,405	$24,713

2. Managing

Average plan asset allocation to equities	Figure 50	66%	71%	72%	71%	71%
Average plan contribution allocation to equities	Figure 51	70%	71%	74%	74%	74%

* Estimated, please see the Methodology section on page 106.

(Continued)

Figure 1.	Highlights at a glance

2. Managing (continued)

Asset and contribution allocations—page 49	*How America Saves 2017* Reference	2012	2013	2014	2015	2016
Average plan asset allocation to target-date funds	Figure 50	17%	19%	23%	26%	28%
Average plan contribution allocation to target-date funds	Figure 52	31%	34%	41%	46%	49%
Participants with balanced strategies	Figure 79	63%	66%	69%	70%	71%
Extreme participant asset allocations (100% fixed income or equity)	Figure 77	16%	14%	13%	12%	10%
Plan investment options—page 53						
Average number of funds offered	Figure 55	18.4	18.2	18.3	18.1	17.9
Average number of funds used	Figure 55	3.1	3.1	2.9	2.8	2.7
Plans offering an index core	Figure 59	46%	49%	52%	54%	57%
Participants offered an index core	Figure 60	56%	59%	64%	67%	70%
Percentage of plans designating a QDIA	Figure 61	67%	70%	71%	77%	80%
Among plans designating a QDIA, percentage target-date fund	Figure 61	90%	91%	94%	95%	96%
Plans offering target-date funds	Figure 69	84%	86%	88%	90%	92%
Participants using target-date funds (when offered)	Figure 65	58%	61%	66%	70%	74%
Plans offering managed account program	Figure 82	16%	19%	22%	25%	27%
Participants offered managed account program	Figure 82	47%	52%	55%	57%	53%
Participants with professionally managed allocations	Figure 66	36%	40%	45%	48%	53%
Participants using a single target-date fund	Figure 66	27%	31%	39%	42%	46%
Participants using a single risk-based balanced fund	Figure 66	6%	6%	2%	2%	3%
Participants using a managed account program	Figure 66	3%	3%	4%	4%	4%
Plans offering company stock	Figure 65	10%	10%	10%	10%	9%
Participants using company stock	Figure 65	16%	15%	14%	14%	12%
Participants with >20% company stock	Text page 76	9%	9%	8%	7%	6%
Investment returns—page 78						
Average 1-year participant total return rate	Figure 85	12.4%	20.4%	7.0%	(0.4%)	8.3%
Average 1-year participant personal return rate	Figure 85	12.0%	19.9%	6.8%	(0.8%)	8.2%
Trading activity—page 82						
Participant-directed trading	Figure 89	9%	10%	10%	9%	8%
Recordkeeping assets exchanged to equities (fixed income)	Figure 89	(1.7%)	0.2%	(0.6%)	(0.8%)	(1.5%)

3. Accessing

Plan loans—page 89						
Plans offering loans	Text page 89	76%	77%	77%	78%	79%
Participants with an outstanding loan (when offered)	Figure 96	18%	18%	17%	16%	16%
Recordkeeping assets borrowed	Text page 91	2%	2%	1%	1%	1%
Plan withdrawals—page 94						
Plans offering hardship withdrawals	Figure 101	82%	83%	83%	84%	84%
Participants using withdrawals (when offered)	Figure 102	4%	4%	4%	3%	3%
Recordkeeping assets withdrawn	Figure 102	1%	1%	1%	1%	1%
Participant account balance withdrawn	Figure 102	33%	32%	31%	32%	32%
Plan distributions and rollovers—page 96						
Terminated participants preserving assets	Figure 111	82%	85%	85%	85%	82%
Assets preserved that were available for distribution	Figure 111	96%	97%	97%	97%	97%
Participant access methods—page 102						
Participants not contacting Vanguard during the year	Figure 112	43%	40%	37%	35%	36%
Participants registered for internet account access	Figure 116	68%	70%	71%	72%	70%
Participant account transactions processed via the web	Figure 117	82%	83%	85%	86%	88%

Source: Vanguard, 2017.

Market overview

In 2016, stock prices rose by 10% for the year (Figure 2).[2] 2016 was characterized by low volatility with only 19% of trading days had a change in stock prices of +/- 1%. Similarly, less than 1% of trading days had a change in stock prices of +/- 3%.

During the crisis, stock prices were exceptionally volatile. In 2008, 16.8% of trading days had a change in stock prices greater than +/–3%. The comparable figure was 8.7% in 2009, 3.2% in 2010, and 4.8% in 2011. However, in 2012, 2013 and 2014, no trading days exhibited this level of volatility. In 2015 1.2% of trading days had a change in stock prices greater than +/-3%. Historically, 1% of stock market trading days are associated with a change in stock prices of greater than +/–3%.

Figure 2. S&P 500 daily close

Source: Standard & Poor's 500.

Past performance is no guarantee of future results. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

2 These changes reflect the price-index level; the total return of buy-and-hold stock market investors would have also included reinvested dividends.

DC retirement plans

DC plans are the dominant type of retirement plan sponsored by private-sector employers in the United States, covering nearly half of all private-sector workers. Although there is still a significant minority of individuals eligible for such plans who fail to participate in them, DC plans have nonetheless enabled millions of American workers to accumulate savings for retirement.

The performance of DC plans can be measured in several ways:

Accumulating plan assets. The level of plan contributions is fundamental to retirement savings adequacy. Plan contributions are affected by employee participation rates, participant deferral rates, and the value of employer contributions. Participant deferral behavior is increasingly influenced by employers' automatic enrollment and automatic escalation default designations. Overall, retirement plan design varies substantially across employers—and variation in the level of employer contributions does impact the employee contributions needed to accumulate sufficient retirement savings.

Managing participant accounts. After deciding to contribute to a retirement savings plan, participants' most important decision is how to allocate their holdings among the major asset classes. As with deferral decisions, many such investment decisions are increasingly influenced by employer established defaults, as well as the growing use of all-in-one portfolio strategies such as target-date funds and managed account programs. These investment decisions—including the types of investment options offered by the plan and the choices participants or employers make from among those options—have a direct impact on account performance over time. Thus, investment choices, in conjunction with the level of plan contributions, ultimately influence participants' level of retirement readiness.

Accessing plan assets. Participants may be able to take a loan or in-service withdrawal to access their savings while working. When changing jobs or retiring, they typically have the option of remaining in the plan, rolling over to another plan or IRA, or taking a cash lump sum.

Our analysis shows that most Vanguard DC plan participants have seen their retirement savings grow over one- and five-year periods.

Accumulating plan assets

Historically, employees have had to decide whether to participate and at what rate to save. Increasingly, employers are making these decisions through automatic enrollment.

Accumulating plan assets

Historically, employees have had to decide whether to participate and at what rate to save. Increasingly, employers are making these decisions through automatic enrollment.

Plan design

Nine in 10 Vanguard-administered DC plans permit pre-tax elective deferrals by eligible employees. Employee deferral decisions are shaped by the design of the DC plan sponsored by their employer.

DC plans with employee-elective deferrals can be grouped into four categories based on the type of employer contributions made to the plan: (1) plans with matching contributions, (2) plans with nonmatching employer contributions, (3) plans with both matching and nonmatching contributions, and (4) plans with no employer contributions at all. Nonmatching contributions are typically structured as a variable or fixed profit-sharing contribution, or less frequently as an employee stock ownership plan (ESOP) contribution.

In employee-contributory DC plans, employer contributions are typically a secondary source of plan funding. Both the type and size of employer contributions vary substantially across plans.

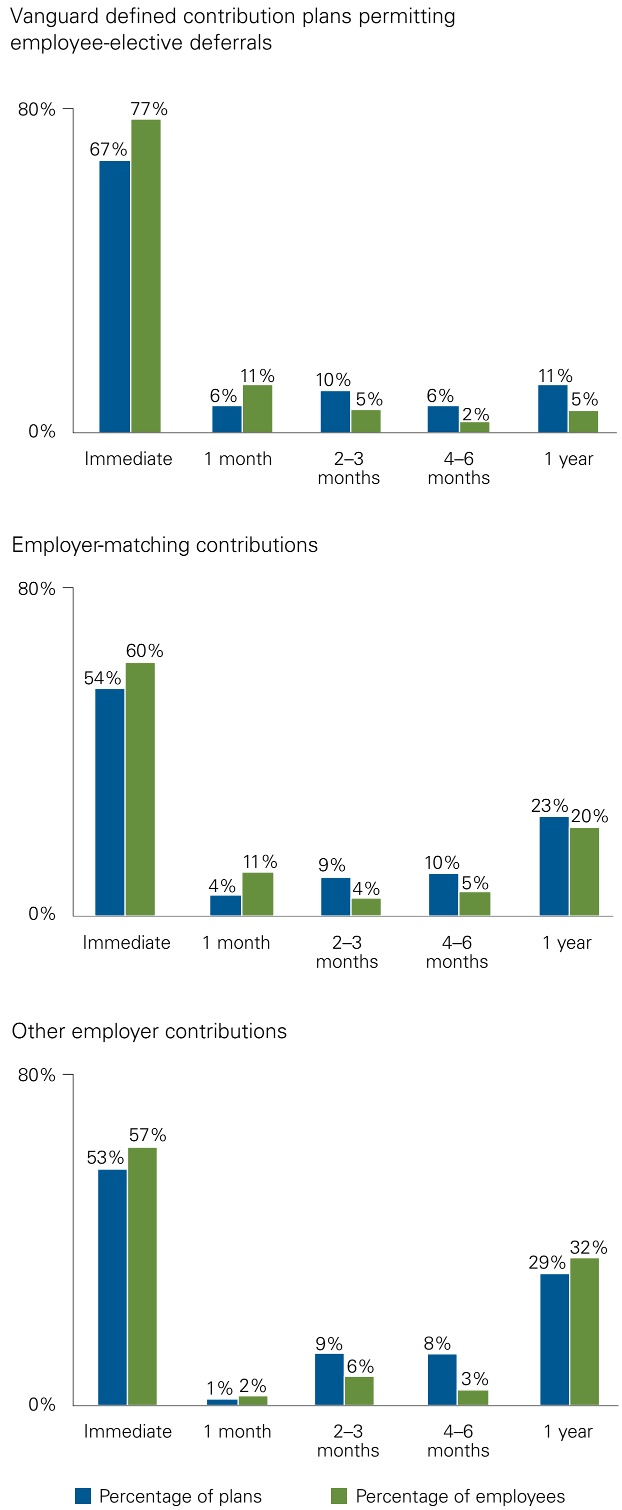
Eligibility

In 2016, two-thirds of Vanguard plans allowed employees to make voluntary contributions immediately after they joined their employer (Figure 3). Larger plans were more likely to offer immediate eligibility than smaller plans. As a result, three-quarters of employees qualified for immediate eligibility in 2016.

At the other extreme, 11% of plan sponsors required eligible employees to have one year of service before they could make employee-elective contributions to their plan. Smaller plans were more likely to impose the one-year wait. As a result, only 5% of total eligible employees were subject to this restriction.

Eligibility rules are more restrictive for employer contributions, including matching contributions and other types of employer contributions, such as profit-sharing or ESOP contributions. A one-year eligibility rule is more common for employer contributions, presumably because employers want to minimize compensation costs for short-tenured employees.

Figure 3. **Eligibility, 2016 estimated**



Source: Vanguard, 2017.

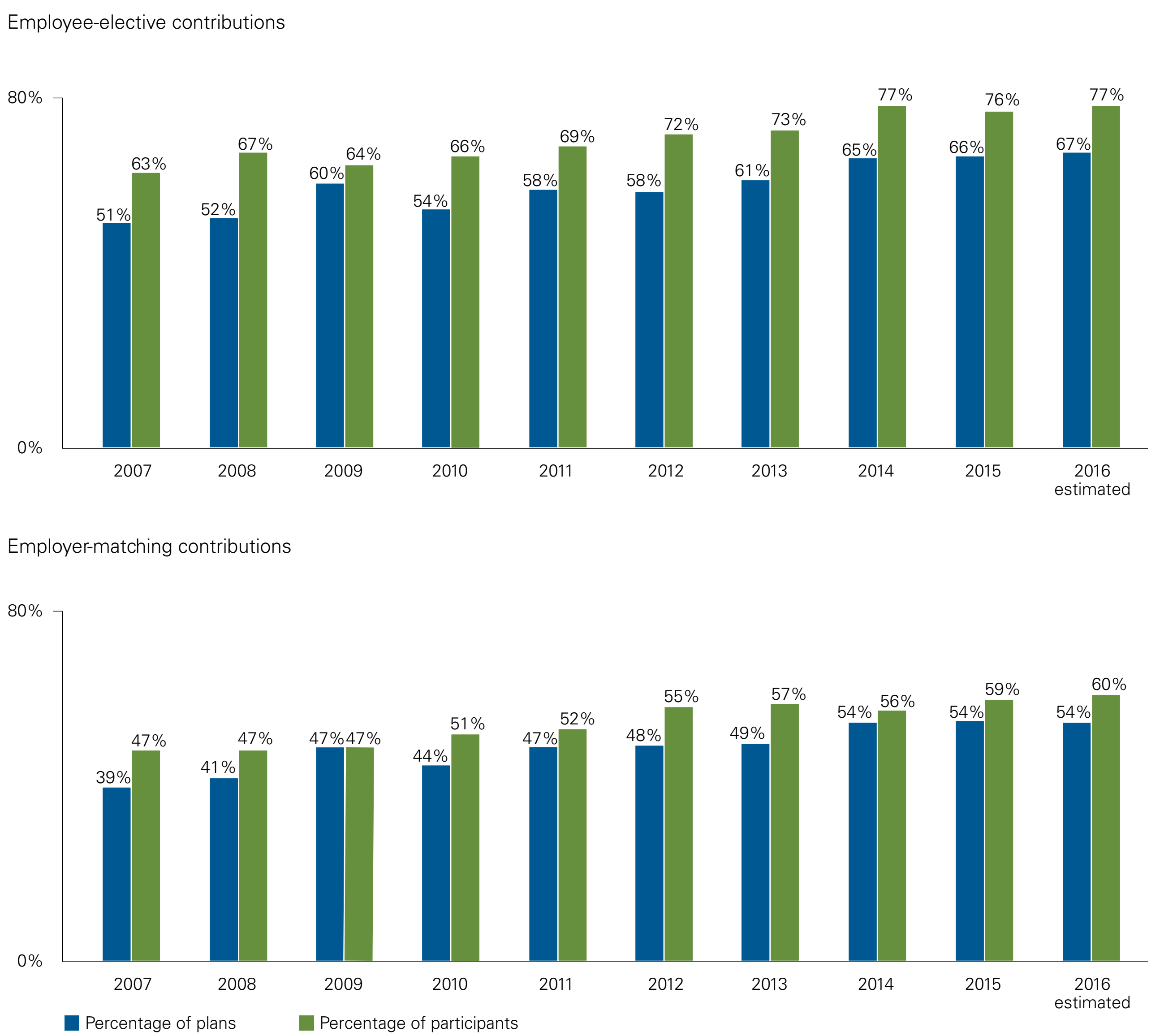
The proportion of plans permitting immediate eligibility for employee-elective contributions has steadily risen (Figure 4). About half of plans offered immediate eligibility in 2007; in 2016, two-thirds did. Because larger plans are more likely to offer immediate eligibility for employee-elective deferrals, in 2016, 77% of employees were in plans offering immediate eligibility. Similar trends are observed for both employer-matching contributions and other employer contributions.

Vesting

In 2016, nearly half of plans immediately vested participants in employer-matching contributions (Figure 5). About half (45%) of participants are in plans with immediate vesting of employer-matching contributions. Smaller plans are more likely to use longer vesting schedules. Three in 10 plans with employer-matching contributions use a 5- or 6-year graded vesting schedule. One in 5 participants with employer-matching contributions is in a plan with a longer vesting schedule.

Figure 4. Immediate plan eligibility trend

Vanguard defined contribution plans permitting employee-elective deferrals

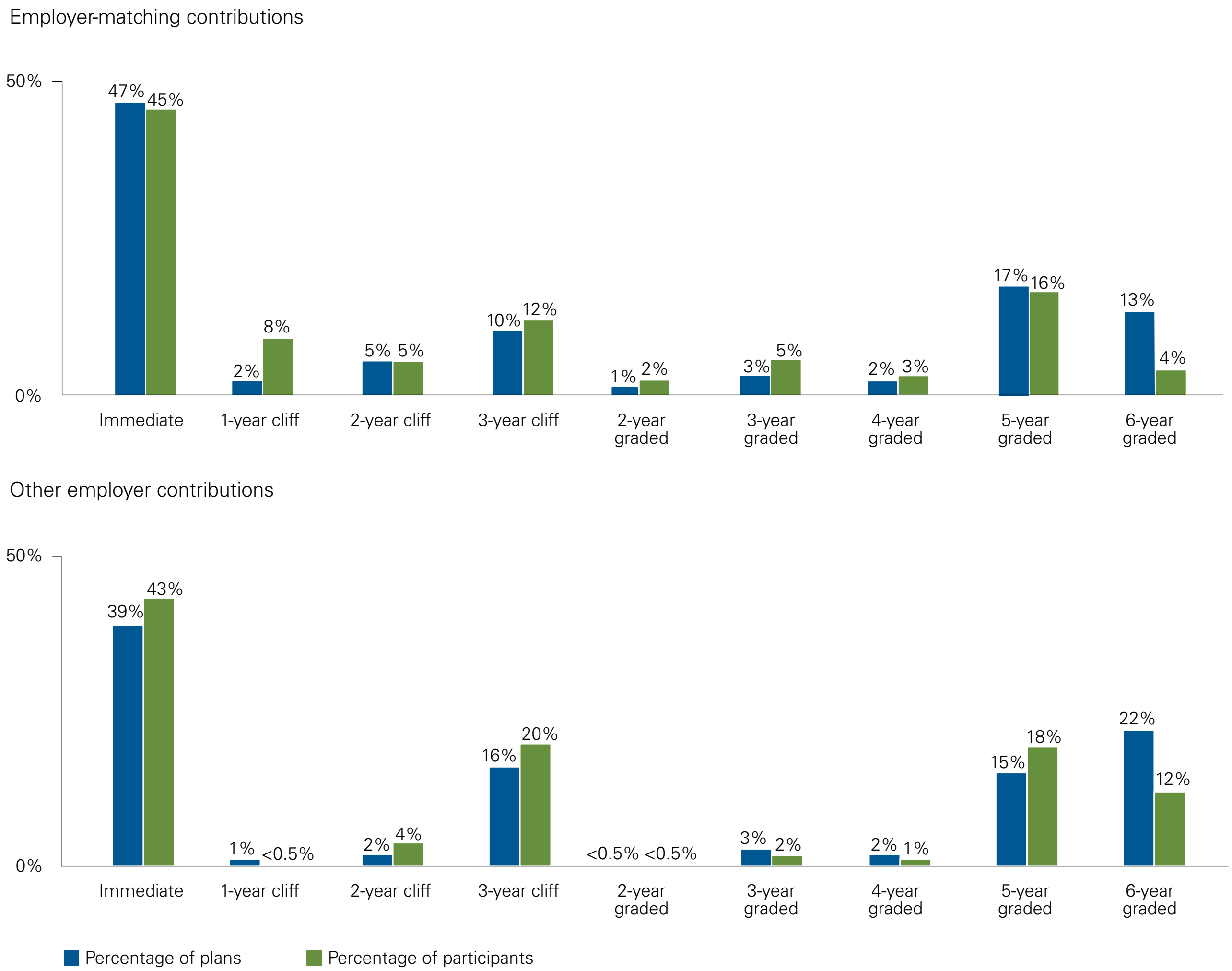


Source: Vanguard, 2017.

In 2016, 4 in 10 plans immediately vested participants for other employer contributions, such as profit-sharing or ESOP contributions. On the other hand, 4 in 10 plans (37%) with other employer contributions use a 5- or 6-year graded vesting schedule and 3 in 10 participants receiving other employer contributions are in plans with these longer vesting schedules.

Figure 5. Vesting, 2016

Vanguard defined contribution plans with employer contributions



Source: Vanguard, 2017.

Employer contributions

Four in 10 Vanguard plans provided only a matching contribution in 2016. This type of design covered nearly two-thirds of participants (Figure 6).

Four in 10 plans, covering one-third of participants, provided both a matching and a nonmatching employer contribution. Twelve percent of plans provided only a nonmatching employer contribution, and 1% of participants were in this type of design. Finally, 6% of plans made no employer contributions of any kind in 2016, and 2% of participants were in this category.

As noted previously, eligibility for employer contributions is typically more restrictive than eligibility for employee-elective deferrals. In 2016, a higher proportion of plans imposed a one-year waiting period on employer contributions, whether in the form of a matching or other type of contribution, than imposed a one-year waiting period on employee-elective deferrals.

These statistics summarize the incidence of employer contributions to a DC plan that accepts employee deferrals. They do not necessarily reflect the entire retirement benefits program funded by certain employers. Some employers may offer a companion employer-funded plan—such as a defined benefit (DB) plan, a stand-alone profit-sharing, ESOP, or a money purchase DC plan—in addition to an employee-contributory DC plan.

Figure 6. Types of employer contributions, 2016 estimated

Vanguard defined contribution plans permitting employee-elective deferrals

Type of employer contribution	Percentage of plans	Percentage of participants
Matching contribution only	42%	64%
Nonmatching contribution only	12	1
Both matching and nonmatching contribution	40	33
Subtotal	94%	98%
No employer contribution	6%	2%

Source: Vanguard, 2017.

Matching contributions

The wide variation in employer contributions is most evident in the design of employer-matching formulas. In 2016, Vanguard administered more than 200 distinct match formulas for plans offering an employer match. Among plans offering a matching contribution in 2016, 7 in 10 (covering about half of participants) provided a single-tier match formula, such as $0.50 on the dollar on the first 6% of pay (Figure 7). Less common, used by 22% of plans (covering 38% of participants), were multi-tier match formulas, such as $1.00 per dollar on the first 3% of pay and $0.50 per dollar on the next 2% of pay.

Another 5% of plans (covering 5% of participants) had a single- or multi-tier formula but imposed a maximum dollar cap on the employer contribution, such as $2,000. Finally, a very small percentage of plans used a match formula that varied by age, tenure, or other variables.

Figure 7. Types of matching contributions, 2016 estimated

Vanguard defined contribution plans with matching contributions

Match type	Example	Percentage of plans	Percentage of participants
Single-tier formula	$0.50 per dollar on 6% of pay	70%	55%
Multi-tier formula	$1.00 per dollar on first 3% of pay; $0.50 per dollar on next 2% of pay	22	38
Dollar cap	Single- or multi-tier formula with $2,000 maximum	5	5
Other	Variable formulas based on age, tenure, or similar variables	3	2

Source: Vanguard, 2017.

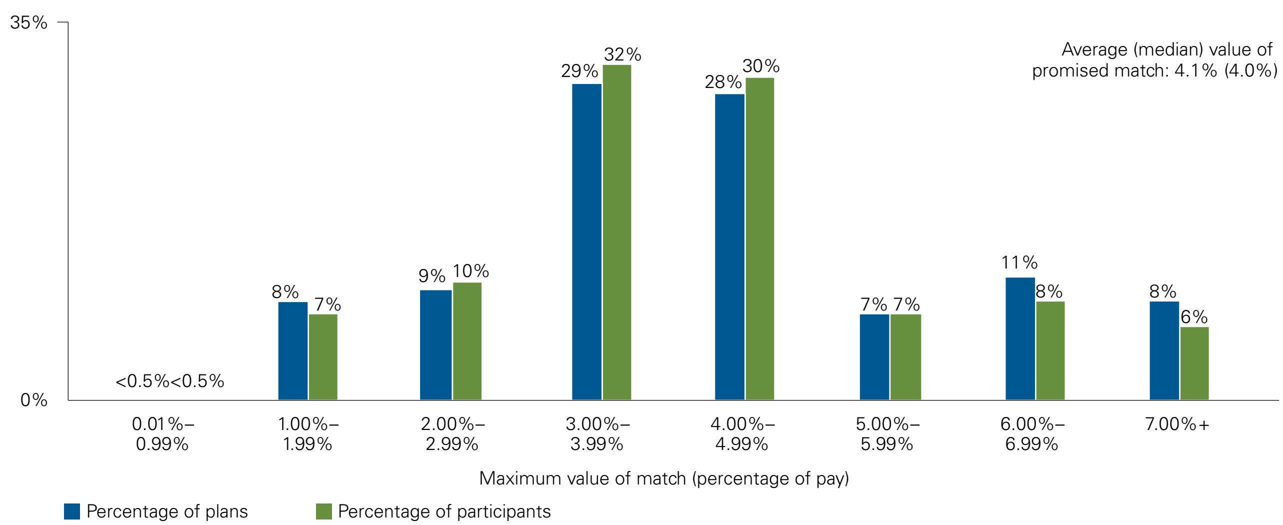
The matching formula most commonly cited as a typical employer match is $0.50 on the dollar on the first 6% of pay. This is the match most commonly offered among Vanguard DC plans and most commonly received by Vanguard DC plan participants. Among plans offering a match, about 1 in 5 provided exactly this match formula in 2016, covering 14% of participants. The second most common matching formula, reflecting a common safe harbor design, was $1.00 on the dollar on the first 3% of pay and $0.50 on the dollar on the next 2% of pay. This match was used by 1 in 10 plans in 2016, covering 13% of participants.

Given the multiplicity of match formulas, one way to summarize matching contributions is to calculate the maximum value of the match promised by the employer. For example, a match of $0.50 on the dollar on the first 6% of pay promises the same matching contribution—3% of pay—as a formula of $1.00 per dollar on the first 3% of pay.

The promised value of the match varies substantially from plan to plan. Among plans with single- or multi-tier match formulas, two-thirds of plans (covering 69% of participants) promised a match of between 3% and 6% of pay (Figure 8). Most promised matches ranged from 1% to 6% of pay. The average value of the promised match was 4.1% of pay; the median value, 4.0%.

Figure 8. **Distribution of promised matching contributions, 2016 estimated**

Vanguard defined contribution plans permitting employee-elective deferrals with a single- or multi-tier match formula



Source: Vanguard, 2017.

Average promised matches dipped a bit in 2009 following the recession, as some sponsors reduced matches. Average promised matches have remained fairly stable between 2007 and 2016, while median matches rose by 1 percentage point (Figure 9).

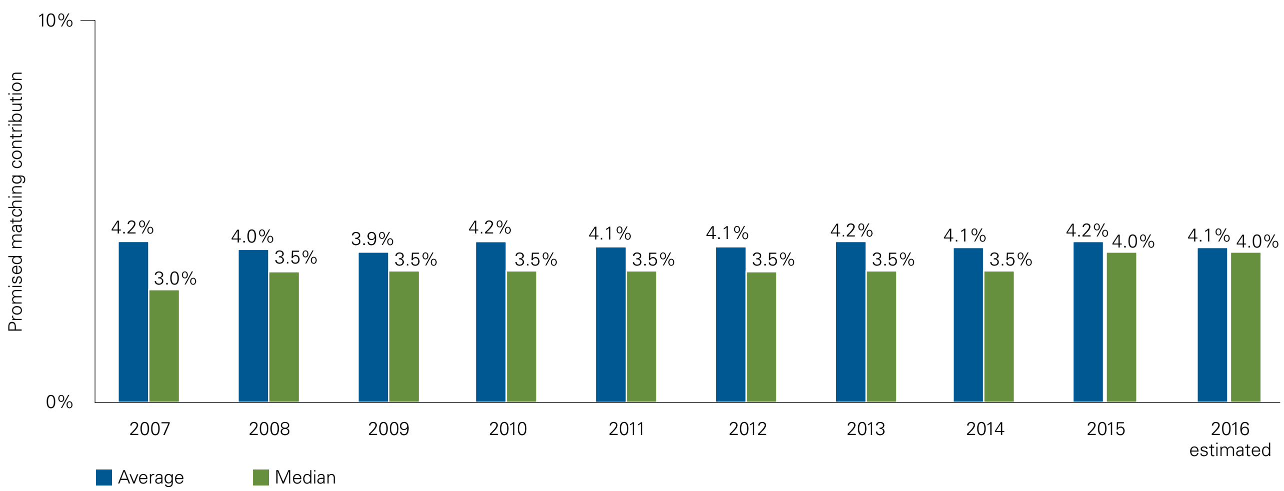
Another way to assess matching formulas is to calculate the employee-elective deferral needed to realize the maximum value of the match. In 2016, about 8 in 10 plans (covering about 9 in 10 participants) required participants to defer between 4% and 7% of their pay to receive the maximum employer-matching contribution (Figure 10).

The average employee-elective deferral required to maximize the match was 6.9% of pay; the median value, 6.0%.

The average employee-elective deferral required to maximize the match declined in 2008 and 2009 and again in 2011, 2012, and 2013 before stabilizing; however, the median deferral required remained constant at 6.0% (Figure 11).

Figure 9. Promised matching contributions

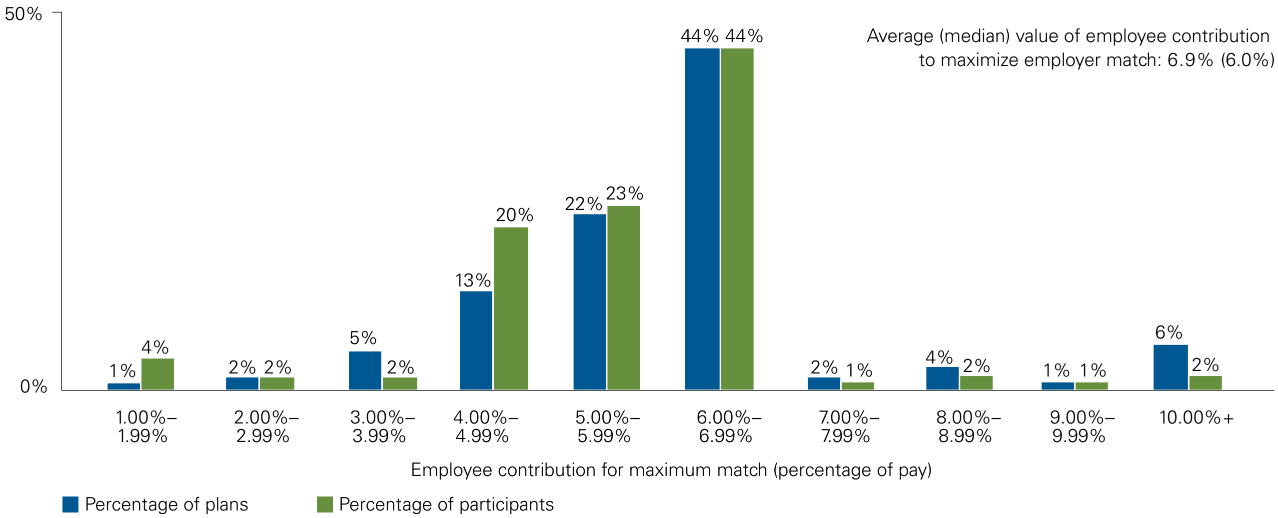
Vanguard defined contribution plans permitting employee-elective deferrals with a single- or multi-tier match formula



Source: Vanguard, 2017.

Figure 10. Employee contributions for maximum match, 2016 estimated

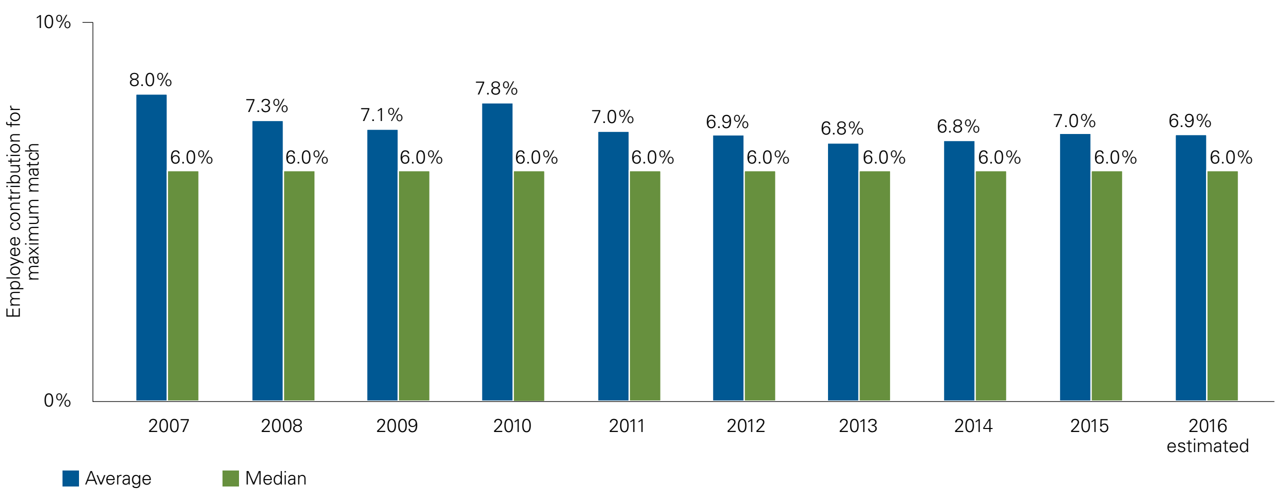
Vanguard defined contribution plans permitting employee-elective deferrals with a single- or multi-tier match formula



Source: Vanguard, 2017.

Figure 11. Employee contributions for maximum match

Vanguard defined contribution plans permitting employee-elective deferrals with a single- or multi-tier match formula



Source: Vanguard, 2017.

Other employer contributions

As noted previously, in a minority of plan designs, employers may make another contribution to the accounts of eligible employees in the form of a variable or fixed profit-sharing contribution or an ESOP contribution. These contributions, unlike matching contributions, may be made on behalf of eligible employees whether or not they actually contribute any part of their pay to the plan. As with matching contributions, eligibility is more restrictive for these types of employer contributions—many employees are not entitled to receive these contributions until they complete one year of service.

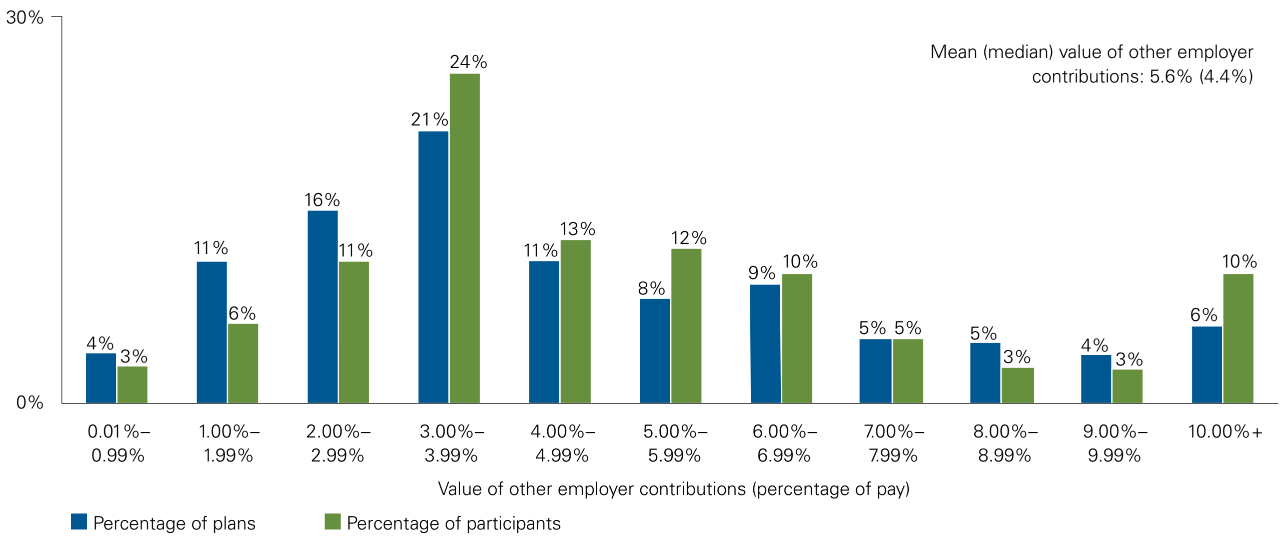
The value of other employer contributions also varies significantly from plan to plan. Among plans offering such contributions in 2016, half provided all participants with a contribution based on the same percentage of pay, while the other half varied the contribution by age and/or tenure. These nonmatching contributions varied in value from about 1% of pay to more than 10% of pay (Figure 12). Among plans with a nonmatching employer contribution, the average contribution was equivalent to 5.6% of pay; the median contribution, 4.4% of pay.

Between 2007 and 2009, the average value of other employer contributions was about 30% lower than in 2010. We attribute this to reductions in variable profit-sharing contributions—consistent with the economic environment during the period. Between 2010 and 2016, the average value of other employer contributions rebounded and surpassed prerecession levels (Figure 13).

As noted previously, 4 in 10 plans, covering one-third of the participants, provided both a matching and a nonmatching employer contribution. In 2016 the median combined value of the promised match and the other employer contribution was 8.0% (Figure 14).

Figure 12. Other employer contributions, 2016 estimated

Vanguard defined contribution plans with other employer contributions



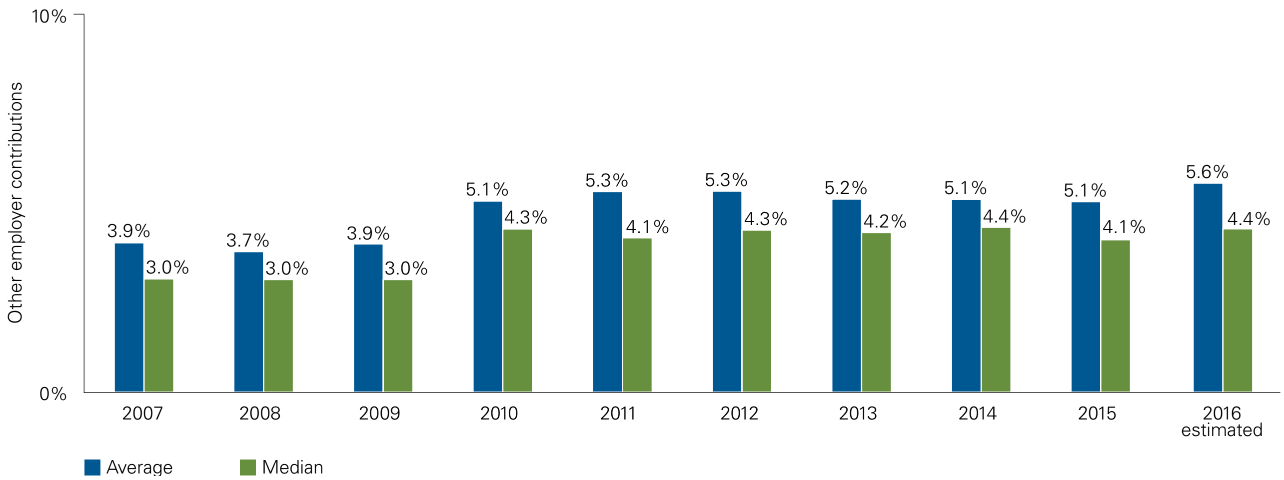
Source: Vanguard, 2017.

Maximum employee contribution limit

Many plans have incorporated expanded contribution limits authorized in the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA). More than ninety percent of DC plans have raised to 50% or more the maximum percentage of pay that employees can contribute to their plans.

Figure 13. Other employer contributions

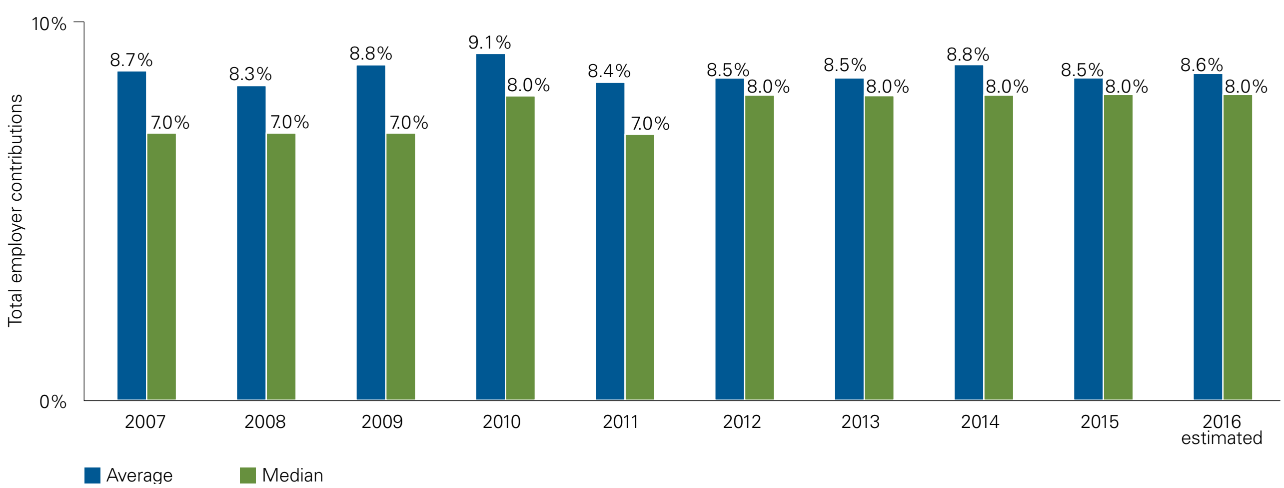
Vanguard defined contribution plans with other employer contributions



Source: Vanguard, 2017

Figure 14. Match and other employer contributions

Vanguard defined contribution plans with both match and other employer contributions



Source: Vanguard, 2017.

Automatic enrollment designs

In a typical 401(k) or 403(b) plan, employees must make an active choice to join the plan. The enrollment decision is framed as a positive election: "Decide if you'd like to join the plan." Why do employees fail to take advantage of their employers' plans? Research in the field of behavioral finance provides a number of explanations:

- **Lack of planning skills.** Some employees are not active, motivated decision-makers when it comes to retirement planning. They have weak planning skills and find it difficult to defer gratification.
- **Default decisions.** Faced with a complex choice and unsure what to do, many individuals often take the default or "no decision" choice. In the case of a voluntary savings plan, which requires that a participant take action in order to sign up, the "no decision" choice is a decision not to contribute to the plan.
- **Inertia and procrastination.** Many individuals deal with a difficult choice by deferring it to another day. Eligible nonparticipants, unsure of what to do, decide to postpone their decision. While many employees know they are not saving enough and express an interest in saving more, they simply never get around to joining the plan or, if they do join, to increasing their contribution rates over time.

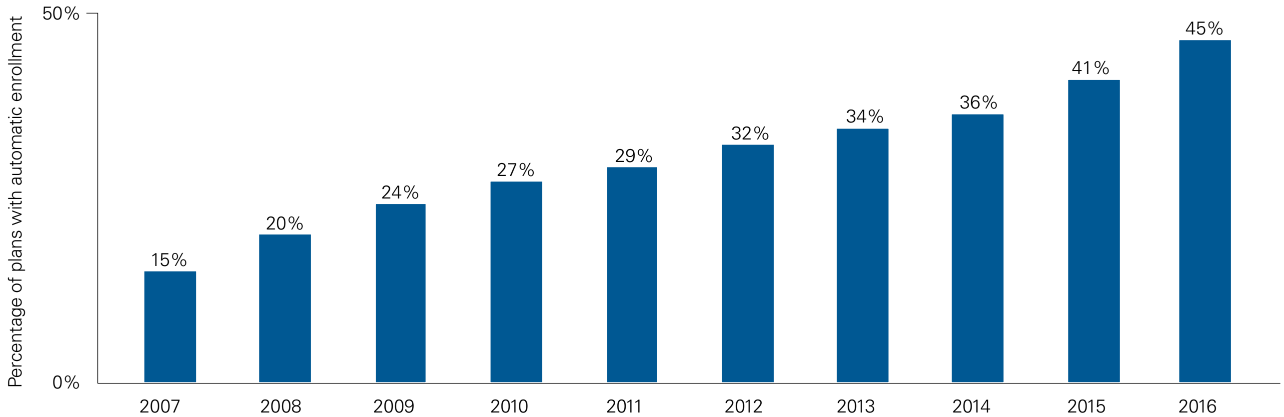
Automatic enrollment or autopilot plan designs reframe the savings decision. With an autopilot design, individuals are automatically enrolled into the plan, their deferral rates are automatically increased each year, and their contributions are automatically invested in a balanced investment strategy. Under an autopilot plan, the decision to save is framed negatively: "Quit the plan if you like." In such a design, "doing nothing" leads to participation in the plan and investment of assets in a long-term retirement portfolio.

As of December 2016, 45% of Vanguard plans permitting employee-elective deferrals had adopted components of an autopilot design (Figure 15). Larger plans are more likely to implement automatic enrollment, with more than half of midsized and large plans using the feature. As a result, slightly more than 6 in 10 participants are now in plans with autopilot designs, although automatic enrollment itself may only apply to newly eligible participants (Figure 16).

Approximately half of these plans have now "swept" eligible nonparticipants—they implemented automatic enrollment for all nonparticipating employees. The remaining half have implemented automatic enrollment for new hires only. Adoption of automatic enrollment designs grew by 10% in 2016, and by the end of 2016, more than half of plans with more than 500 participants had added the feature.

Figure 15. Automatic enrollment adoption

Vanguard defined contribution plans with employee-elective contributions



Source: Vanguard, 2017.

Figure 16. Automatic enrollment design by plan size, 2016

Vanguard defined contribution plans with automatic enrollment

		Number of participants			
	All	<500	500–999	1,000–4,999	>5,000
Percentage of plans with elective employee contributions offering	**45%**	**29%**	**56%**	**67%**	**60%**
Percentage of participants in plans offering	**61%**	**39%**	**55%**	**68%**	**61%**
For plans offering automatic enrollment					
Percentage of plans with automatic enrollment, automatic savings rate increases, and a balanced default fund	67%	57%	75%	71%	68%
Percentage of plans with automatic enrollment and a balanced default fund	32	41	25	29	32
Percentage of plans with automatic enrollment and a money market or stable value default fund	1	2	0	<0.5	0

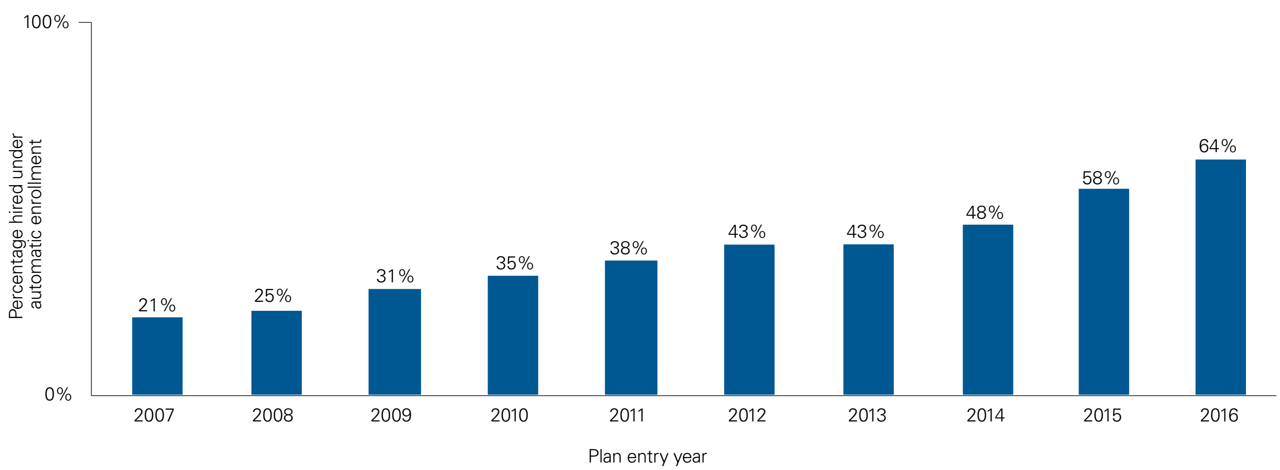
Source: Vanguard, 2017.

Among plans automatically enrolling employees, two-thirds use all three features of an autopilot design. These plan sponsors automatically enroll employees, automatically increase the deferral rate annually, and invest participants' assets in a balanced fund. Another 32% of plan sponsors automatically enroll employees and invest participants' assets in a balanced fund but do not automatically increase participant deferral rates. In 2016, nearly two-thirds of new plan entrants—participants contributing to the plan for the first time in 2016—were in plans that had adopted automatic enrollment (Figure 17).

Forty-four percent of these plans automatically enroll participants at a 3% contribution rate (Figure 18). Two-thirds of plans automatically increase the contribution rate annually. Ninety-nine percent of these plans use a target-date or other balanced investment strategy as the default fund, with 97% choosing a target-date fund as the default. The design of automatic enrollment plans is improving. In 2016, 48% of plans chose a default of 4% or higher, compared with 2007 when only 24% did. In fact, 20% of plans chose a default of 6% or more—nearly triple the proportion of plans choosing 6% or more in 2007.

Figure 17. Participants hired under automatic enrollment, 2016

Vanguard defined contribution plans with employee-elective contributions



Source: Vanguard, 2017.

Figure 18.	Automatic enrollment design trends

Vanguard defined contribution plans with automatic enrollment

Default automatic enrollment rate	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1 percent	3%	2%	3%	2%	2%	2%	2%	2%	1%	1%
2 percent	17	13	14	13	13	13	12	10	8	7
3 percent	56	60	56	57	55	53	51	49	48	44
4 percent	10	10	11	11	11	12	13	15	16	15
5 percent	7	7	7	7	8	8	9	9	11	13
6 percent or more	7	8	9	10	11	12	13	15	16	20
Default automatic increase rate										
1 percent	66%	73%	68%	68%	67%	67%	67%	68%	68%	65%
2 percent	2	2	1	1	2	2	2	2	2	2
Voluntary election	23	16	15	16	16	17	17	18	20	24
Service feature not offered	9	9	16	15	15	14	14	12	10	9
Default automatic increase cap										
<6 percent	3%	5%	6%	6%	5%	3%	3%	3%	2%	2%
6 percent	14	17	24	22	22	21	20	18	16	14
7 to 9 percent	6	5	6	7	8	8	8	9	11	10
10 percent	32	30	36	37	38	39	41	42	42	44
11 to 20 percent	20	20	20	20	19	21	21	21	22	23
>20 percent	9	7	4	4	4	3	3	2	2	2
No cap	16	16	4	4	4	5	4	5	5	5
Default fund										
Target-date fund	81%	87%	87%	89%	90%	91%	93%	95%	97%	97%
Other balanced fund	15	1	10	8	7	6	5	3	2	2
Subtotal	**96%**	**98%**	**97%**	**97%**	**97%**	**97%**	**98%**	**98%**	**99%**	**99%**
Money market or stable value fund	4%	2%	3%	3%	3%	3%	2%	2%	1%	1%

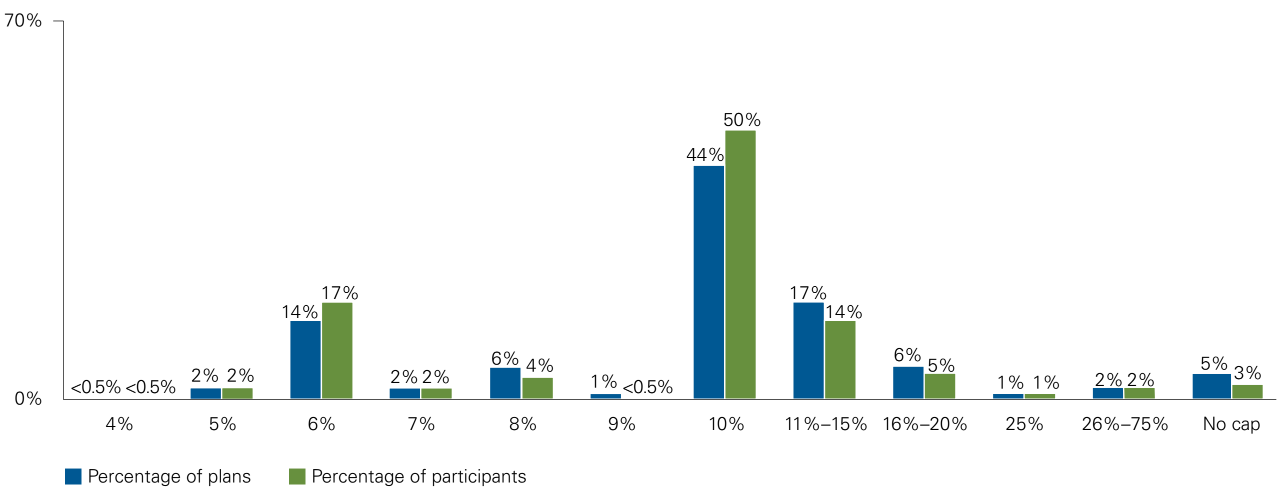
Source: Vanguard, 2017.

Forty-four percent of plans with automatic enrollment and annual increases cap the annual increase at 10% and half of annual-increase participants are capped at 10% (**Figure 19**). However, about one-quarter of plans use caps between 11% and 25%. Five percent of plans have no cap—likely an error. We recommend plan sponsors set the cap at a level where participants are saving 12% to 15% or more, factoring in employer contributions.

Plan sponsors may also elect to offer automatic annual increases in plans with voluntary enrollment designs. Participants are then presented with the annual increase election at enrollment and when they change their employee-elective deferral rate. In 2016, about one-quarter of plans with voluntary enrollment offered an automatic annual increase option and slightly more than half of participants in these designs had access to the option (**Figure 20**). About one-quarter of participants in these plans had elected automatic annual increases.

Figure 19. Automatic increase plan caps

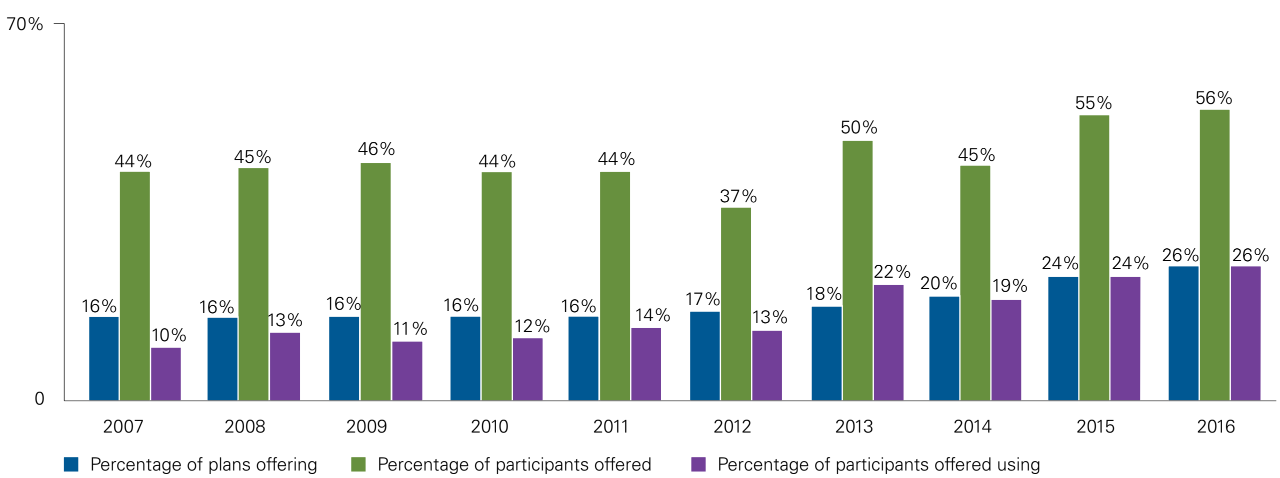
Automatic enrollment plans with an automatic annual incease as of December 31, 2016



Source: Vanguard, 2017.

Figure 20. Voluntary annual increase adoption

Vanguard enrollment plans with voluntary annual increase



Source: Vanguard, 2017.

Participation rates

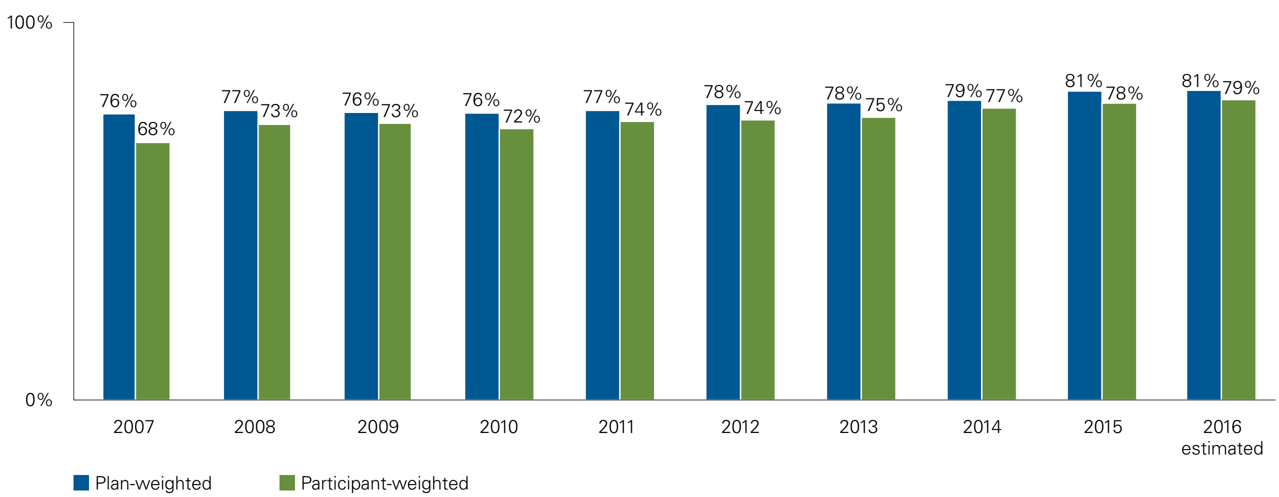
A plan's participation rate—the percentage of eligible employees who choose to make voluntary contributions—remains the broadest metric for gauging 401(k) plan performance. The most common measure of participation rates is calculated by taking the average of participation rates among a group of plans. We refer to this as the plan-weighted participation rate. In 2016, Vanguard's plan-weighted participation rate was 81% (estimated, see the Methodology section on page 106) and has risen steadily since 2007 (Figure 21).

A second measure of participation rates considers all employees in Vanguard-administered plans as if they were in a single plan. We refer to this as the participant-weighted participation rate. Across the universe of Vanguard participants, 79% of eligible employees are enrolled in their employer's voluntary savings program. This broader measure of plan participation has risen in recent years from 68% to 79%. This increase reflects the adoption of automatic enrollment by larger plan sponsors.

These two measures provide different views of employee participation in their retirement savings plans, although with the rising adoption of automatic enrollment these two metrics are converging. The first measure indicates that, in the average plan, about one-fifth of eligible employees fail to contribute. The second measure, however, shows that within the entire employee universe, about one-fifth of employees fail to take advantage of their employer's plan. The first measure is a useful benchmark for an individual plan sponsor because it is calculated at the plan level; the second is a valuable measure of the progress of 401(k) plans as a whole because it looks at all eligible employees across all plans. However, with the rise in automatic enrollment, these two measures are now converging.

Figure 21. Plan participation rates

Vanguard defined contribution plans permitting employee-elective deferrals



Source: Vanguard, 2017.

Distribution of participation rates

Participation rates vary considerably across plans (Figure 22). In 2016, two-thirds of plans had a participation rate of 80% or higher, while less than 10% of plans had a participation rate of less than 50%. Participation rates also vary by plan size, with larger plans historically having lower participation rates than other plans (Figure 23). One reason for lower participation rates at large companies may be the presence of another retirement plan benefit, such as an employer-funded DB plan, employer profit-sharing, or ESOP contributions to a DC plan.

Other possible reasons include the inherent difficulty of communicating across many locations in a large firm and the fact that large firms often outsource the enrollment process to their provider, while small firms may tend to rely on an in-house human resources representative. With larger plans most likely to add automatic enrollment, there is now less variation in participation rates by plan size.

Figure 22. Distribution of participation rates

Vanguard defined contribution plans permitting employee-elective deferrals

Percentage of plans

Plan participation rate	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016 estimated
90%–100%	20%	24%	23%	21%	24%	29%	31%	35%	40%	41%
80%–89%	31	30	29	31	31	28	30	28	25	24
70%–79%	20	20	20	19	17	17	14	14	14	13
60%–69%	14	11	11	12	12	10	9	9	8	9
50%–59%	8	8	7	7	7	7	7	6	5	5
<50%	7	7	10	10	9	9	9	8	8	8
Average plan participation rate	**76%**	**77%**	**76%**	**76%**	**77%**	**78%**	**78%**	**79%**	**81%**	**81%**

Source: Vanguard, 2017.

Figure 23. Participation rates by plan size

Vanguard defined contribution plans permitting employee-elective deferrals

Number of participants

Plan-weighted participation rate	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016 estimated
<500	76%	77%	75%	74%	75%	76%	76%	77%	79%	79%
500–999	77	79	78	78	79	80	82	82	83	82
1,000–4,999	75	78	79	78	79	80	81	80	84	84
5,000+	73	78	76	78	80	81	81	74	82	80
All plans	**76%**	**77%**	**76%**	**76%**	**77%**	**78%**	**78%**	**79%**	**81%**	**81%**
Participant-weighted participation rate										
<500	70%	72%	69%	68%	70%	70%	69%	72%	75%	76%
500–999	74	76	74	74	76	77	78	77	77	76
1,000–4,999	67	71	72	69	70	72	72	73	80	81
5,000+	67	74	73	75	76	76	77	67	77	78
All participants	**68%**	**73%**	**73%**	**72%**	**74%**	**74%**	**75%**	**77%**	**78%**	**79%**

Source: Vanguard, 2017.

Participation rates by employee demographics

Participation rates also vary considerably by employee demographics (**Figure 24**). Income is one of the primary determinants of plan participation rates. Only about two-thirds of eligible employees with income of less than $30,000 contributed to their employer's DC plan in 2016, while 93% of employees with income of more than $100,000 elected to participate. Even among the highest-paid employees, 7% of eligible workers still failed to take advantage of their employer's DC plan.

Participation rates were lowest for employees younger than 25. Slightly more than half of employees younger than 25 made employee-elective deferrals to their employer's plan in 2016, while more than three-quarters of eligible employees between ages 35 and 64 saved for retirement in their employer's plan. Tenure had a significant influence on plan participation. In 2016, only about 6 in 10 eligible employees with less than two years on the job participated in their employer's plan, while 8 in 10 employees with tenure of ten years or more participated.

Figure 24. Participation rates by participant demographics

Vanguard defined contribution plans permitting employee-elective deferrals

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016 estimated
All	68%	73%	73%	72%	74%	74%	75%	77%	78%	79%
Income										
<$30,000	45%	56%	55%	53%	56%	57%	57%	62%	58%	65%
$30,000–$49,999	66	71	70	69	70	71	71	75	75	74
$50,000–$74,999	76	78	76	76	75	75	76	79	80	79
$75,000–$99,999	84	85	84	83	82	82	82	83	84	86
$100,000+	91	91	90	91	90	90	91	92	92	93
Age										
<25	38%	49%	49%	44%	51%	52%	53%	57%	54%	54%
25–34	61	68	68	68	69	70	71	74	74	71
35–44	70	75	74	74	74	75	76	79	79	77
45–54	74	78	77	77	78	78	79	81	81	79
55–64	74	77	76	76	78	79	80	82	83	82
65+	62	67	68	67	71	74	74	75	77	76
Gender										
Male	69%	75%	73%	73%	74%	73%	75%	76%	77%	78%
Female	67	73	72	71	75	74	77	77	79	79
Job tenure (years)										
0–1	49%	58%	55%	56%	61%	61%	62%	67%	64%	61%
2–3	61	69	69	66	69	71	72	75	78	76
4–6	68	73	72	72	72	73	75	79	81	82
7–9	74	79	77	76	76	78	78	79	81	82
10+	80	82	81	81	81	82	83	84	85	83

Source: Vanguard, 2017.

Men and women appear to participate at about the same level. But these overall averages fail to account for the income differences between men and women. At most income levels, women are significantly more likely than men to join their employer's plan (Figure 25). For example, in 2016, 86% of women earning $50,000 to $74,999 participated in their employer's plan—compared with 77% of men in the same income group.

Participation rates also vary by industry group (Figure 26). Employees in the agriculture, mining, and construction and the finance, insurance, and real estate industry groups had the highest participation rate, with about 9 in 10 workers participating in their employer's plan, while employees in the wholesale and retail trade group had the lowest participation rate at 61%.

Figure 25. Participation by income and gender, 2016 estimated

Vanguard defined contribution plans permitting employee-elective deferrals

	Female	Male	All
<$30,000	68%	63%	65%
$30,000–$49,999	79	72	74
$50,000–$74,999	86	77	79
$75,000–$99,999	90	82	86
$100,000+	94	91	93

Source: Vanguard, 2017.

Figure 26. Participation rates by industry sector, 2016 estimated

Vanguard defined contribution plans permitting employee-elective deferrals

	Plan-weighted	Participant-weighted
Overall	81%	79%
Industry group		
Agriculture, mining, and construction	80	92
Finance, insurance, and real estate	88	90
Manufacturing	81	85
Transportation, utilities, and communications	81	76
Business, professional, and nonprofit	80	74
Education and health	75	74
Media, entertainment, and leisure	76	66
Wholesale and retail trade	76	61

Source: Vanguard, 2017.

Impact of automatic enrollment on plan design

Reflecting increased adoption of automatic enrollment designs, there has been a dramatic improvement in participation rates between 2007 and 2016 among demographic groups that traditionally have lower voluntary participation rates. Employees subjected to an automatic enrollment feature have an overall participation rate of 90%, compared with a participation rate of only 63% for employees hired under plans with voluntary enrollment (**Figure 27**).

Plans with automatic enrollment have higher participation rates across all demographic variables. For individuals earning less than $30,000 in plans with automatic enrollment, the participation rate is more than double that of individuals with voluntary enrollment.

Aggregate plan participation rates

As noted previously, some plan sponsors make other nonmatching contributions for all eligible employees, whether or not these employees actually defer any part of their pay to the plan. When these contributions are factored in, both the plan- and participant-weighted participation rates improve. The plan-weighted participation rate rises to 87% and the participant-weighted rate to 80% (**Figure 28**). In other words, across all Vanguard plans, about 80% of employees either make their own contributions, receive an employer contribution, or both.

Figure 27. Participation rates by plan design, 2016 estimated

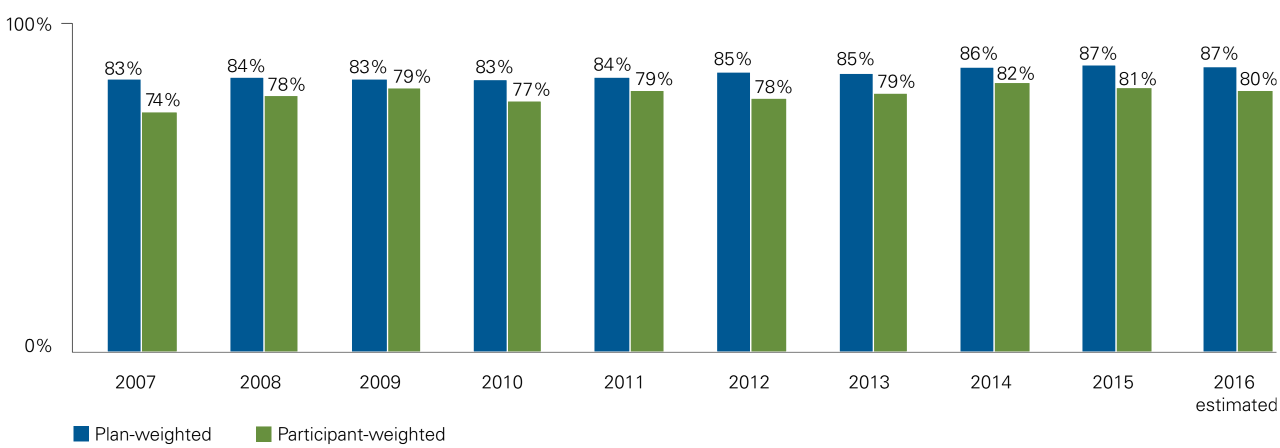
Vanguard defined contribution plans permitting employee-elective deferrals

	Voluntary enrollment	Automatic enrollment	All
All	63%	90%	79%
Income			
<$30,000	32%	87%	65%
$30,000–$49,999	56	92	74
$50,000–$74,999	67	94	79
$75,000–$99,999	75	96	86
$100,000+	88	97	93
Age			
<25	27%	85%	54%
25–34	56	92	71
35–44	66	92	77
45–54	70	93	79
55–64	74	93	82
65+	68	90	76
Gender			
Male	62%	92%	78%
Female	67	91	79
Job tenure (years)			
0–1	38%	88%	61%
2–3	60	94	76
4–6	66	94	82
7–9	72	91	82
10+	78	95	83

Source: Vanguard, 2017.

Figure 28. Aggregate plan participation rates

Vanguard defined contribution plans permitting employee-elective deferrals



Source: Vanguard, 2017.

Employee deferrals

In a typical DC plan, employees are the main source of funding, while employer contributions play a secondary role. Thus, the level of participant deferrals is a critical determinant of whether the DC plan will generate an adequate level of savings for retirement.

Vanguard participants saved 6.2% of their income on average in their employer's plan in 2016 **(Figure 29)**.

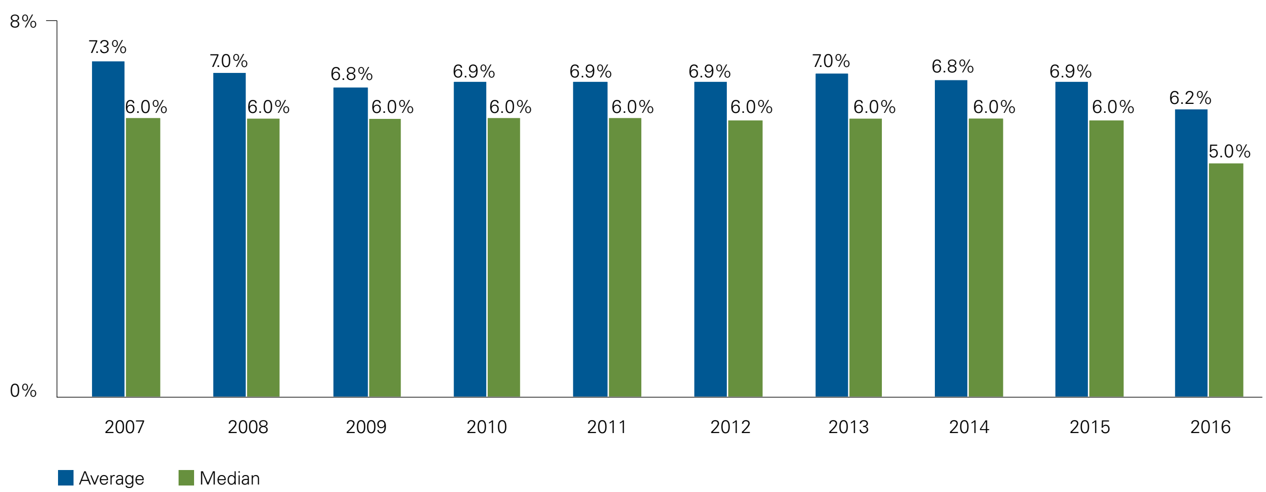
The median participant deferral rate was 5.0%, meaning that half of participants were saving above this rate and half were saving below it.

Vanguard deferral rates are drawn from recordkeeping data and exclude eligible employees not contributing to their plans. Industry deferral rates sometimes include eligible employees not contributing to their plan and are generally self-reported by plan sponsors.

The decline in average and median deferral rates in 2016 is attributable to a changing industry mix and the increase in automatic enrollment.

Figure 29. Participant employee-elective deferral rates

Vanguard defined contribution plans permitting employee-elective deferrals



Source: Vanguard, 2017.

Distribution of deferral rates

Individual deferral rates vary considerably among participants (Figure 30). Nearly 1 in 5 participants had a deferral rate of 10% or higher in 2016, while more than one-third had a deferral rate of less than 4%. During 2016, only 10% of participants saved the statutory maximum of $18,000 ($24,000 for participants age 50 or older) (see page 37). In plans offering catch-up contributions, only 12% of participants age 50 or older took advantage of this feature in 2016 (see page 38).

Figure 30. Distribution of participant employee-elective deferral rates

Vanguard defined contribution plans permitting employee-elective deferrals

Percentage of plans

Deferral rate	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0.1%–3.9%	27%	30%	32%	28%	28%	29%	28%	30%	29%	36%
4.0%–6.0%	23	22	22	23	25	23	23	23	22	23
6.1%–9.9%	27	26	25	27	27	28	29	28	29	23
10.0%–14.9%	15	15	14	15	14	14	14	13	14	13
15.0%+	8	7	7	7	6	6	6	6	6	5

Source: Vanguard, 2017.

Plan size has little effect on participant deferral rates (Figure 31). In 2016, plans with 5,000 or more participants had an average deferral rate of 6.0%—about the same as the overall average rate of 6.2%. Employees at large firms typically have more generous compensation packages and so arguably should have a higher propensity to save than employees at small companies. But the presence of automatic enrollment and other employer-funded retirement benefits as part of that package may dilute this effect.

Deferral rates by employee demographics

As with plan participation rates, employee demographics have a strong influence on deferral rates (Figure 32). Income is the primary determinant of deferral rates, which generally rise with income. The statutory maximum contribution was $18,000 ($24,000 for participants 50 and older), and a highly compensated employee was one who earned $120,000 or more in 2015 (based on the prior year for 2016).

In 2016, participants with incomes of less than $30,000 had deferral rates averaging 3.9%, while participants earning $75,000 to $99,999 had deferral rates of 7.6%—a savings rate that is nearly double. Deferral rates were 8.1% for participants earning $100,000 or more.

Age is another important variable influencing savings. In 2016, deferral rates were lowest for participants younger than 25. This group saved only 3.9% of income. Deferral rates for participants ages 55 to 64 were twice as high, averaging 7.8%. Deferral rates also rose directly with employee tenure.

Figure 31. Participant employee-elective deferral rates by plan size

Vanguard defined contribution plans permitting employee-elective deferrals

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Average—all plans	7.3%	7.0%	6.8%	6.9%	6.9%	6.9%	7.0%	6.8%	6.9%	6.2%
Median	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.0
Average by plan size (number of participants)										
<500	7.2%	7.2%	7.0%	7.0%	6.9%	7.0%	7.0%	6.9%	7.1%	7.1%
500–999	7.3	7.1	6.9	6.8	6.8	6.9	6.8	7.1	6.8	7.0
1,000–4,999	7.2	7.0	6.9	6.8	6.8	6.8	6.9	6.7	6.9	6.5
5,000+	7.4	6.9	6.7	7.0	6.9	6.8	7.0	6.8	7.0	6.0

Source: Vanguard, 2017.

Figure 32.	Employee-elective deferral rates by participant demographics

Vanguard defined contribution plans permitting employee-elective deferrals

Average deferral rate	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All	7.3%	7.0%	6.8%	6.9%	6.9%	6.9%	7.0%	6.8%	6.9%	6.2%
Income										
<$30,000	5.7%	4.8%	4.7%	4.8%	4.8%	4.7%	4.8%	5.0%	4.6%	3.9%
$30,000–$49,999	6.2	5.9	5.6	5.8	5.8	5.7	5.8	5.8	5.7	5.4
$50,000–$74,999	7.6	7.4	7.0	7.1	7.0	6.9	7.0	6.9	6.9	6.6
$75,000–$99,999	8.9	8.6	8.4	8.4	8.2	8.1	8.1	7.9	8.0	7.6
$100,000+	8.5	8.1	8.2	8.2	8.1	8.1	8.3	8.1	8.4	8.1
Age										
<25	4.5%	4.1%	4.0%	4.2%	4.2%	4.0%	4.4%	4.1%	4.7%	3.9%
25–34	5.9	5.6	5.5	5.7	5.6	5.4	5.8	5.5	5.9	5.3
35–44	6.7	6.4	6.2	6.4	6.1	6.3	6.4	6.3	6.4	5.9
45–54	7.8	7.5	7.2	7.3	7.2	7.2	7.3	7.2	7.3	6.6
55–64	9.2	8.9	8.5	8.6	8.6	8.5	8.6	8.5	8.6	7.8
65+	10.8	10.4	9.8	9.9	9.8	9.8	9.8	9.7	9.7	8.3
Gender										
Male	7.3%	7.0%	6.7%	6.9%	6.9%	6.9%	7.0%	6.9%	6.9%	6.6%
Female	7.2	6.9	6.8	6.9	6.9	6.8	7.0	6.8	6.9	5.7
Job tenure (years)										
0–1	5.6%	5.0%	4.9%	4.8%	4.8%	4.7%	4.9%	4.6%	5.0%	4.6%
2–3	6.7	6.3	6.1	6.3	6.3	6.0	6.3	6.2	6.5	5.7
4–6	7.1	6.8	6.5	6.8	6.8	6.8	7.0	7.2	7.1	6.3
7–9	7.4	7.1	6.9	7.0	7.0	7.0	7.2	7.2	7.4	6.6
10+	8.2	8.0	7.7	7.8	7.8	7.9	8.0	8.0	8.0	7.5
Account balance										
<$10,000	4.1%	4.1%	3.6%	3.8%	3.9%	3.8%	3.8%	3.8%	3.9%	3.6%
$10,000–$24,999	6.5	6.8	5.8	5.7	5.9	5.8	5.9	6.1	6.4	6.3
$25,000–$49,999	7.4	7.9	7.1	6.8	6.8	6.7	6.9	6.9	7.4	7.2
$50,000–$99,999	8.6	9.1	8.4	8.2	8.1	7.8	7.7	7.7	8.1	8.1
$100,000–$249,999	10.2	10.5	10.0	9.8	9.8	9.6	9.2	9.1	9.3	9.1
$250,000+	10.6	10.1	10.6	10.4	10.3	10.4	10.4	10.2	10.4	10.2

Source: Vanguard, 2017.

Deferral rates also are correlated with account balances. Participants with account balances of less than $10,000 had the lowest average deferral rate, 3.6% in 2016. As account balances rose, average deferral rates also rose. Overall, men and women appear to save at similar rates. But, as with participation rates, the overall averages understate the difference because they fail to account for women's lower incomes. Across most income groups, women saved at rates that are 2% to 8% higher than those of men (Figure 33).

Deferral rates also vary—by about one-third—by industry group (Figure 34). Participants in the agriculture, mining, and construction industry group had the highest median deferral rates in 2016, while participants in the media, entertainment, and leisure group had the lowest deferral rates.

Impact of automatic enrollment

Plan design, specifically the predominant use of a 3% default deferral rate, means participants in plans with automatic enrollment are saving less.

Participants joining a plan under an automatic enrollment feature have an average deferral rate of 6.1%, compared with 6.3% for participants under plans with voluntary enrollment—a spread of only 0.2 percentage points (Figure 35). In prior years this gap was wider—it appears that automatic annual increases are beginning to cause deferral rates to converge.

Figure 33. Deferral rates by income and gender, 2016

Vanguard defined contribution plans permitting employee-elective deferrals

Average deferral rate

	Female	Male	All
<$30,000	3.7%	4.3%	3.9%
$30,000–$49,999	5.5	5.4	5.4
$50,000–$74,999	6.7	6.6	6.6
$75,000–$99,999	8.1	7.5	7.6
$100,000+	8.5	8.0	8.1

Source: Vanguard, 2017.

In the past five years this spread has ranged from 0.6 percentage points in 2015 to 2.2 percentage points in 2012.

This suggests that higher default deferral rates would be amenable to plan participants in automatic enrollment designs. Our research on automatic enrollment indicates that "quit rates" do not deteriorate when higher default percentages are used to enroll employees.

Maximum contributors

During 2016, only 10% of participants saved the statutory maximum dollar amount of $18,000 ($24,000 for participants age 50 or older) (Figure 36). Participants who contributed the maximum dollar amount tended to have higher incomes, were older, had longer tenures with their current employer, and had accumulated substantially higher account balances.

One-third of participants with incomes of more than $100,000 contributed the maximum allowed. Similarly, 4 in 10 participants with account balances of more than $250,000 contributed the maximum allowed in 2016. One-sixth of participants older than 65 contributed the maximum.

Figure 34. Deferral rates by industry sector, 2016

Vanguard defined contribution plans permitting employee-elective deferrals

Average deferral rate

	Mean	Median
Overall	6.2%	5.0%
Industry group		
Agriculture, mining, and construction	7.6%	6.8%
Education and health	7.0	6.0
Transportation, utilities, and communications	6.9	6.0
Business, professional, and nonprofit	6.9	6.0
Manufacturing	6.6	6.0
Finance, insurance, and real estate	6.2	4.6
Wholesale and retail trade	5.5	4.6
Media, entertainment, and leisure	4.2	2.0

Source: Vanguard, 2017.

Figure 35. Participant deferral rates by plan design, 2016

Vanguard defined contribution plans permitting employee-elective deferrals

Average deferral rates

	Voluntary enrollment	Automatic enrollment	All
All	6.3%	6.1%	6.2%
Income			
<$30,000	4.0%	3.5%	3.9%
$30,000–$49,999	5.6	5.1	5.4
$50,000–$74,999	6.6	6.6	6.6
$75,000–$99,999	7.5	7.8	7.6
$100,000+	8.1	8.2	8.1
Age			
<25	4.3%	3.4%	3.9%
25–34	5.4	5.2	5.3
35–44	6.0	5.8	5.9
45–54	6.6	6.6	6.6
55–64	7.8	7.9	7.8
65+	8.2	8.8	8.3
Gender			
Male	6.8%	6.3%	6.6%
Female	5.6	6.0	5.7
Job tenure (years)			
0–1	5.0%	4.1%	4.6%
2–3	5.7	5.7	5.7
4–6	6.0	6.9	6.3
7–9	6.3	7.3	6.6
10+	7.4	8.1	7.5
Account balance			
<$10,000	3.7%	3.4%	3.6%
$10,000–$24,999	6.3	6.2	6.3
$25,000–$49,999	7.2	7.2	7.2
$50,000–$99,999	8.1	8.0	8.1
$100,000–$249,999	9.1	9.1	9.1
$250,000+	10.1	10.5	10.2

Source: Vanguard, 2017.

Figure 36. Participants contributing the maximum by participant demographics, 2016

Vanguard defined contribution plans permitting employee-elective deferrals

All	10%
Income	
<$30,000	1%
$30,000–$49,999	3
$50,000–$74,999	4
$75,000–$99,999	7
$100,000+	32
Age	
<25	2%
25–34	5
35–44	9
45–54	12
55–64	16
65+	17
Gender	
Male	12%
Female	7
Job tenure (years)	
0–1	5%
2–3	8
4–6	9
7–9	10
10+	15
Account balance	
<$10,000	2%
$10,000–$24,999	4
$25,000–$49,999	8
$50,000–$99,999	12
$100,000–$249,999	17
$250,000+	43
Industry group	
Agriculture, mining, and construction	11%
Business, professional, and nonprofit	23
Education and health	3
Finance, insurance, and real estate	8
Manufacturing	13
Wholesale and retail trade	9
Media, entertainment, and leisure	16
Transportation, utilities, and communications	16

Source: Vanguard, 2017.

Catch-up contributions

Nearly all Vanguard plans offered catch-up contributions in 2016. Catch-up contributions permit participants age 50 and older to contribute more than permitted for participants under age 50. Twelve percent of age-50-and-older participants eligible for catch-up contributions took advantage of this feature in 2016 (Figure 37). Participants earning less than $100,000 would need deferral rates higher than 20% of income in order to make catch-up contributions, suggesting that adoption of catch-up contributions by participants is actually quite strong.

The characteristics of participants making catch-up contributions are similar to those of participants making the maximum contribution to their plan. They tended to have higher incomes and had accumulated substantially higher account balances.

Four in 10 participants with incomes of more than $100,000 made catch-up contributions. Similarly, 4 in 10 participants with account balances of more than $250,000 made catch-up contributions in 2016.

Roth contributions

At year-end 2016, the Roth feature was offered by 65% of Vanguard plans and had been adopted by 13% of participants in plans offering the feature (Figure 38). Those who used this feature tended to be younger and shorter-tenured participants.

Thirteen percent of plans offered Roth in-plan conversions, and 1% of participants with access to the option converted assets between 2010 and 2016.

After-tax contributions

After-tax employee-elective deferrals are available to participants in about one-fifth of Vanguard plans. The after-tax feature is more likely to be offered by large plans and one-third of participants have access to this feature. In 2016, only 8% of employees offered the after-tax deferral feature took advantage of it (Figure 39). Those who used the feature also tended to have higher incomes and were older, longer-tenured employees.

Figure 37. Catch-up contribution participation rates by participant demographics, 2016

Vanguard defined contribution plans permitting catch-up contributions

Percentage of plans offering	98%
Percentage of participants offered	99%
Percentage of participants using if offered	12%
Income	
<$30,000	0%
$30,000–$49,999	1
$50,000–$74,999	2
$75,000–$99,999	6
$100,000+	39
Gender	
Male	15%
Female	7
Job tenure (years)	
0–1	6%
2–3	9
4–6	10
7–9	10
10+	14
Account balance	
<$10,000	0%
$10,000–$24,999	1
$25,000–$49,999	5
$50,000–$99,999	8
$100,000–$249,999	12
$250,000+	38
Industry group	
Manufacturing	11%
Agriculture, mining, and construction	25
Wholesale and retail trade	4
Transportation, utilities, and communications	14
Education and health	15
Media, entertainment, and leisure	12
Finance, insurance, and real estate	16
Business, professional, and nonprofit	19

Source: Vanguard, 2017.

Figure 38. Roth participation rates by participant demographics, 2016

Vanguard defined contribution plans permitting Roth contributions

Percentage of plans offering	65%
Percentage of participants offered	68%
Percentage of participants using if offered	13%
Income	
<$30,000	7%
$30,000–$49,999	11
$50,000–$74,999	15
$75,000–$99,999	16
$100,000+	15
Age	
<25	13%
25–34	17
35–44	14
45–54	11
55–64	8
65+	4
Gender	
Male	14%
Female	9
Job tenure (years)	
0–1	13%
2–3	16
4–6	15
7–9	12
10+	9
Account balance	
<$10,000	11%
$10,000–$24,999	17
$25,000–$49,999	16
$50,000–$99,999	14
$100,000–$249,999	11
$250,000+	12
Industry group	
Manufacturing	10%
Agriculture, mining, and construction	19
Wholesale and retail trade	3
Transportation, utilities, and communications	18
Education and health	11
Media, entertainment, and leisure	16
Finance, insurance, and real estate	11
Business, professional, and nonprofit	14

Source: Vanguard, 2017.

Figure 39. After-tax participation rates by participant demographics, 2016

Vanguard defined contribution plans permitting after-tax contributions

Percentage of plans offering	18%
Percentage of participants offered	33%
Percentage of participants using if offered	8%
Income	
<$30,000	2%
$30,000–$49,999	6
$50,000–$74,999	6
$75,000–$99,999	7
$100,000+	13
Age	
<25	4%
25–34	7
35–44	7
45–54	8
55–64	8
65+	8
Gender	
Male	7%
Female	10
Job tenure (years)	
0–1	3%
2–3	6
4–6	7
7–9	8
10+	9
Industry group	
Manufacturing	4%
Agriculture, mining, and construction	22
Wholesale and retail trade	13
Transportation, utilities, and communications	6
Education and health	6
Media, entertainment, and leisure	6
Finance, insurance, and real estate	29
Business, professional, and nonprofit	5

Source: Vanguard, 2017.

Aggregate contributions

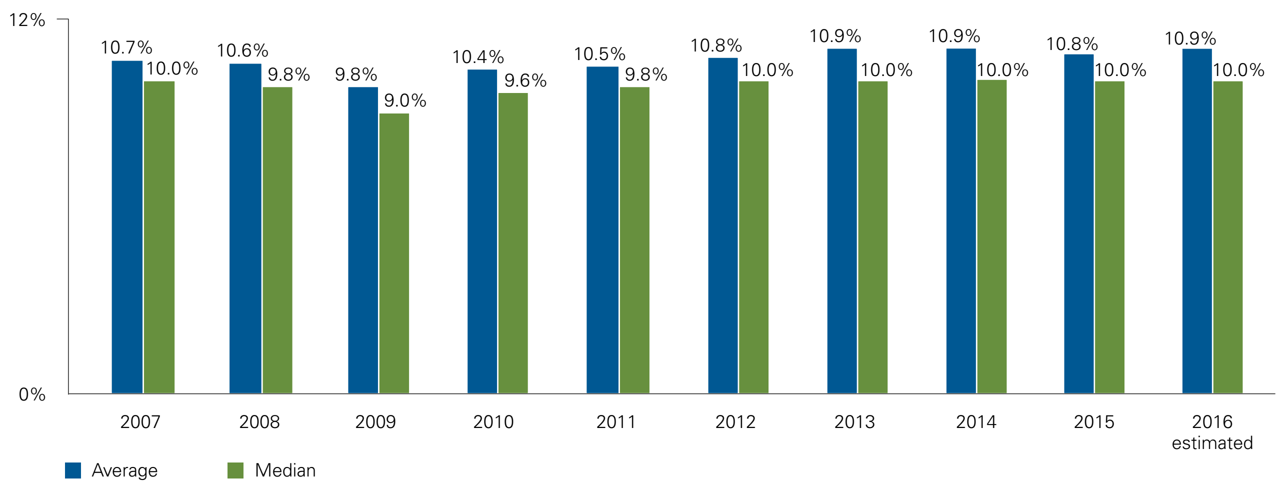
Taking into account both employee and employer contributions, the average total participant contribution rate in 2016 was 10.9% (estimated, see the Methodology section on page 106) and the median was 10.0% (Figure 40). These rates exclude eligible nonparticipants. Aggregate participant and employer contribution rates have been fairly stable between 2007 and 2016—with the exception of the slight dip during the Great Recession. When eligible nonparticipants, with their 0% contribution rate, are included, the average aggregate contribution rate is 8.2% and the median is 7.4% (Figure 41). Aggregate employee and employer contribution rates are generally rising over the 10-year period reflecting the rising adoption of automatic enrollment which results in fewer individuals deferring zero.

Distribution of aggregate contribution rates

Vanguard estimates that a typical participant should target a total contribution rate of 12% to 15%, including both employee and employer contributions. Forty-five percent of participants in 2016 had total employee and employer savings rates that met those thresholds or reached the statutory contribution limit (Figure 42). For participants with lower wages, Social Security is expected to replace a higher percentage of income and so a lower retirement savings rate may be appropriate. For higher-wage participants, Social Security replaces a lower percentage of income and savings rates may need to be higher. In fact, higher-wage participants may not be able to achieve sufficient savings rates within the plan because of statutory contribution limits.

Figure 40. Aggregate participant and employer contribution rates

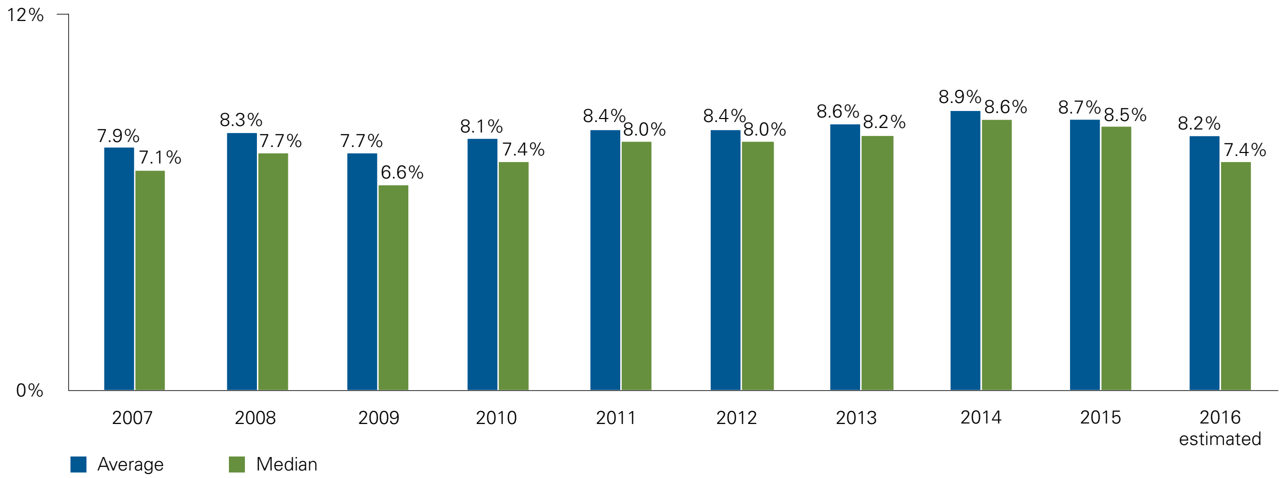
Vanguard defined contribution plans permitting employee-elective deferrals



Source: Vanguard, 2017.

Figure 41. Aggregate employee and employer contribution rates

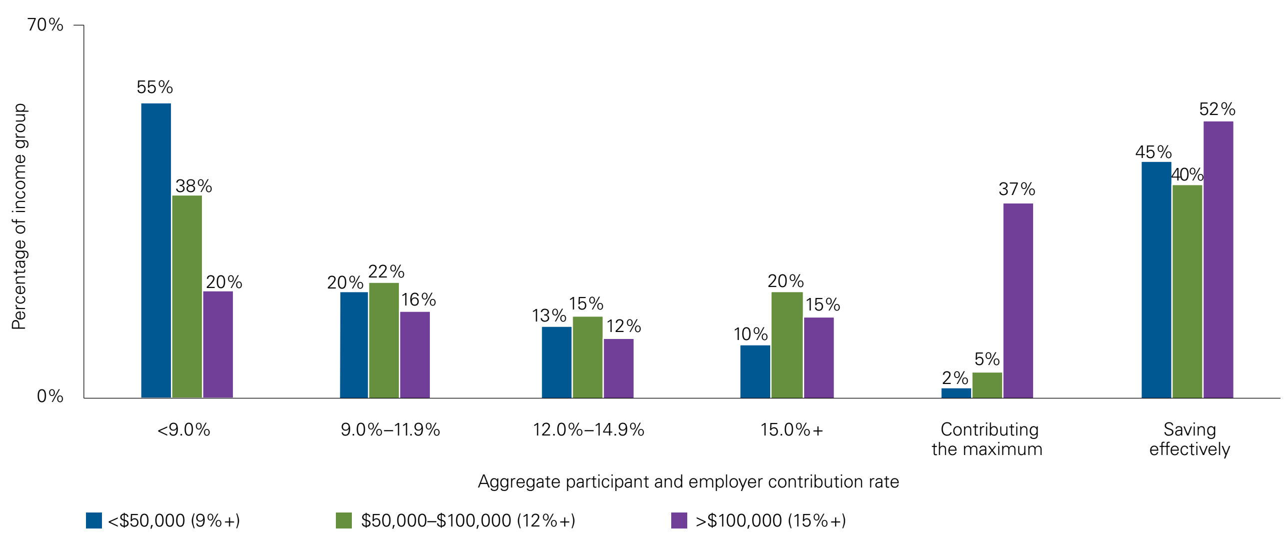
Vanguard defined contribution plans permitting employee-elective deferrals



Source: Vanguard, 2017.

Figure 42. Distribution of aggregate participant and employer contribution rates, 2016 estimated

Vanguard defined contribution plans permitting employee-elective deferrals



Note: The percentage noted after the income range is the total contribution rate recommended for effective savings.
Source: Vanguard, 2017.

Account balances

Account balances are a widely cited measure of the overall effectiveness of DC plans and are determined by contribution levels and investment performance over time.

Vanguard account balances are a measure of how much plan participants have accumulated for retirement at a given employer. In the United States, DC plans are not a closed system. When participants change jobs or retire, their plan assets may remain with the plan of the employer they are leaving, may be rolled over to another employer plan or to an IRA, or may be cashed out. As a result, current DC plan balances often do not reflect lifetime savings and are only a partial measure of retirement preparedness for most participants.

Average versus median balances

In 2016, the average account balance for Vanguard participants was $96,495; the median balance was $24,713 **(Figure 43)**. In 2016, Vanguard participants' average account balances were essentially flat and median account balances fell by 6%. The average 1-year participant total return was 8.3% in 2016 (see page 79). Two factors are driving the change in participant account balances. The first is a changing business mix—new plans converted in 2016 had lower account balances. The second is the rising adoption of automatic enrollment—in 2016 more than one-third of participants had joined their plan under automatic enrollment.

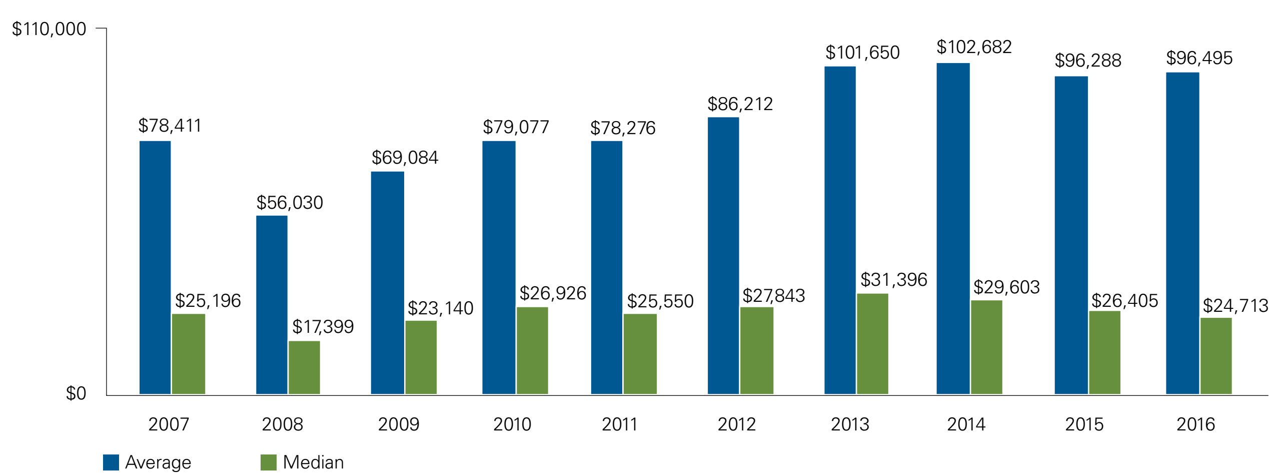
The wide divergence between the median and the average balance is due to a small number of very large accounts that significantly raises the average above the median **(Figure 44)**. One-third of participants had a 2016 account balance of less than $10,000, while one-quarter had balances in excess of $100,000.

Because of the skewed distribution of assets, average balances are indicative of participants at about the 75th percentile (i.e., about 75% of all participants have balances below, and 25% have balances above the average). Average balances are more indicative of the results experienced by longer-tenured, more affluent, or older participants. The median balance represents the typical participant: half of all participants have balances above the median, half have balances below.

Average account balances also vary somewhat by plan size, with smaller plans having higher balances than larger plans **(Figure 45)**. Automatic enrollment is one factor driving differences in average balances—larger plans have been much more likely to adopt automatic enrollment.

Figure 43. Account balances

Vanguard defined contribution plans



Source: Vanguard, 2017.

Figure 44. Distribution of account balances

Vanguard defined contribution plans

Percentage of accounts

Range of balance	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<$10,000	33%	39%	34%	31%	32%	31%	30%	31%	33%	34%
$10,000–$19,999	12	14	13	13	13	12	12	11	12	12
$20,000–$39,999	14	14	15	15	14	14	14	13	13	13
$40,000–$59,999	9	8	9	9	9	9	8	8	8	8
$60,000–$79,999	6	6	6	6	6	6	6	6	5	5
$80,000–$99,999	4	4	4	5	4	4	4	4	4	4
$100,000+	22	15	19	21	22	24	26	27	25	24

Source: Vanguard, 2017.

Figure 45. Account balances by plan size

Vanguard defined contribution plans

Number of participants

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Average										
<500	$92,696	$68,635	$86,550	$98,825	$100,806	$111,799	$133,126	$141,332	$136,610	$143,869
500–999	$73,622	$56,109	$68,230	$76,219	$76,679	$86,615	$101,835	$104,972	$99,203	$103,460
1,000–4,999	$72,811	$52,516	$66,210	$75,038	$76,613	$85,385	$99,389	$101,376	$98,101	$100,827
5,000+	$80,127	$56,331	$68,648	$79,178	$77,030	$84,285	$99,883	$100,070	$92,679	$81,786
All plans	$78,411	$56,030	$69,084	$79,077	$78,276	$86,212	$101,650	$102,682	$96,288	$96,495
Median										
<500	$27,712	$20,682	$27,957	$33,129	$33,225	$36,388	$41,195	$41,848	$37,792	$38,685
500–999	$26,371	$20,028	$25,491	$28,582	$28,345	$30,627	$34,348	$33,447	$29,147	$29,789
1,000–4,999	$24,254	$16,834	$22,824	$26,427	$23,217	$29,283	$32,603	$30,710	$28,425	$27,768
5,000+	$25,260	$17,102	$22,593	$26,401	$24,414	$26,453	$30,024	$28,197	$24,943	$22,850
All plans	$25,196	$17,399	$23,140	$26,926	$25,550	$27,843	$31,396	$29,603	$26,405	$24,713

Source: Vanguard, 2017.

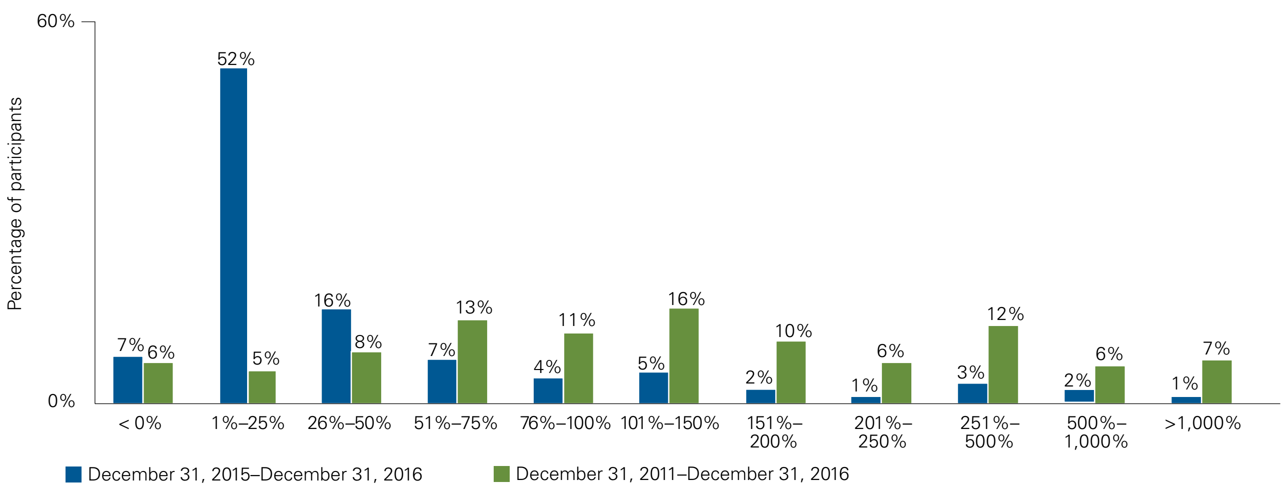
Change in account balances

The change in average and median account balances in 2016 is the result of evolution in the participant base and market performance. When we examine continuous participants—those with an account balance in both December 2015 and December 2016—the median account balance rose by 19% (Figure 46). More than 90% of these continuous participants saw their balances rise because of equity-oriented asset allocations and/or ongoing contributions. Among continuous participants with a balance in both December 2011 and December. 2016—the median account balance rose 121%, and 94% of continuous participants had a higher account balance in 2016 than in 2011.

Account balances are widely available on statements and websites, and are often cited as participants' principal tool for monitoring investment results. Because of ongoing contributions, account balances will appear to be less negatively impacted during falling markets. This "contribution effect" may mask the psychological impact of falling stock prices on participants.

Figure 46. Change in account balances, continuous participants

Vanguard defined contribution plan participants with a balance at both the beginning and end of the period



	December 31, 2015–December 31, 2016	December 31, 2011–December 31, 2016
Median change	19%	121%
Percentage of participants with positive changes	93	94

Source: Vanguard, 2017.

Account balances by participant demographics

Median and average account balances vary considerably by participant demographics (Figure 47). Among the factors influencing account balances are income, age, and job tenure. These three factors are intertwined. Not only do incomes, on average, tend to rise somewhat with age, making saving more affordable, but older participants generally save at higher rates. Also, the longer an employee's tenure with a firm, the more likely the employee is to earn a higher salary, participate in the plan, and contribute at higher levels. Longer-tenured participants also have higher balances because they have been contributing to their employer's plan for a longer period.

Gender also influences current balances. Sixty percent of Vanguard participants are male, and men have average and median balances that are about 50% higher than those of women. Gender is often a proxy for other factors, such as income and job tenure. Women in our sample tend to have lower incomes and shorter job tenure than men. However, as noted earlier in this report, women tend to save more than men at the same income level.

Figure 47. Account balances by participant demographics, 2016

Vanguard defined contribution plans

	All participants	
	Average	Median
All	**$96,495**	**$24,713**
Income		
<$30,000	$8,069	$1,131
$30,000–$49,999	$26,270	$7,541
$50,000–$74,999	$60,203	$22,591
$75,000–$99,999	$97,679	$44,140
$100,000+	$237,061	$113,495
Age		
<25	$4,154	$1,325
25–34	$22,256	$8,192
35–44	$61,631	$23,491
45–54	$116,699	$43,467
55–64	$178,963	$66,643
65+	$196,907	$60,724
Gender		
Male	$117,270	$31,371
Female	$76,143	$20,680
Job tenure (years)		
0–1	$11,235	$2,329
2–3	$25,087	$10,392
4–6	$46,492	$22,743
7–9	$79,514	$36,690
10+	$188,744	$91,317

Source: Vanguard, 2017.

A different picture emerges when account balances are compared based on income. When income is less than $100,000, women generally have average and median account balances higher than those of men (Figure 48). For example, female participants with income between $30,000 and $49,999 have average account balances that are 15% higher than their male counterparts, and median balances that are 30% higher.

Balances by industry group

There are significant variations in account balances by industry sector, which reflect a complex mixture of firm characteristics (influencing employer contributions) and workforce demographics (influencing participant savings rates). Participants employed in the agriculture, mining, and construction industry group have average and median account balances that are about two to three times higher than other participants (Figure 49). Participants employed in the education and health industry group have the lowest average and median account balances.

Figure 48. Account balances by income and gender, 2016

Vanguard defined contribution plans permitting employee-elective deferrals

Average	Female	Male	All
<$30,000	$7,456	$10,717	$8,069
$30,000–$49,999	$29,460	$25,700	$26,270
$50,000–$74,999	$65,545	$59,426	$60,203
$75,000–$99,999	$112,367	$96,649	$97,679
$100,000+	$229,391	$255,930	$237,061
Median			
<$30,000	$1,283	$1,106	$1,131
$30,000–$49,999	$9,286	$7,119	$7,541
$50,000–$74,999	$25,942	$22,349	$22,591
$75,000–$99,999	$51,562	$42,692	$44,140
$100,000+	$112,481	$120,084	$113,495

Source: Vanguard, 2017.

Figure 49. Balances by industry sector, 2016.

Vanguard defined contribution plans

	Average	Median
All	**$96,495**	**$24,713**
Agriculture, mining, and construction	$246,933	$77,572
Manufacturing	$104,472	$33,162
Finance, insurance, and real estate	$101,384	$31,411
Business, professional, and nonprofit	$78,805	$25,149
Media, entertainment, and leisure	$105,976	$24,546
Transportation, utilities, and communications	$87,835	$23,317
Wholesale and retail trade	$67,345	$15,665
Education and health	$56,525	$10,304

Source: Vanguard, 2017.

Managing participant accounts

Participant investment decisions are a critical determinant of long-term retirement savings growth.

Managing participant accounts

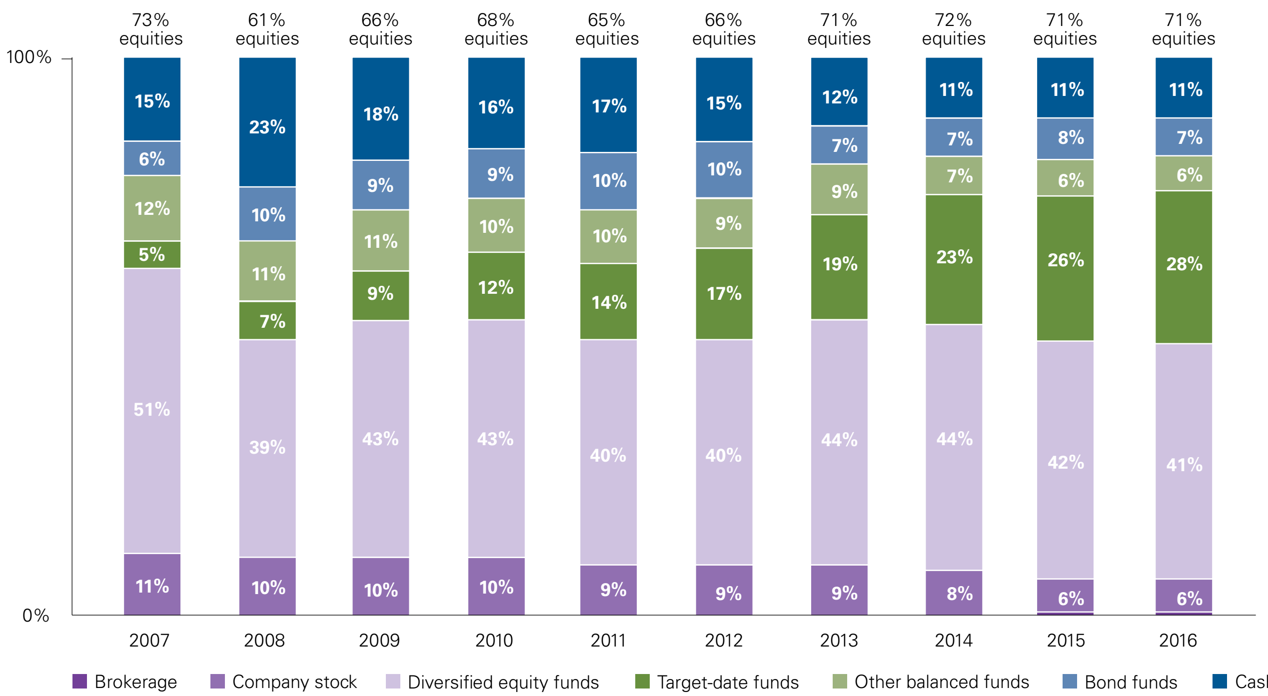
Participant investment decisions are a critical determinant of long-term retirement savings growth.

Asset and contribution allocations

The percentage of plan assets invested in equities stood at 71% in 2016 (Figure 50). The allocation to equities includes the equity component of balanced strategies. The overall equity allocation is up from 61% in 2008, a shift of 10 percentage points. This is due to the rise in equity markets from the 2008–2009 downturn as well as improved participant portfolio construction. Equity allocations have nearly returned to their pre-recession peak of 73%. In 2016, investments in balanced strategies reached 34%, including 28% in target-date funds and 6% in other balanced options. The growth of target-date funds in particular is dramatically reshaping investment patterns in DC plans, increasing age-appropriate

Figure 50. Plan asset allocation summary

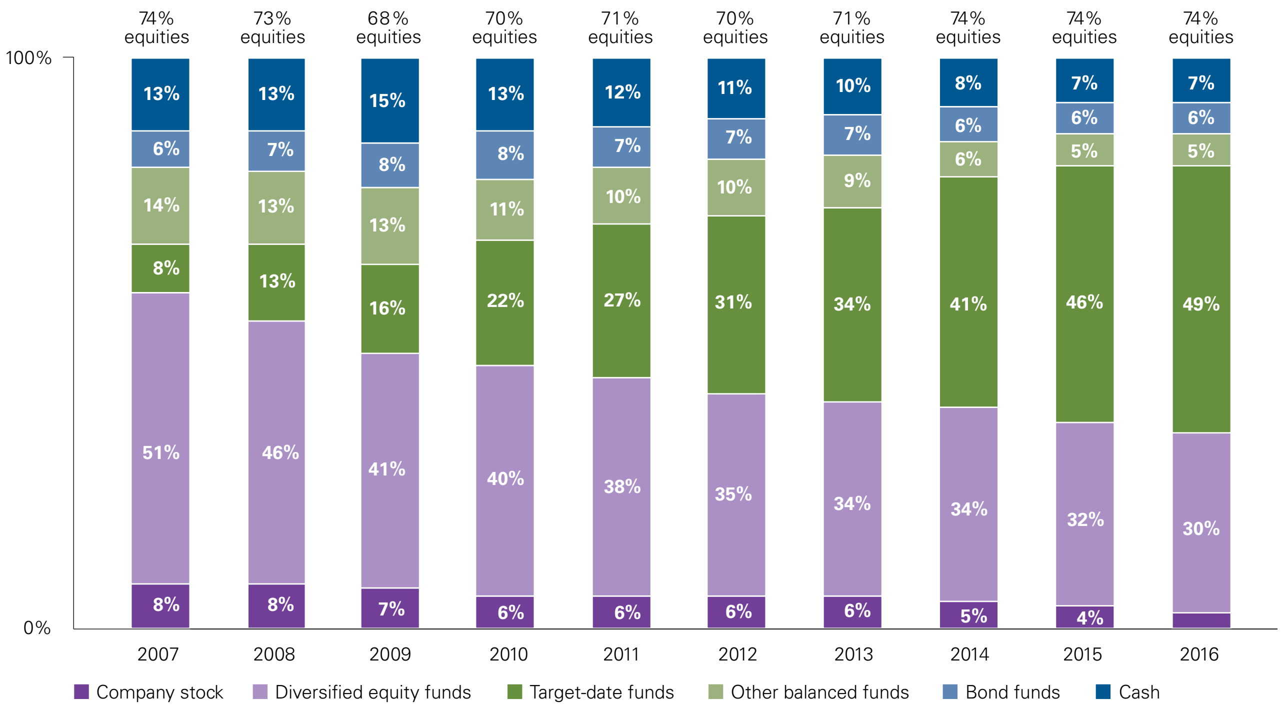
Vanguard defined contribution plans



Source: Vanguard, 2017.

Figure 51. Plan contribution allocation summary

Vanguard defined contribution plans



Source: Vanguard, 2017.

equity allocations and reducing extreme allocations. Three-quarters of plan contribution dollars were invested in equities during 2016 and 49% of plan contribution dollars were invested in target-date funds (Figure 51). Participant contribution allocations to equities have returned to their pre-recession peak of 74%.

Asset allocation by participant demographics

The average participant-weighted asset allocation to equities was 74% in 2016, and asset allocation decisions vary somewhat by participant demographics (Figure 52). In the past, higher-income participants tended to take on somewhat more equity market risk on average than lower-income participants. However, with the rising adoption of target-date funds, the differences are no longer discernible. In 2016, participants with household incomes of less than $30,000 had 73% of their average account balance allocated to equities; for participants with household incomes of more than $100,000, the figure was 74%.

Participants younger than 45 had the highest equity exposure, with nearly 90% of plan assets, at the median, invested in equities in 2016. Equity allocations were lowest for participants older than 65, many of whom are currently retired or who will soon retire. Participants older than 65 had a median equity allocation of 46%. The age-related variation in equity exposure has changed markedly due to the rising use of target-date funds (see page 62).

Figure 52. Asset allocation by participant demographics, 2016

Vanguard defined contribution plans

	Brokerage	Company stock	Diversified equity funds	Target-date funds	Other balanced funds	Bond funds	Cash	Average equity participant-weighted	Median equity participant-weighted
All asset-weighted	1%	6%	41%	28%	6%	7%	11%		
Average participant-weighted	<0.5%	3%	22%	58%	6%	4%	7%	74%	83%
Household income									
<$30,000	<0.5%	7%	35%	31%	6%	7%	14%	73%	83%
$30,000–$49,999	<0.5	6	37	32	6	7	12	74	83
$50,000–$74,999	<0.5	6	40	30	6	7	11	74	82
$75,000–$99,999	<0.5	6	42	27	7	7	11	74	82
$100,000+	1	5	45	24	7	8	10	74	82
Age									
<25	<0.5%	3%	13%	78%	3%	1%	2%	87%	90%
25–34	<0.5	4	25	61	4	3	3	86	90
35–44	<0.5	5	41	39	5	5	5	81	88
45–54	<0.5	6	47	28	6	6	7	72	76
55–64	1	7	40	23	7	9	13	60	65
65+	1	8	34	18	7	10	22	47	46
Gender									
Male	1%	7%	41%	27%	6%	7%	11%	74%	84%
Female	<0.5	5	40	31	7	7	10	73	82
Job tenure (years)									
0–1	<0.5%	2%	28%	55%	6%	4%	5%	80%	90%
2–3	<0.5	3	29	54	5	4	5	79	88
4–6	<0.5	4	32	49	5	5	5	77	87
7–9	<0.5	5	37	40	5	6	7	74	81
10+	1	7	43	22	6	8	13	67	73
Account balance									
<$10,000	<0.5%	3%	9%	76%	6%	2%	4%	77%	88%
$10,000–$24,999	<0.5	3	17	64	6	3	7	71	80
$25,000–$49,999	<0.5	4	23	55	6	4	8	71	79
$50,000–$99,999	<0.5	4	31	45	6	5	9	71	79
$100,000–$149,999	<0.5	4	37	37	6	6	10	74	85
$150,000–$199,999	<0.5	4	40	32	6	7	11	73	81
$200,000–$249,999	<0.5	5	42	29	6	7	11	72	80
$250,000+	1	8	46	19	6	8	12	70	77

Source: Vanguard, 2017.

Asset allocation by plan size and industry sector

The average allocation to equities does not vary significantly by plan size (**Figure 53**). However among larger plans, there is a substitution of company stock holdings for diversified equity funds and a modestly larger allocation to equities overall. Large plans are more likely than small plans to offer company stock and are more likely to make employer-matching or other contributions in stock. As a result, certain large firms have significantly higher exposure to company stock as an asset class.

Company stock accounted for 6% of assets for all DC plans at Vanguard in 2016. Among large plans, 9% of assets were allocated to company stock at year-end 2016, compared with a 1%-or-less allocation among small plans. These averages include plans offering—and plans not offering—company stock. The averages for those plans actively offering company stock to participants were higher (see page 76).

Balanced funds, including target-date funds, accounted for 34% of assets for all DC plans at Vanguard in 2016. Among smaller plans, 34% of assets were allocated to balanced funds at year-end 2016, compared with 33% among large plans.

Overall asset allocations also vary by industry group (**Figure 54**). Participants in the business, professional, and nonprofit industry group have the most conservative allocations, while participants in the media, entertainment, and leisure industry group have the most aggressive allocations. Participants in the agriculture, mining, and construction industry group also have more aggressive allocations, including the highest allocations to company stock.

Figure 53. Asset allocation by plan size, 2016

Vanguard defined contribution plans

	Plan participants				
	<500	500–999	1,000–4,999	5,000+	All plans
Total equity asset-weighted	**70%**	**70%**	**69%**	**72%**	**71%**
Brokerage	2	1	1	<0.5	1
Company stock	<0.5	1	2	9	6
Diversified equity	46	43	42	40	41
Target-date funds	24	30	30	28	28
Other balanced funds	10	8	7	5	6
Bond funds	8	7	7	7	7
Cash	10	10	11	11	11

Source: Vanguard, 2017.

Figure 54. Asset allocation by industry sector, 2016

Vanguard defined contribution plans

	Brokerage	Company stock	Diversified equity funds	Target-date funds	Other balanced funds	Bond funds	Cash	Average equity participant-weighted	Median equity participant-weighted
All asset-weighted	**1%**	**6%**	**41%**	**28%**	**6%**	**7%**	**11%**		
Average participant-weighted	**<0.5%**	**3%**	**22%**	**58%**	**6%**	**4%**	**7%**	**74%**	**83%**
Industry group									
Media, entertainment, and leisure	1%	3%	39%	36%	9%	6%	6%	78%	88%
Agriculture, mining, and construction	1	28	32	18	2	7	12	76	87
Transportation, utilities, and communications	<0.5	7	44	22	8	7	12	76	86
Finance, insurance, and real estate	<0.5	2	43	30	5	9	11	74	83
Wholesale and retail trade	<0.5	1	38	38	4	6	13	73	83
Manufacturing	<0.5	5	40	31	5	7	12	74	82
Education and health	1	<0.5	42	32	8	8	9	73	82
Business, professional, and nonprofit	1	3	45	26	8	8	9	71	80

Source: Vanguard, 2017.

Plan investment options

Participant investment decisions in DC plans occur within the context of a set or a menu of choices offered by the employer.

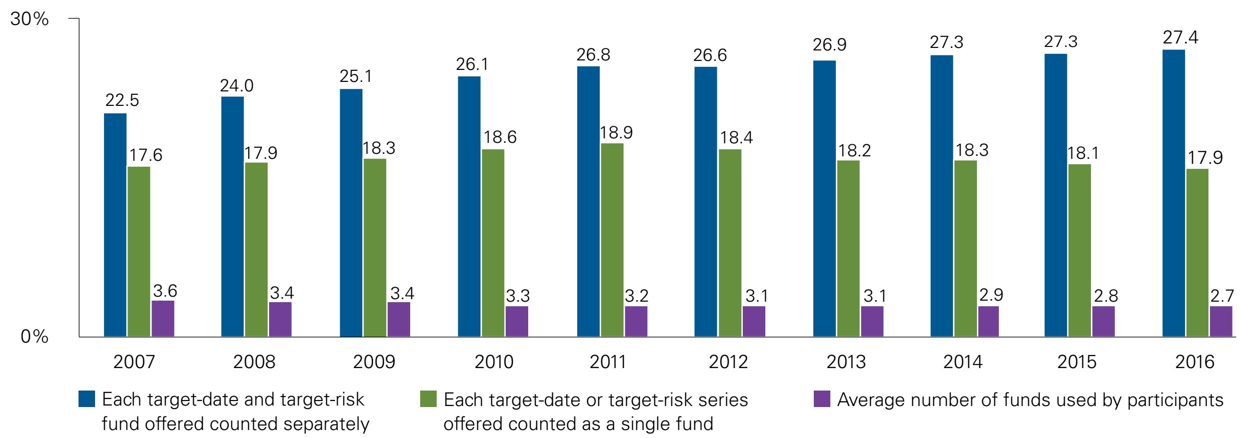
Number of options offered

The average Vanguard plan offered 27.4 investment options in 2016, essentially unchanged from 27.3 investment options in 2015 but up from 22.5 options in 2007—an increase of about one-fifth (**Figure 55**). The growth in the number of funds offered has been influenced by the increased use of "all-in-one" funds such as target-date funds, which are offered as a series of options. When each distinct target-date (or target-risk) fund is counted as a single offering, the average number of investment options for 2016 is 27.4. But when an entire series of such funds is counted as a single offering, the average number of investment options offered falls to 17.9. By this measure, sponsors have added one series of target-date (or target-risk) funds and one or perhaps two other investment options since 2007—not the five additional options implied by the aggregate number.

Despite the modest expansion of funds offered—the number of funds used by participants has declined. This is directly attributable to the growth of target-date funds.

Figure 55. Average number of investment options offered and used

Vanguard defined contribution plans

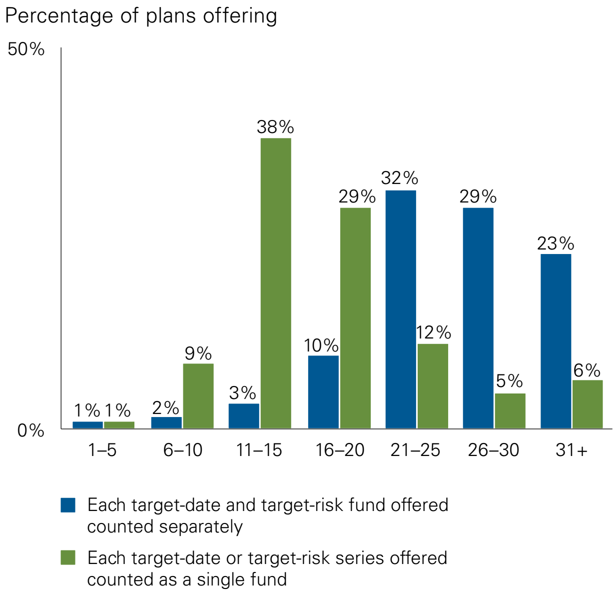


Source: Vanguard, 2017.

Counting a target-date or target-risk series as a single fund offering, the median plan sponsor offered 16 investment options in 2016. In 2016, 11% of plans offered more than 25 distinct investment options, while 10% of plans offered 10 or fewer (Figure 56).

Figure 56. Number of options offered, 2016

Vanguard defined contribution plans



Source: Vanguard, 2017.

Types of options offered

Virtually all Vanguard DC plans offer an array of investment options covering four major investment categories: equities, bonds, balanced (including target-date and target-risk strategies), and money market or stable value options (Figure 57). Given most sponsors' desire to promote equity-oriented portfolios for retirement, diversified equity funds continued to be the most popular type of fund offered. Equity offerings typically included both indexed and actively managed U.S. stock funds, including large-capitalization and mid- or small- capitalization stocks, as well as one or more international funds.

Virtually all plans offered international equity funds, but only 32% offered separate emerging markets funds. Many of the broader international funds include emerging markets exposure already, as do target-date and some balanced strategies. Thirty-five percent of plans offered sector funds, such as technology or health care funds. One in 6 plans offered a self-directed brokerage feature. Meanwhile, plan sponsor interest in target-date funds continued to grow. At year-end 2016, 92% of plans offered target-date funds.

The types of investment options offered do not vary substantially by plan size. However, large plans are much more likely than small plans to offer company stock, self-directed brokerage accounts, and managed account programs. In addition, larger plans have been quicker than smaller plans to add target-date and inflation-protected securities funds.

Tiering

Tiering is a clear, understandable, and effective way to present plan investment choices to participants. Investment options are presented in categories or tiers. Typically the tiers are: all-in-one options, such as target-date or risk-based balanced funds; an index core; and, supplemental investment options. Most Vanguard plan sponsors tier their investment lineup.

Figure 57. Type of investment options offered, 2016

Vanguard defined contribution plans

Percentage of plans offering

		Number of participants			
	All	<500	500–999	1,000–4,999	5,000+
Cash	**99%**	**98%**	**99%**	**100%**	**99%**
Money market	67	69	64	62	65
Stable value/Investment contract	63	58	64	69	73
Bond funds	**98%**	**97%**	**99%**	**>99.5%**	**99%**
Active	72	67	76	79	74
Index	89	88	90	88	94
Inflation-protected securities	33	30	33	35	39
High-yield	19	19	19	18	19
International	19	16	24	23	16
Balanced funds	**99%**	**99%**	**99%**	**>99.5%**	**100%**
Traditional balanced	70	74	68	63	65
Target-risk	17	22	9	10	11
Target-date	92	86	97	98	99
Equity funds	**99%**	**99%**	**99%**	**>99.5%**	**100%**
Domestic equity funds	**99%**	**99%**	**99%**	**>99.5%**	**100%**
Active domestic	94	94	93	95	93
Index domestic	99	98	99	>99.5	99
Large-cap value	90	92	87	91	84
Large-cap growth	90	91	88	92	84
Large-cap blend	97	97	98	99	94
Mid-cap	89	88	92	92	83
Small-cap	88	88	90	90	80
Socially responsible	8	7	6	9	17
International equity funds	**97%**	**96%**	**98%**	**99%**	**98%**
Active international	85	84	86	87	86
Index international	66	63	69	71	73
Emerging markets	32	31	34	34	33
Sector funds	**35%**	**38%**	**32%**	**34%**	**25%**
REIT	31	32	30	31	25
Health care	11	13	10	8	7
Energy	7	8	5	6	6
Precious metals	4	4	3	3	4
Technology	2	2	3	2	2
Utilities	1	1	2	1	0
Natural resources	1	1	2	1	2
Financials	1	<0.5	2	<0.5	1
Communications	<0.5	<0.5	1	0	1
Commodities	<0.5	<0.5	1	<0.5	1
Consumer	<0.5	<0.5	<0.5	<0.5	0
Company stock	**9%**	**2%**	**7%**	**16%**	**35%**
Self-directed brokerage	**17%**	**14%**	**17%**	**18%**	**30%**
Managed account program	**27%**	**11%**	**30%**	**51%**	**56%**

Source: Vanguard, 2017.

All index

Money market, stable value, and company stock funds, by definition are not indexed funds Excluding these nonindexable options, only 2% of all Vanguard plans offer an all index menu.

Index core

A newer development in investment menu design is offering a passive (or index) "core." A passive core is a comprehensive set of low-cost index options that span the global capital markets. At a minimum, a passive core in our definition consists of four options covering U.S. equities, non-U.S. equities, U.S. taxable bonds, and cash. A passive core of these four options offers participants broad diversification, varying levels of risk exposure, and very low investment costs.

In 2016, nearly 6 in 10 Vanguard plans offered at least four options within a passive core (Figure 58). Because larger plans have been quicker to offer this approach, 7 in 10 Vanguard participants were offered a passive core in 2016. In addition, many of these plans also offered a passive target-date fund to further simplify participant portfolio construction. Half of plans offered both a passive core and passive target-date funds, and two-thirds of participants had access to these fund lineups. In 2007, one-third of all plans offered a passive core and 2 in 10 offered both a passive core and passive target-date funds (Figure 59). In 2007, about 36% of participants were offered a passive core and one-quarter were offered both a passive core and passive target-date funds (Figure 60).

Figure 58. Index core offered, 2016

Vanguard defined contribution plans

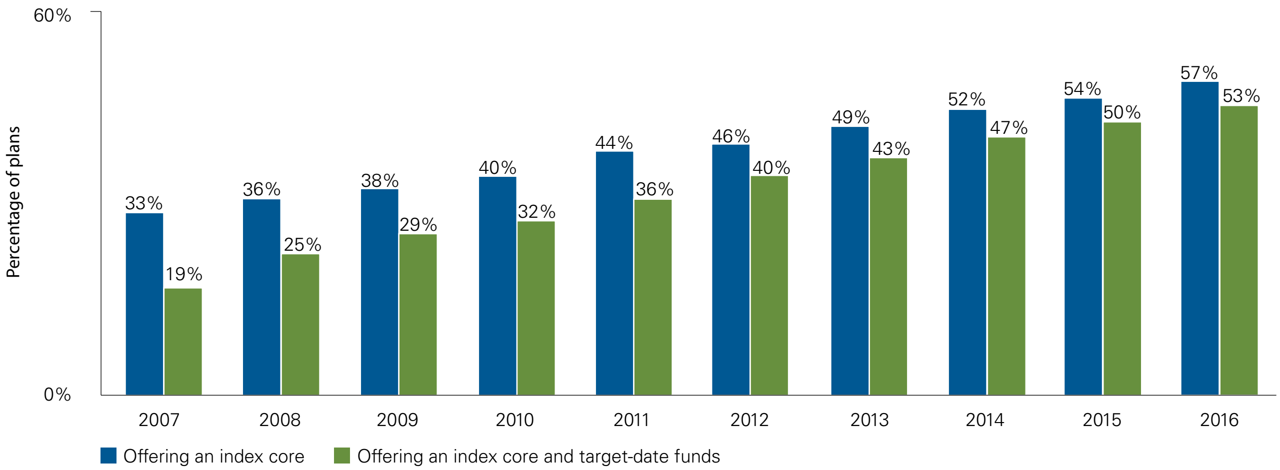
		Number of participants			
	All	<500	500–999	1,000–4,999	5,000+
Percentage of plans offering an index core	57%	52%	61%	61%	71%
Percentage of plans offering an index core and target-date funds	53	46	59	59	69
Percentage of participants offered an index core	70	55	61	61	74
Percentage of participants offered an index core and target-date funds	67	51	58	59	71

An index core includes broadly diversified index funds for U.S. stocks, U.S. bonds, and international stocks. At a minimum, the definition includes index funds for large-cap U.S. stocks, intermediate or long-term bonds, and developed markets.

Source: Vanguard, 2017.

Figure 59.	Index core offered trend, plans

Vanguard defined contribution plans

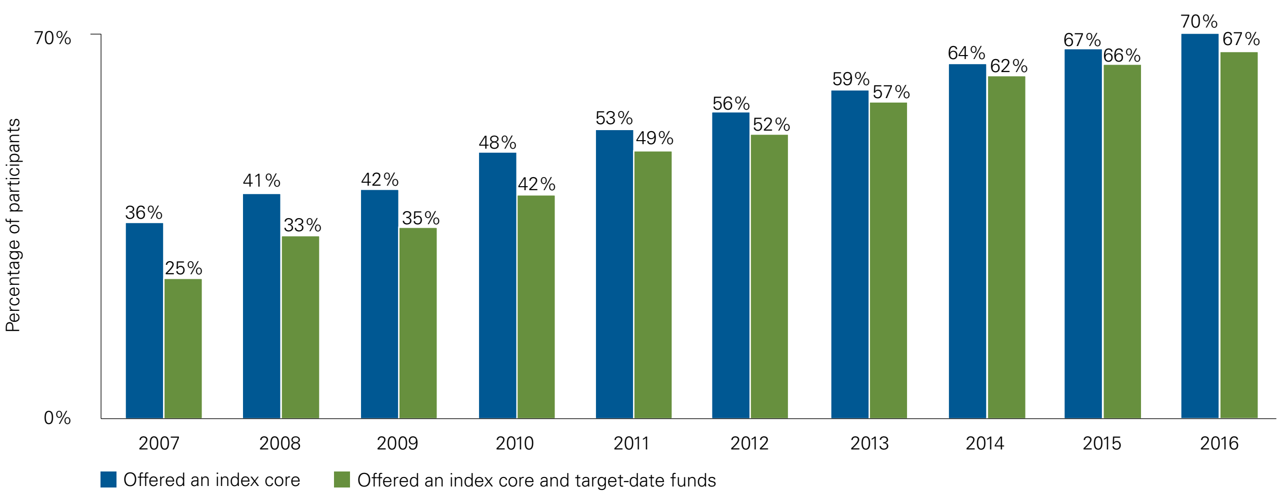


An index core includes broadly diversified index funds for U.S. stocks, U.S. bonds, and international stocks. At a minimum, the definition includes index funds for large-cap U.S. stocks, intermediate or long-term bonds, and developed markets.

Source: Vanguard, 2017.

Figure 60.	Index core offered trend, participants

Vanguard defined contribution plans



An index core includes broadly diversified index funds for U.S. stocks, U.S. bonds, and international stocks. At a minimum, the definition includes index funds for large-cap U.S. stocks, intermediate or long-term bonds, and developed markets.

Source: Vanguard, 2017.

Default funds

Increasingly, participants are being directed into default investments selected by the plan sponsor, rather than making active investment choices on their own. Default investing is rising in importance in response to concerns about the lack of investment knowledge among participants, as well as the growing use of automatic enrollment. In response to these developments, the U.S. Department of Labor (DOL), acting under the PPA, authorized three types of default investments as eligible for special fiduciary protection. These options, known as QDIAs, include target-date funds, other balanced funds, and managed account advisory services.

Nearly all Vanguard plans have designated a default fund and 9 in 10 had selected a target-date or balanced fund option as the default option in 2016 (**Figure 61**). In 2007, 40% of plan sponsors had designated a money market or stable value fund as the default option (**Figure 62**).

Eighty percent of plans in 2016 had specifically designated a QDIA under the DOL's regulations. Typically, these were plans with automatic enrollment or employer contributions other than a match. Among plans choosing a QDIA, 96% of designated QDIAs were target-date funds and 4% were balanced funds. Less than 1% of plans selected a managed account advisory service as a QDIA.

Figure 61. Default fund designations, 2016

Vanguard defined contribution plans

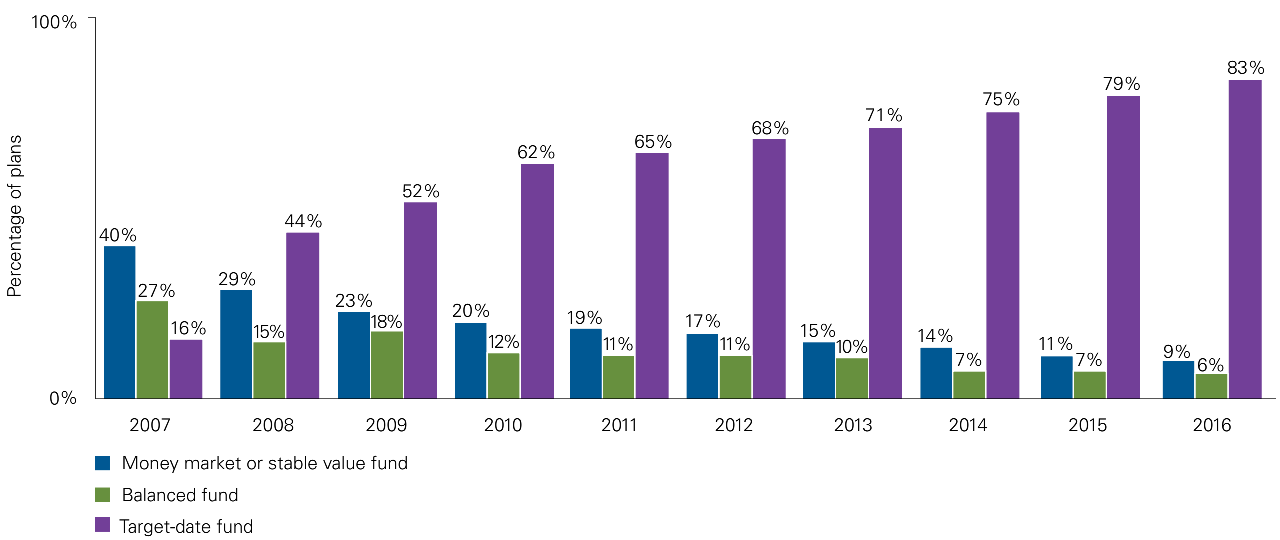
	QDIA plans	Non-QDIA plans	All plans
Among all plans			
Target-date fund	77%	6%	83%
Balanced fund	3	3	6
Money market or stable value	0	9	9
Total plans designating a default	**80%**	**18%**	**98%**

Among plans designating a QDIA	
Target-date fund	96%
Balanced fund	4
Total plans designating a QDIA	**100%**

Source: Vanguard, 2017.

Figure 62. Default fund designation trend

Vanguard defined contribution plans



Source: Vanguard, 2017.

Number of options used

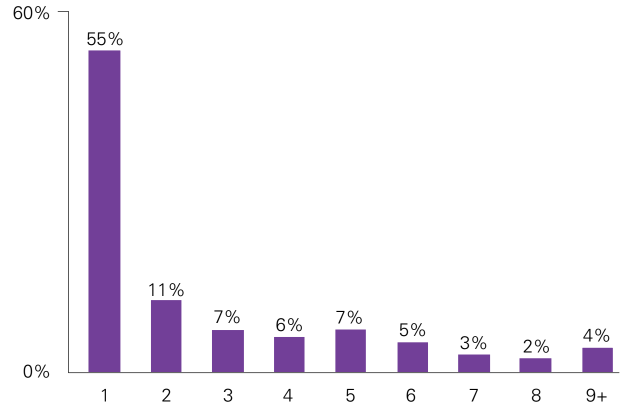
Although sponsors tend to offer a large menu of investment choices, more than half of participants used only one fund (Figure 63). The average Vanguard participant used 2.7 options in 2016 and the median participant used just 1.0 option—fewer than the 3.6 options used, on average, in 2007, and the median participant used 3.0 in 2007.

One reason for this change is the growing number of single target-date fund investors. In 2016, 55% of participants held a single-fund option in their account (Figure 64). Eighty-three percent of these participants were invested in a single target-date fund and 6% were invested in either traditional balanced funds or target-risk funds. Since 2007, the percentage of single-fund investors holding cash investments has declined from 33% to 6% due to the growth of automatic enrollment, the availability of target-date funds, and a shift in default fund designations by employers.

Figure 63. Number of options used, 2016

Vanguard defined contribution plans

Percentage of participants using

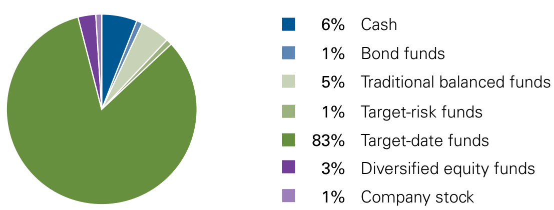


Source: Vanguard, 2017.

Figure 64. Single-fund holders, 2016

Vanguard defined contribution plans

Percentage of single-fund participants using



Vanguard defined contribution plans

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Percentage of participants holding a single fund	30%	34%	35%	37%	41%	43%	44%	48%	51%	55%
Percentage of single-fund participants using										
Cash	33%	27%	23%	18%	16%	14%	11%	8%	7%	6%
Bond funds	2	2	2	1	1	1	1	1	1	1
Traditional balanced funds	8	6	6	5	5	4	3	3	3	5
Target-risk funds	16	14	13	11	10	9	10	2	1	1
Target-date funds	25	39	45	53	59	64	69	81	84	83
Diversified equity funds	12	9	8	7	5	4	4	4	3	3
Company stock	4	3	3	5	4	4	2	1	1	1

Source: Vanguard, 2017.

Types of options used

Among the options offered by DC plans, which do participants actually use? In 2016, a balanced fund (including target-date and other balanced funds) was the most common participant holding (81% of participants), followed by a diversified domestic equity fund (35% of participants) (Figure 65). Among the balanced options held, target-date funds were overwhelmingly more likely to be held (74% of participants offered) than traditional balanced funds (20% of participants offered) or target-risk funds (5% of participants offered). Before 2008, participants were most likely to hold a diversified domestic equity fund. This trend shift was first observed in 2009.

Nearly all participants were offered a U.S. equity index fund, yet only 3 in 10 used that option. However, participants holding balanced strategies (whether traditional, target-date, or target-risk) are often holding substantial equity index exposure. When participants holding index investments through all balanced options are factored in, 8 in 10 Vanguard participants hold some U.S. equity index exposure.

Only 1 in 5 participants chose to hold a bond fund and about 1 in 5 also chose a money market or stable value cash investment.

Most Vanguard DC participants were offered a stand-alone international equity fund, but only about one-fifth of participants chose to use one. Emerging markets funds were offered and used even less frequently; 3 in 10 participants had access to them and only 7% of those chose to use one. Increasingly, international equity exposure is occurring through packaged investment programs, such as target-date funds.

Sector funds were offered to one-quarter of participants in 2016 and were also used infrequently; only 10% of participants who were offered these funds used them.

Three in 10 Vanguard participants were offered a self-directed brokerage feature. Self-directed brokerage accounts allow participants to choose investments from thousands of individual stocks, bonds, and mutual funds. In plans offering a self-directed brokerage feature, only 1% of these participants used the feature in 2016. In these plans, about 2% of plan assets were invested in the self-directed brokerage feature in 2016.

Figure 65. Type of investment options offered and used, 2016

Vanguard defined contribution plans

	Percentage of plans offering	Percentage of participants offered	Percentage of participants offered using	Percentage of all participants using
Cash	99%	>99.5%	19%	19%
Money market	67	64	12	8
Stable value/Investment contract	63	72	17	12
Bond funds	98%	99%	20%	20%
Active	72	76	10	8
Index	89	93	16	14
Inflation-protected securities	33	38	4	1
High-yield	19	15	5	1
International	19	15	2	<0.5
Balanced funds	99%	>99.5%	81%	81%
Traditional balanced	70	66	20	13
Target-risk	17	16	5	1
Target-date	92	97	74	72
Equity funds	99%	>99.5%	36%	36%
Domestic equity funds	99%	>99.5%	35%	35%
Active domestic	94	94	23	22
Index domestic	99	99	28	28
Large-cap value	90	89	13	12
Large-cap growth	90	89	17	15
Large-cap blend	97	96	24	23
Mid-cap	89	81	17	14
Small-cap	88	81	13	11
Socially responsible	8	18	3	1
International equity funds	97%	98%	21%	20%
Active international	85	87	15	13
Index international	66	68	13	9
Emerging markets	32	28	7	2
Sector funds	35%	24%	10%	2%
REIT	31	23	7	2
Health care	11	7	8	1
Energy	7	6	6	<0.5
Precious metals	4	3	2	<0.5
Technology	2	3	8	<0.5
Utilities	1	<0.5	4	<0.5
Natural resources	1	2	3	<0.5
Financials	1	2	3	<0.5
Communications	<0.5	2	6	<0.5
Commodities	<0.5	<0.5	5	<0.5
Consumer	<0.5	<0.5	2	<0.5
Company stock	9%	24%	48%	12%
Self-directed brokerage	17%	29%	1%	<0.5%
Managed account program	27%	53%	7%	4%

Source: Vanguard, 2017.

Professionally managed allocations

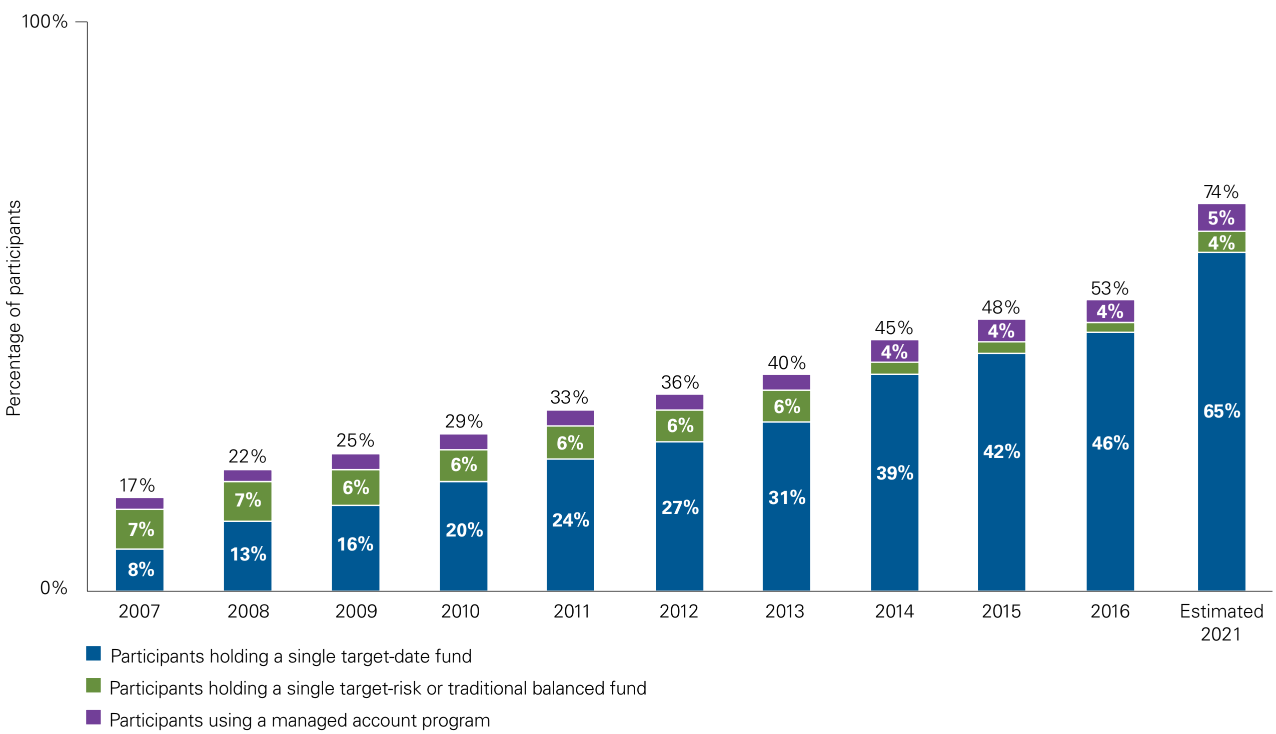
The most notable effect of plan investment menus on participant choices is the expanded offering and use of professionally managed allocations. Participants with professionally managed allocations have their entire account balance invested solely in a single target-date, target-risk, or traditional balanced fund, or a managed account advisory service.

In 2016, more than half of Vanguard participants were invested in a professionally managed allocation (Figure 66). Driving this development is the growing use of target-date funds. A total of 46% of participants were invested in a single target-date fund in 2016. Among new plan entrants (those entering the plan for the first time), 81% of participants were invested in a single target-date fund (Figure 67). Due to the growing use of the target-date option, we anticipate that three-quarters of all participants will be solely invested in a professionally managed option by 2021. These professionally managed investment options signal a shift in responsibility for investment decision-making away from the participant and toward employer-selected investment and advice programs.

The users of the three types of professionally managed allocation strategies are quite distinct from nonusers. The three types of managed allocation investors are also quite different from one another (Figure 68). Participants who construct their own portfolios tend to be older, male, and longer-tenured with higher average and median balances. Both single TDF and balanced fund investors are younger and shorter-tenured, with lower account balances. Single TDF investors are more likely to be in an automatic enrollment plan and to have been defaulted into the fund. In contrast, managed account investors are older, longer-tenured, and have higher balances. Finally, some plan sponsors have opted to reenroll participants to the plan's QDIA. This most often occurs when changing providers. Two percent of single TDF investors were reenrolled.

Figure 66. Participants with professionally managed allocations

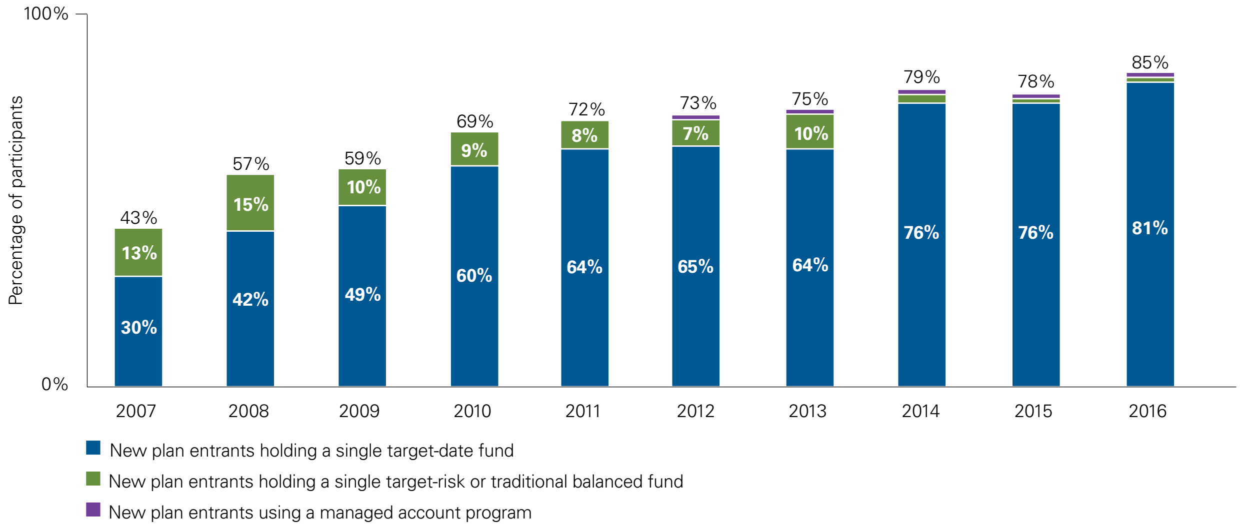
Vanguard defined contribution plans



Source: Vanguard, 2017.

Figure 67. Participants with professionally managed allocations, new plan entrants during the year

Vanguard defined contribution plans



Source: Vanguard, 2017.

Figure 68. Demographic characteristics of participants with professionally managed allocations, 2016

Vanguard defined contribution plans

	All	All other participants	Single target-date fund	Single balanced fund	Managed account
Percentage of participants		47%	46%	3%	4%
Percentage male	58%	61%	54%	72%	60%
Median age	45	50	39	49	51
Median tenure	6	10	3	3	12
Average account balance	$96,495	$161,602	$31,030	$35,644	$144,863
Median account balance	$24,713	$68,186	$7,922	$9,216	$75,467
Percentage web-registered	70%	83%	60%	29%	91%
Percentage defaulted under automatic enrollment	22%		48%	3%	1%
Percentage defaulted under reenrollment	1%		2%	<0.5%	

Source: Vanguard, 2017.

Target-date funds

Target-date funds base portfolio allocations on an expected retirement date; allocations grow more conservative as the participant approaches the fund's target year. Target-date fund use has grown from 6 in 10 plans in 2007 to 9 in 10 plans in 2016 (Figure 69). At year-end 2016, nearly all participants were in plans offering target-date funds. Seven in 10 of all participants had all or part of their account invested in target-date funds in 2016. Nearly half of all contribution dollars were directed to target-date funds in 2016.

Among plans offering the strategy, target-date options accounted for 29% of plan assets in 2016 (Figure 70). In these plans, half of all contributions in 2016 were directed to target-date funds.

Target-date funds are replacing target-risk funds, which maintain a static risk allocation (Figure 71). Since 2007, the fraction of plans offering target-risk funds as an investment option declined from 37% of plans to 17% of plans. However, 13% of plans maintain both target-risk and target-date funds, although for some of these plans, new contributions into the target-risk funds may be restricted.

Figure 69. Use of target-date funds

Vanguard defined contribution plans

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Percentage of all plans offering target-date funds	58%	68%	75%	79%	82%	84%	86%	88%	90%	92%
Percentage of recordkeeping assets in target-date funds	5	7	9	12	14	17	19	23	26	28
Percentage of all contributions directed to target-date funds	8	13	16	22	27	31	34	41	46	49
Percentage of all participants offered target-date funds	67	76	81	86	87	88	90	97	98	97
Percentage of all participants using target-date funds	18	28	34	42	47	51	55	64	69	72

Source: Vanguard, 2017.

Note: Investments in target-date funds are subject to the risks of their underlying funds. The year in the fund name refers to the approximate year (the target date) when an investor in the fund would retire and leave the workforce. The fund will gradually shift its emphasis from more aggressive investments to more conservative ones based on its target date. An investment in target-date funds is not guaranteed at any time, including on or after the target date.

Figure 70. Plan use of target-date funds

Vanguard defined contribution plans offering target-date funds

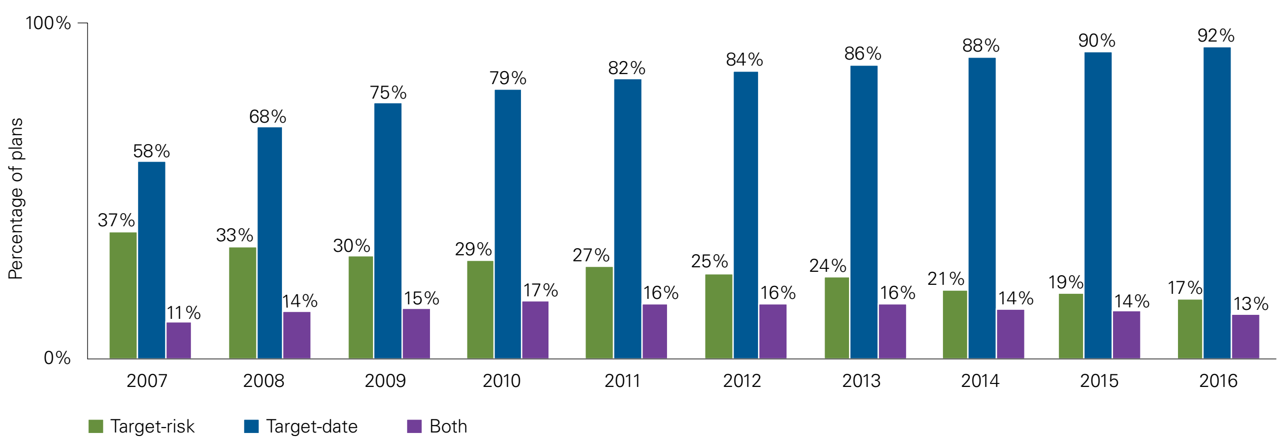
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Percentage of plan assets invested in target-date funds	7%	9%	12%	15%	17%	19%	20%	24%	26%	29%
Percentage of plan contributions invested in target-date funds	12%	17%	21%	26%	31%	35%	38%	42%	47%	50%
Distribution of percentage of plan assets in target-date funds										
<10%	63%	55%	48%	38%	31%	25%	21%	16%	13%	11%
10%–19%	20	25	27	32	34	34	31	28	26	22
20%–29%	8	10	11	14	17	20	23	25	25	25
30%–39%	3	3	5	6	7	8	10	11	13	15
40%–49%	2	2	3	3	4	4	5	7	8	9
50%+	4	5	6	7	7	9	10	13	15	18
Distribution of percentage of plan contributions to target-date funds										
<10%	41%	27%	23%	17%	13%	9%	7%	6%	4%	4%
10%–19%	29	32	29	25	20	17	14	10	8	7
20%–29%	14	19	23	25	25	23	21	17	14	10
30%–39%	6	10	11	16	19	21	22	22	18	17
40%–49%	4	5	5	7	10	13	16	17	21	20
50%+	6	7	9	10	13	17	20	28	35	42

Source: Vanguard, 2017.

Figure 71. Trend in plan adoption of target-date and target-risk funds

Vanguard defined contribution plans

Percentage of plans offering



Source: Vanguard, 2017.

Participant use of target-date funds

Among participants using target-date funds, half of account balances were invested in these funds (Figure 72). These target-date participants directed 78% of their 2016 total contributions to target-date funds. Participants invest in target-date funds in one of two ways. "Pure" investors hold a single target-date fund. They accounted for 65% of all target-date investors in 2016. The remaining target-date investors are "mixed" investors. They hold a target-date fund in combination with other investments (or, less commonly, multiple target-date funds and/or other options).

Pure target-date investors are more likely to be younger, lower-wage, shorter-tenured participants with lower 401(k) account balances than other investors. Meanwhile, mixed investors appear very much like non-target-date investors in terms of their demographic and portfolio characteristics. Sixty-three percent of single target-date fund investors were younger than 45, compared with only 44% of mixed investors (Figure 73). More than two-thirds of plan participants younger than 35 hold a single target-date fund.

Figure 72. Participant use of target-date funds

Vanguard defined contribution plan participants using target-date funds

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Percentage of all participants offered target-date funds	67%	76%	81%	86%	87%	88%	90%	97%	98%	97%
Percentage of participants using target-date funds when offered	27%	37%	42%	48%	54%	58%	61%	66%	70%	74%
Percentage of participant account balances in target-date funds	38%	37%	38%	41%	43%	46%	48%	50%	51%	53%
Percentage of total participant and employer contributions in target-date funds	52%	57%	63%	67%	71%	72%	74%	75%	76%	78%
Distribution of percentage of participant assets in target-date funds										
1%–24%	28%	26%	26%	24%	21%	19%	17%	15%	14%	13%
25%–49%	13	12	12	11	10	10	10	9	9	8
50%–74%	8	7	8	8	8	8	8	7	7	6
75%–99%	7	6	7	8	8	7	7	7	7	7
100%	44	49	47	49	53	56	58	62	63	66
Distribution of percentage of total participant and employer contributions in target-date funds										
1%–24%	24%	19%	16%	14%	11%	11%	9%	9%	8%	8%
25%–49%	14	13	11	11	9	9	8	8	8	7
50%–74%	7	7	7	6	7	7	7	6	6	4
75%–99%	4	5	4	5	4	4	5	8	5	5
100%	51	56	62	64	69	69	71	69	73	76
Percentage of participants owning										
One target-date fund only	43%	46%	46%	48%	52%	54%	56%	60%	62%	65%
One target-date fund plus other funds	48	46	46	44	41	38	36	33	31	28
Two or more target-date funds only	1	2	2	2	1	2	2	2	2	2
Two or more target-date funds plus other funds	8	6	6	6	6	6	6	5	5	5

Source: Vanguard, 2017.

Figure 73. Participant use of target-date funds by age

Vanguard defined contribution plan participants

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Distribution of pure target-date fund holders by age										
<25	11%	11%	9%	8%	8%	7%	7%	6%	6%	7%
25–34	30	31	31	31	32	32	32	31	31	31
35–44	26	25	26	26	26	26	26	26	26	25
45–54	21	21	21	22	21	21	21	21	21	20
55–64	10	10	11	11	11	12	12	13	13	14
65+	2	2	2	2	2	2	2	2	3	3
Distribution of mixed target-date fund holders by age										
<25	3%	3%	2%	2%	1%	2%	2%	2%	2%	2%
25–34	24	22	21	20	19	18	18	17	17	17
35–44	28	28	27	27	27	26	26	26	25	25
45–54	28	29	30	30	30	30	29	29	28	28
55–64	15	16	17	18	20	20	21	22	23	23
65+	2	2	3	3	3	4	4	4	5	5
Percentage of all participants holding a single target-date fund by age										
<25	27%	42%	50%	62%	69%	69%	71%	76%	77%	82%
25–34	12	21	25	33	40	46	51	60	63	67
35–44	7	12	15	20	24	28	31	41	45	49
45–54	5	9	11	15	18	21	23	31	34	38
55–64	5	7	9	12	14	16	19	25	28	31
65+	3	6	7	9	11	13	15	20	23	25
Percentage of all participants holding target-date funds with other options by age										
<25	11%	14%	14%	14%	12%	14%	14%	14%	15%	11%
25–34	13	18	20	23	22	22	22	22	22	20
35–44	11	16	19	23	24	24	25	27	27	27
45–54	10	15	19	22	24	25	26	28	29	28
55–64	9	14	17	21	22	24	25	28	29	28
65+	5	10	12	15	17	18	20	22	24	24

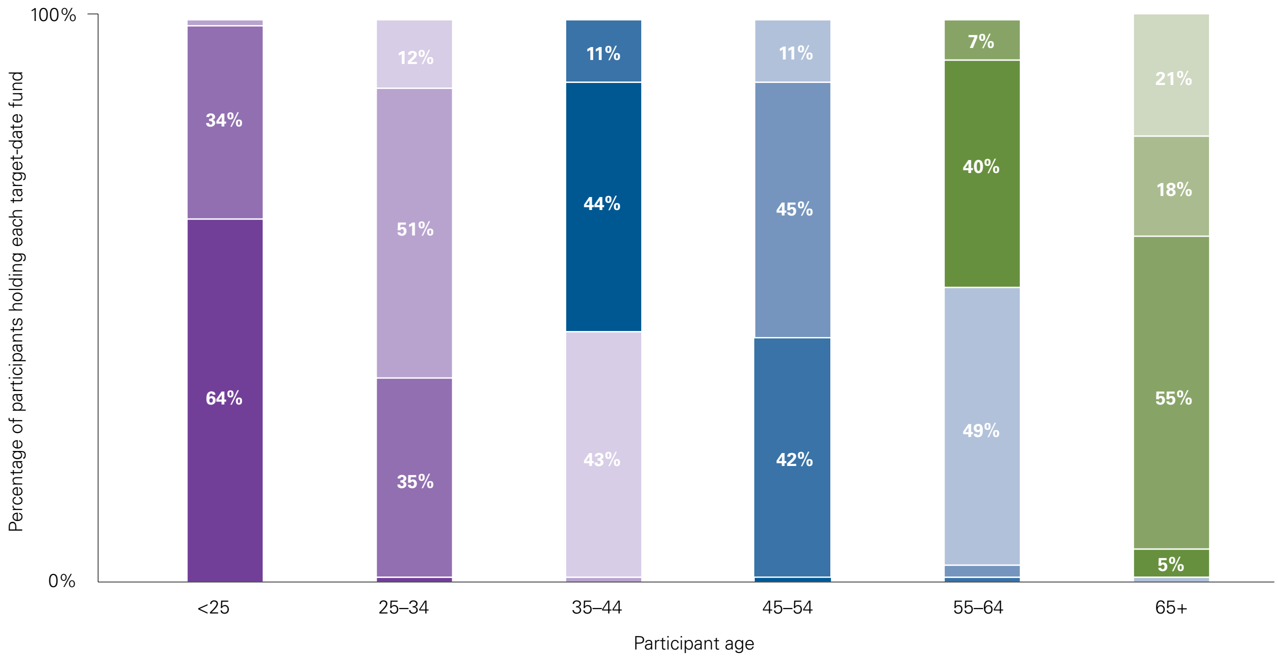
Source: Vanguard, 2017.

Half of all mixed target-date investors arise through sponsor action and the other half through participant choice.[3] Sponsor actions leading to mixed investors include employer contributions in company stock; nonelective contributions to the plan's default fund; recordkeeping corrections applied to the plan's default fund; or mapping of assets from an existing investment option to the default fund because of a plan menu change. Mixed investors who choose to combine a target-date fund with other plan options appear to pursue a range of reasonable diversification strategies, although they do not fit within the "all-in-one" portfolio approach of the target-date concept.

Single target-date fund investors appear to select, or are defaulted into, a target-date fund with an appropriate target date (**Figure 74**). Half of participants age 25 to 34 are invested in a 2050 target-date fund, with most of the other participants using either a 2045 or 2055 target-date fund. Similarly, nearly half

Figure 74. Target-date fund utilization by age, 2016

Vanguard defined contribution plan participants holding a single target-date fund (46% of all participants)



Percentage of single target-date fund holders

<25	25–34	35–44	45–54	55–64	65+
7%	31%	25%	20%	14%	3%

Source: Vanguard, 2017.

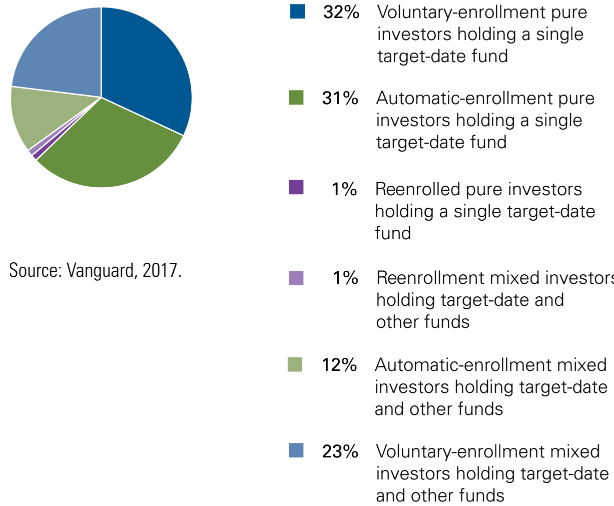
3 For an in-depth analysis of TDF investors, see Pagliaro, Cynthia A. and Stephen P. Utkus, *A different kind of target-date investor*, Vanguard research, institutional.vanguard.com

of participants age 55 to 64 are invested in a 2025 target-date fund, with most of the other participants using a 2020 target-date fund.

Automatic enrollment into a target-date fund default is one important factor explaining the increase in the fraction of pure target-date investors. However, a large fraction of pure investors select target-date options voluntarily. Of the 64% of participants who were pure investors in 2016, a large portion of participants were in plans not offering automatic enrollment. Half of pure investors were in plans where participants made the choice to select the fund (Figure 75).

Figure 75. **Plan design and target-date funds, 2016**

Vanguard defined contribution plan participants holding target-date funds



Source: Vanguard, 2017.

Participant equity allocations

Equities are the dominant asset class holding of many plan participants. From an investment risk perspective, an asset allocation to equities of 80% or more may appear appropriate in light of the long-term retirement objectives of most DC plan participants.

The growing use of professionally managed allocations within DC plans, including target-date funds, is reshaping equity allocations by age and reducing extreme allocations.

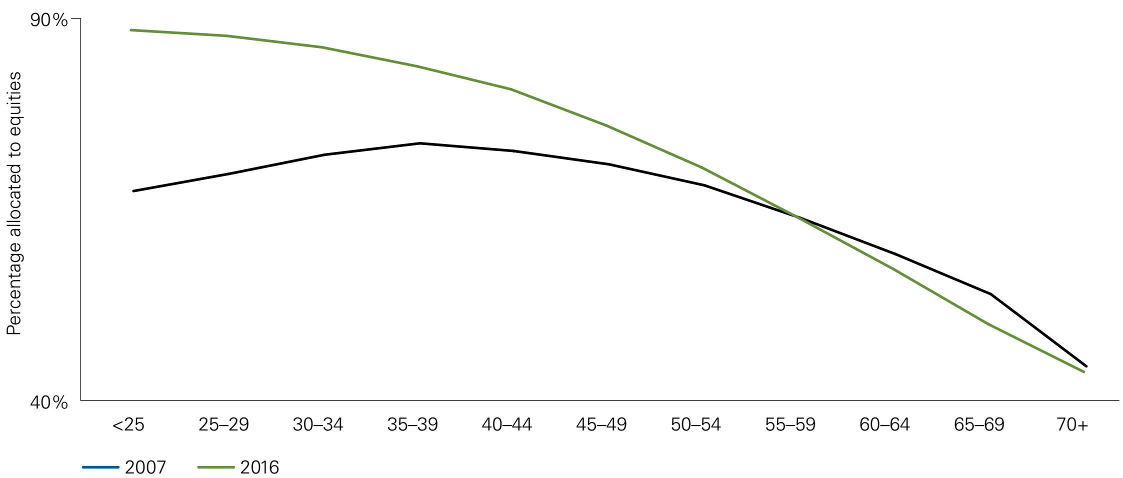
Equity allocations by age

In prior reports we have noted that participants' age-based equity allocation was hump-shaped, with younger participants adopting more conservative allocations, middle-aged participants holding the highest equity exposure, and older participants having equity exposure on par with younger participants (Figure 76). In 2016, the equity allocation among Vanguard DC participants is downward sloping by age. This phenomenon is tied directly to the growing use of target-date funds, along with managed account advice, both of which provide for a declining equity exposure with age.

Figure 76. Trend in asset allocation by participant age

Vanguard defined contribution plans

Average equity allocation participant-weighted



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Equity allocation by age										
<25	67%	73%	77%	82%	84%	85%	85%	87%	88%	87%
25–29	69	70	73	77	79	81	83	86	87	87
30–34	72	70	72	75	76	78	80	84	85	85
35–39	73	71	72	75	75	76	79	82	83	83
40–44	72	69	71	73	73	74	76	79	80	80
45–49	70	66	68	70	69	70	73	75	75	75
50–54	68	62	64	66	64	65	68	70	70	69
55–59	63	57	58	60	59	59	63	64	64	63
60–64	59	52	53	54	52	53	56	57	57	56
65–69	54	47	48	49	48	48	51	51	50	49
70+	44	39	40	41	40	41	44	45	43	43

Source: Vanguard, 2017.

One development influencing this change is the growth in default funds under automatic enrollment and the designation of target-date funds as the most common type of default investment. However, participants choosing target-date funds on a voluntary basis are also contributing in a meaningful way to this change.

A transition is under way in the factors influencing age-related equity exposure in DC plans. On the one hand, existing participants make few changes in their allocations as they age because of inertia in financial decision-making. On the other hand, the growing use of professionally managed allocations, particularly among new entrants to plans, is contributing to a sharper delineation of equity risk-taking by age.

Extreme equity allocations

The rising use of professionally managed allocations is also influencing extreme portfolio allocations (Figure 77). The fraction of participants with no allocation to equities has fallen by two-thirds, from 11% in 2007 to 4% in 2016. At the other extreme, the fraction of participants investing exclusively in equities has fallen from 17% to 6% over the same period.

One of the benefits of target-date funds is that they eliminate extreme equity allocations. Non-target-date participants tend to hold greater extremes in equity exposure (Figure 78, Panel D). Twenty-one percent of "do-it-yourself" investors hold extreme portfolios (9% with no equities, 12% with only equities). Professionally managed investors cannot hold extreme positions because professionally managed options generally include both equity and fixed income assets.

Figure 77. Distribution of equity exposure

Vanguard defined contribution plan participants

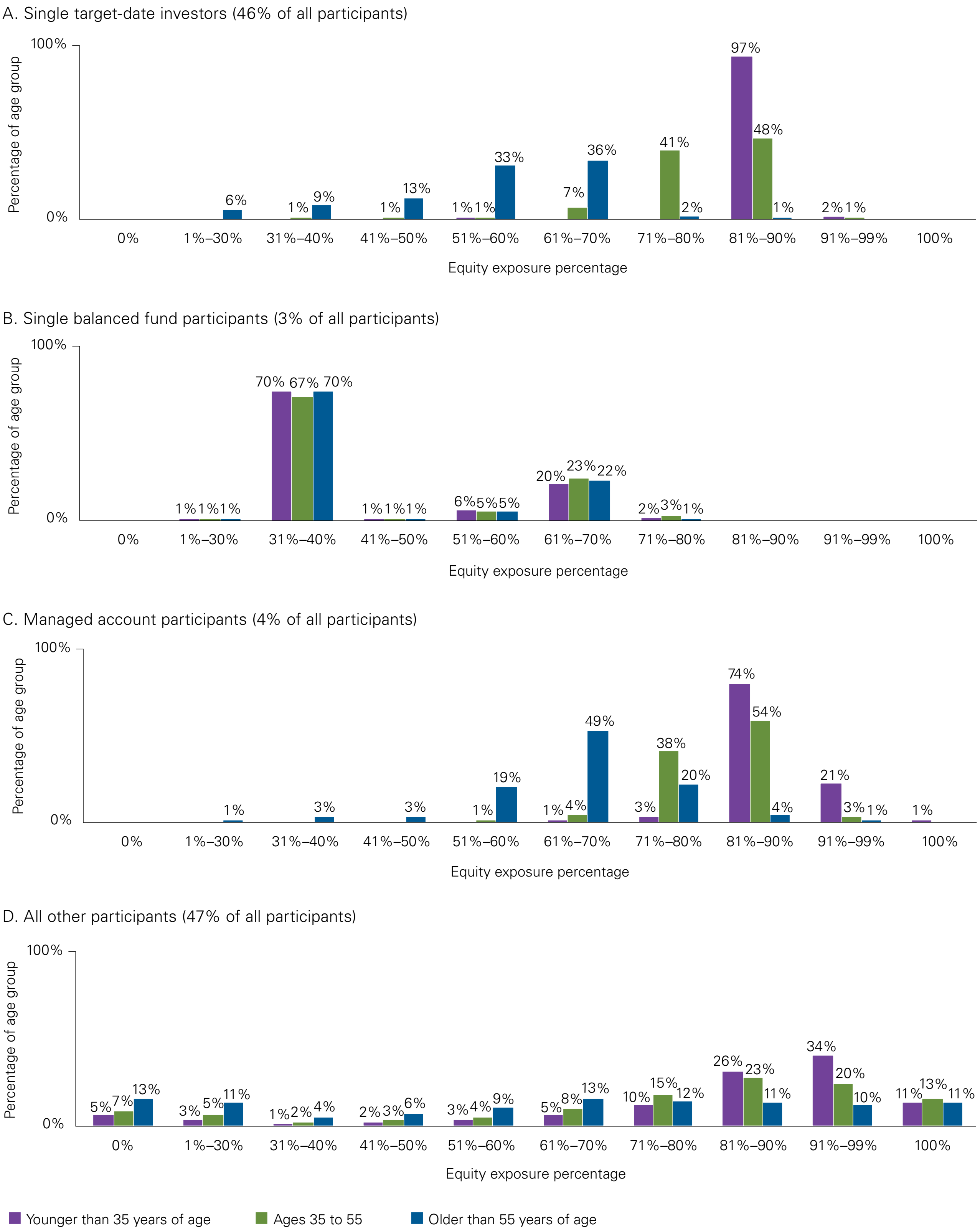
Percentage of participants

Percentage of account balances in equities	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Percentage of contributions to equities, 2016
0%	11%	11%	11%	9%	8%	7%	6%	5%	5%	4%	4%
1%–10%	1	2	2	2	2	2	2	1	1	1	<0.5
11%–20%	2	2	2	2	3	2	1	1	1	1	1
21%–30%	2	3	2	2	2	2	2	2	2	2	1
31%–40%	2	4	3	3	5	5	6	3	2	4	4
41%–50%	6	4	6	6	4	4	2	2	3	3	3
51%–60%	5	9	7	6	7	7	6	8	7	6	6
61%–70%	11	12	11	10	10	10	12	10	10	10	10
71%–80%	11	11	11	12	14	15	12	13	12	16	17
81%–90%	19	18	22	26	26	28	33	37	40	38	41
91%–99%	13	8	9	9	9	9	10	10	10	9	6
100%	17	16	14	13	10	9	8	8	7	6	7
Average equity participant-weighted	**68%**	**65%**	**66%**	**68%**	**68%**	**69%**	**72%**	**74%**	**74%**	**74%**	**75%**
Median equity participant-weighted	**80%**	**74%**	**76%**	**79%**	**79%**	**79%**	**82%**	**83%**	**83%**	**83%**	**85%**

Source: Vanguard, 2017.

Figure 78. Distribution of equity exposure by investor type, 2016

Vanguard defined contribution plan participants



Source: Vanguard, 2017.

Among pure target-date investors, virtually all have equity allocations ranging from 51% to 90% of their portfolios. A large group of pure target-date investors has equity allocations in the 81%-to-90% range.

This phenomenon reflects two facts: (1) automatic enrollment into target-date funds typically applies to new hires who are disproportionately younger than 40; and (2) in voluntary enrollment plans, a single target-date fund is a popular strategy among new hires. Among pure target-date investors, there is also age-appropriate variation in the equity allocation.

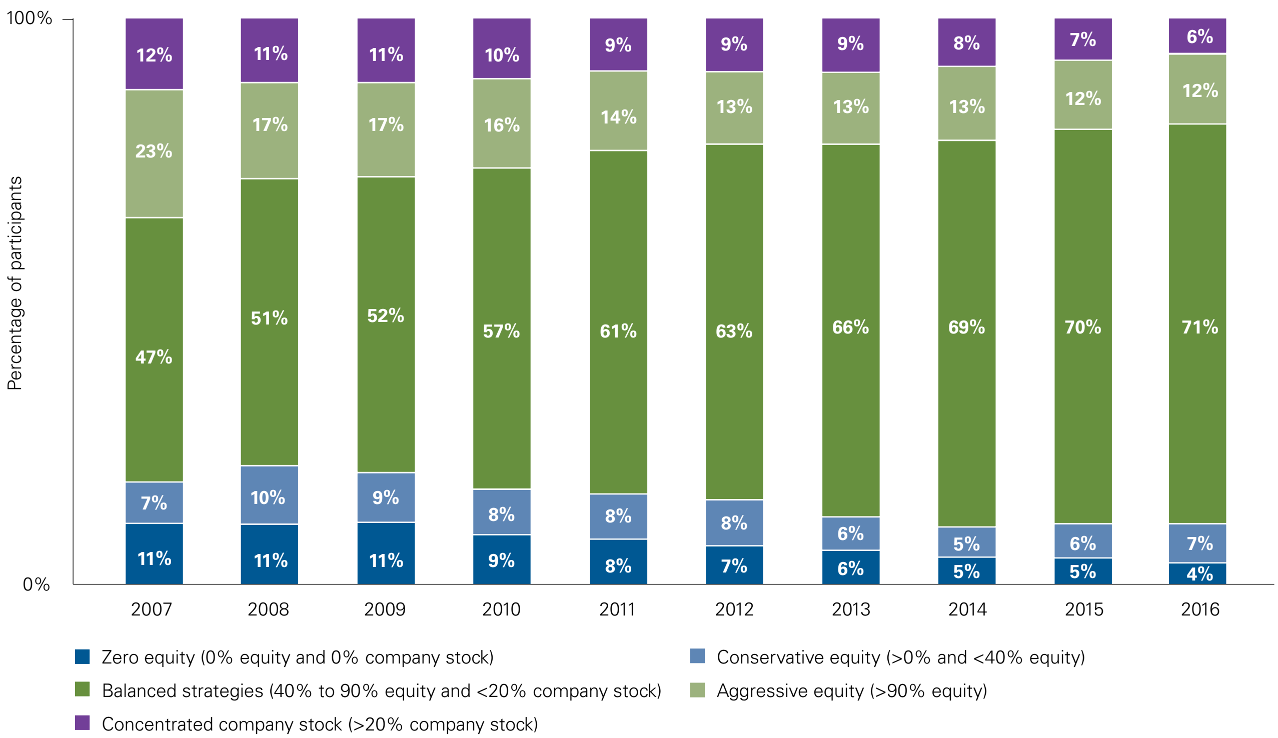
This rising use of professionally managed allocations is also contributing to a reduction in portfolio construction errors **(Figure 79)**. The fraction of participants holding broadly diversified portfolios rose from 47% in 2007 to 71% in 2016. Participants holding concentrated stock positions fell by two-thirds, along with reductions in extreme portfolio positions. More than 8 in 10 participants younger than age 35 held balanced portfolios compared with two-thirds of participants age 55 to 64 and only 44% of participants 65 or older **(Figure 80, page 74)**.

Initial equity allocations

We analyzed how participants are currently allocating their contributions, based on the year they entered their employer's retirement plan.[4] Participants who enrolled during 2008–2009 were allocating 73% of contributions to equities **(Figure 81, page 74)**. Participants who enrolled during 2016 were allocating 80% of their contributions to equities. New plan entrants in 2016 allocated more than three-quarters of their total contributions to target-date funds.

Figure 79. Participant portfolio construction

Vanguard defined contribution plans

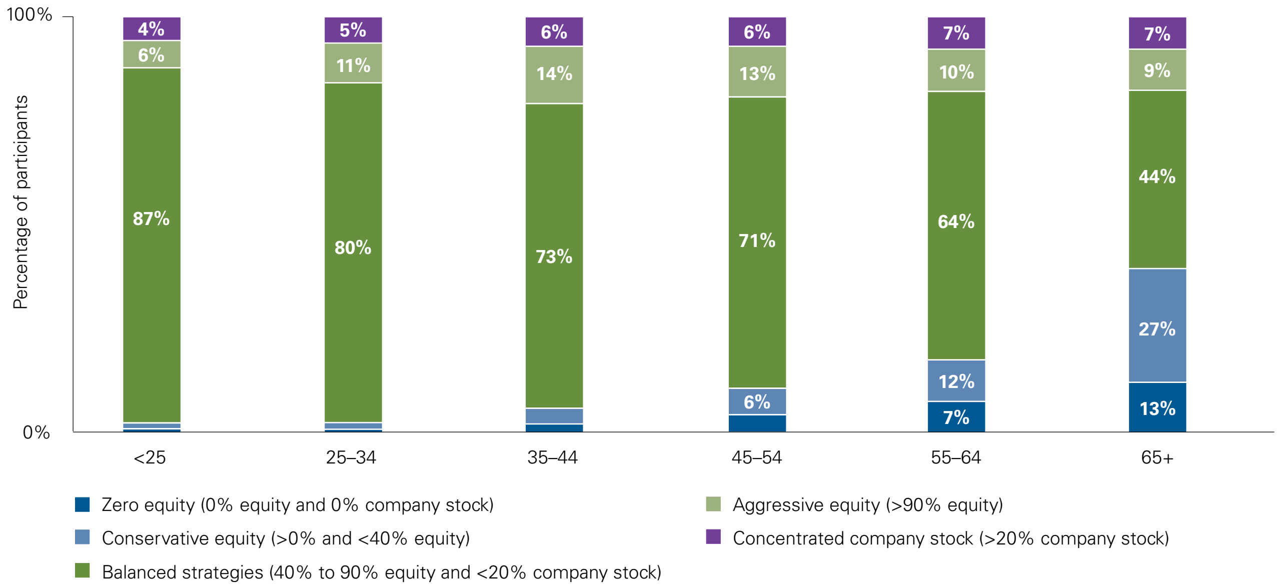


Source: Vanguard, 2017.

4 We do not have ready access to contribution allocations over time and so instead focus on current contribution allocation by date of plan entry.

Figure 80. Participant portfolio construction by age, 2016

Vanguard defined contribution plans

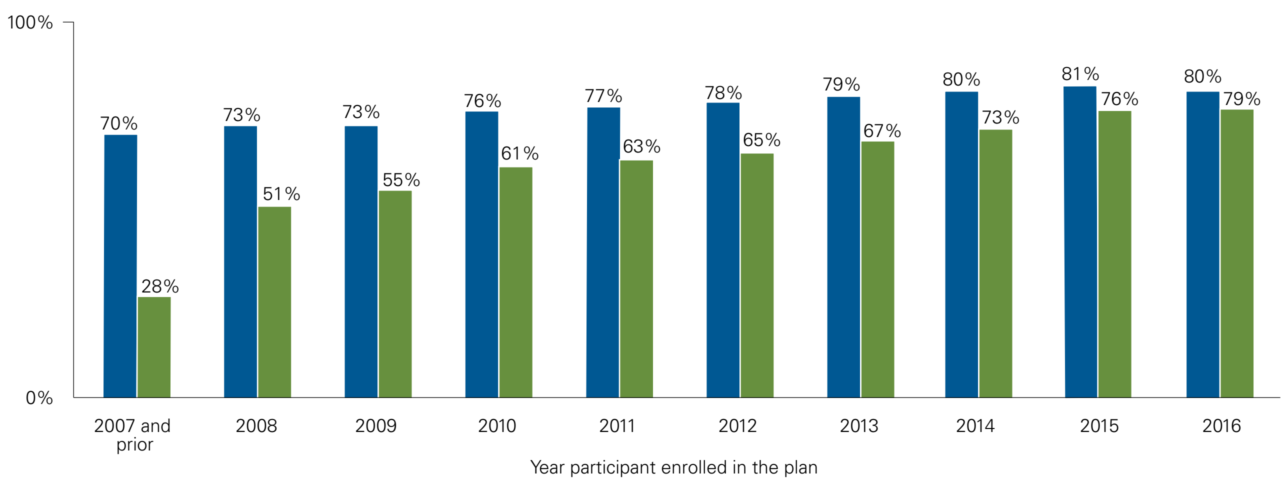


Source: Vanguard, 2017.

Figure 81. Current contribution allocation by plan entry date, 2016

Vanguard defined contribution plans

Contributions from January 1, 2016 through December 31, 2016



Distribution of all participants with contributions in 2016 by year of plan entry

2007 and prior	2008	2009	2010	2011	2012	2013	2014	2015	2016
34%	4%	3%	4%	5%	5%	7%	10%	13%	15%

Percentage of total 2016 contributions allocated to equity · Percentage of total 2016 contributions allocated to target-date funds

Source: Vanguard, 2017.

Advice

Many participants in DC plans may lack the financial planning skills, time, or interest to make appropriate investment decisions. To address participants' need for assistance with investment decisions, plan sponsors using Vanguard as their recordkeeper offer a range of advice programs, including an online advice service, Personal Online Advisor; a managed account advisory service, Vanguard Managed Account Program; and Vanguard Financial Planning Services.

The online advice service and managed account program are provided by Financial Engines, a third-party advisor; the financial planning services are provided by Vanguard Advisers, Inc. Each of these programs allows participants to include information about assets they have outside the plan, which may affect the selection of in-plan investments.

Online advice is targeted toward participants who want to manage their investments themselves. Thirty-nine percent of plans offer online advice, which assists participants in developing and managing optimal portfolios and continues to recommend portfolio changes over time (Figure 82). Participants need to take action to implement online advice. Because large plans are more likely to offer advice, two-thirds of participants have access to the online advice service.

Managed account advice is targeted toward participants who prefer professional investment management. The managed account program includes development of customized portfolios using the funds offered in the plan, and ongoing monitoring and rebalancing. It also offers customized retirement savings projections. Participants may also further personalize the advice according to risk tolerance or other holdings. Twenty-seven percent of plans offer managed account advice—and again, because larger plans are more likely to offer advice, half of participants have access to the service.

Financial planning services are offered to all participants with plan sponsor authorization, but a fee may apply. However, the service is available at no charge to participants 55 and older who are in or nearing retirement if their plan sponsor authorizes the offer. Sixty-seven percent of plans offer this service to their participants, and three-quarters of participants in this age group have access to the program.

Figure 82. Advice offered, 2016

Vanguard defined contribution plans

		Number of participants			
	All	<500	500–999	1,000–4,999	5,000+
Online advice					
Percentage of plans offering online advice	39%	23%	45%	64%	70%
Percentage of participants offered online advice	65	29	46	66	68
Percentage of participants offered online advice accessing	6	9	6	5	6
Managed account advice					
Percentage of plans offering managed account advice	27%	11%	30%	52%	56%
Percentage of participants offered managed account advice	53	15	30	54	57
Percentage of participants offered managed account advice accessing	7	6	5	7	7
Financial planning services					
Percentage of plans offering financial plans	67%	62%	68%	74%	74%
Percentage of participants offered financial plans	73	69	71	76	72
Percentage of participants offered financial plans accessing	2	3	2	2	2

Source: Vanguard, 2017.

Company stock

Company stock is more likely to be offered as an investment option by a large plan—35% of Vanguard plans with 5,000 or more participants offered company stock, compared with only 2% of plans with fewer than 500 participants. In some plans that offer company stock, participants can choose whether or not to invest their own contributions in this option.

Employer contributions—which may be 401(k) matching, profit-sharing, or ESOP contributions—are either directed to company stock by the employer, invested at the participant's discretion, or a combination of the two.

As of 2016, only 9% of Vanguard recordkeeping plans offered company stock as an investment option. However, because large plans are more likely to offer company stock, 24% of Vanguard recordkeeping participants had access to company stock in their employer's plan. Among all Vanguard participants:

- 88% had no company stock investments in 2016—either because their employer did not offer company stock (76%) or because they chose not to invest in it (12%).

- 6% had company stock holdings of 1% to 20% of their account balance in 2016.

- 6% had concentrated positions exceeding 20% of their account balance as of 2016.

Among Vanguard plans actively offering company stock, 81% had 20% or less of plan assets invested in company stock (Figure 83). The remaining 19% had concentration levels of more than 20%. This is an improvement from 2007, when nearly one-quarter of these plans had concentration levels of more than 20%.

In 2016, half of Vanguard participants who were offered company stock in their plan chose not to invest their contributions—or their employer's contributions—in company stock. If they received employer stock contributions, they diversified these assets. At the other extreme, one-quarter of participants in plans actively offering company stock had more than 20% of their account balance invested in company stock, and 4% had more than 80% of their account balance in company stock.

During 2016, the modest shift away from participant company stock holdings persisted. The number of participants in plans with company stock and holding a concentrated position of more than 80% of their account balance in company stock fell from 8% in 2007 to 4% in 2016, and fewer plans are offering company stock.

Despite this shift, why do one-quarter of participants in plans offering company stock continue to hold a concentrated position in their employer's stock? One reason is that most participants view company stock as a safer investment than a diversified equity fund. Another factor encouraging concentrated stock holdings is the plan sponsor's decision to make an employer contribution in company stock. This implied endorsement often leads participants to invest more of their own savings in the stock as well.

The effect is evident in the average company stock allocation for plans making employer contributions in cash compared with those making employer contributions in stock. In 2016, plans offering company stock as an investment option but making employer contributions in cash had an average of 18% of plan assets invested in company stock (Figure 84). Meanwhile, plans offering company stock as an investment option and making employer contributions in stock had an average of 23% of plan assets in company stock.

Figure 83. Company stock exposure for plans and participants

Vanguard defined contribution plans actively offering company stock

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Balance of plan in company stock—percentage of plans										
1%–20%	77%	82%	79%	80%	75%	77%	78%	79%	82%	81%
21%–40%	17	10	15	13	17	16	16	15	14	16
41%–60%	4	6	5	6	7	6	6	6	4	3
61%–80%	1	1	0	0	0	0	0	0	0	0
>80%	1	1	1	1	1	1	0	0	0	0
Balance in company stock—percentage of participants										
0%	42%	44%	45%	43%	45%	45%	47%	50%	50%	55%
1%–20%	26	26	25	26	25	24	22	22	22	21
21%–40%	13	12	12	12	12	13	14	14	13	12
41%–60%	7	6	6	6	5	5	7	6	8	6
61%–80%	4	3	3	3	3	3	4	3	2	2
>80%	8	9	9	10	10	10	6	5	5	4

Source: Vanguard, 2017.

Figure 84. Impact of company-stock employer contributions on asset allocation, 2016

Vanguard defined contribution plans

		All Vanguard 401(k) plans with an employer contribution		
	Vanguard defined contribution plans	Plans making employer contributions in cash	Plans offering company stock making employer contributions in cash	Plans offering company stock making employer contributions in company stock
Percentage of plans		93%	6%	1%
Brokerage	1%	1%	<0.5%	<0.5%
Company stock	6	<0.5	18	23
Diversified equity funds	41	43	36	36
Balanced funds	34	38	28	27
Bond funds	7	7	7	7
Cash	11	11	11	7

Source: Vanguard, 2017.

Investment returns

There are two categories of investment returns: total returns and personalized returns. Total rates of return reflect time-weighted investment performance and allow comparison of results to benchmark indexes. Personal rates of return are dollar-weighted returns, reflecting account investment performance, adjusted for each participant's unique pattern of contributions, exchanges, and withdrawals. They are not directly comparable to time-weighted performance data for market indexes or mutual funds. Both return measures are influenced by market conditions; however, only total rates of return can be compared with published benchmark indexes.

Participant returns

Due to generally rising markets in 2016, average total and personal returns for DC participants were 8.3% and 8.2% for the 1-year period ended December 31, 2016 (Figure 85). Reflecting strong U.S. equity markets, average total and personal returns for DC participants were around 5% across the 3-year period and around 9% for the 5-year period ended December 31, 2016.

Five-year participant total returns averaged 9.1% per year or 55% cumulatively (personalized total returns rose 8.5% per year or 50% cumulatively).

Distribution of returns

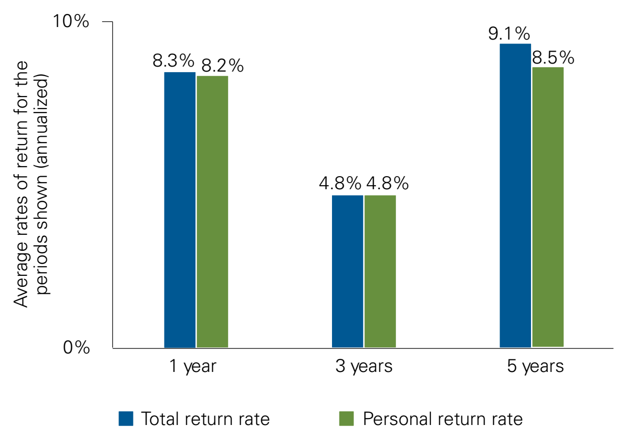
As of December 2016, 5-year personalized annual returns were positive for nearly all Vanguard DC plan participants. There was wide variation in returns among participants (Figure 86). Participants in the fifth percentile had 5-year personalized returns of 2.0% per year in 2016. At the other extreme, participants above the 95th percentile had 5-year personalized returns greater than 14.3% per year. The variation in returns is largely due to the variation in participant asset allocations and their individual account holdings.

Participants with managed allocations—notably target-date funds and managed account advisory services—had less dispersion in outcomes. Total 5-year returns for single target-date investors ranged from 7.2% for the 5th percentile to 10.6% for the 95th percentile, a difference of approximately 3 percentage points (Figure 87). For the single balanced fund and managed account participants, the 5th-to-95th percentile differences were approximately 4 percentage points. The managed account is a customized portfolio approach and thus results are, accordingly, more dispersed than with target-date funds.

By comparison, among all other participants, realized returns for those making their own choices ranged from 1.9% per year for the 5th percentile to 14.7% for the 95th percentile, a difference of nearly 13 percentage points.

Figure 85. Participant rates of return, December 2016

Vanguard defined contribution plans



Market returns ended December 31, 2016	1 year	3 years	5 years
60/40 Balanced*	8.0%	5.4%	8.7%
70/30 Balanced*	8.8	5.7	9.8
S&P 500	12.0	8.9	14.7
Barclays US Aggregate	2.6	3.0	2.2
FTSE Global All Cap ex US	4.7	-1.1	5.6

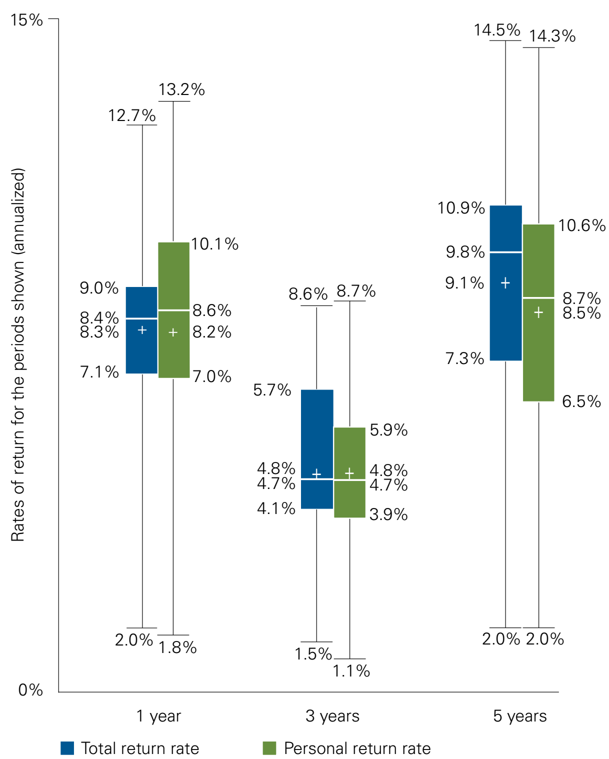
Past performance is no guarantee of future returns. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

*Balanced composites based on S&P 500 and Barclays US Aggregate Indexes for periods and percentages shown; rebalanced monthly.

Source: Vanguard, 2017.

Figure 86. Variation in participant total and personal return rates, 2016

Vanguard defined contribution plans

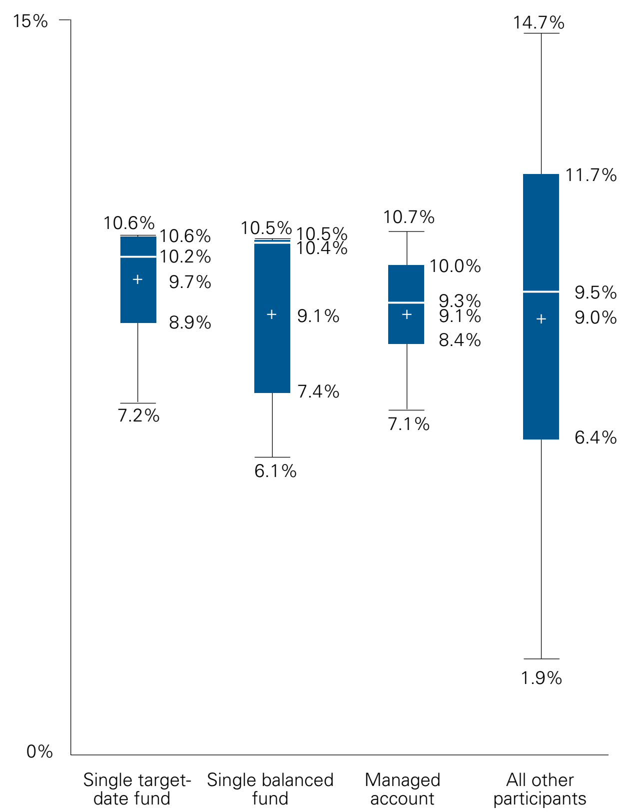


Note: Based on 3.5 million observations for 1 year; 2.4 million for 3 year; and 1.9 million for 5 year.

Source: Vanguard, 2017.

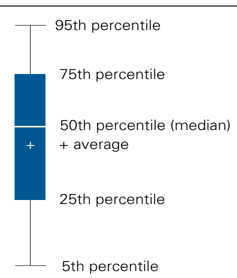
Figure 87. Distribution of 5-year total returns by strategy, 2016

Vanguard defined contribution plans



Note: Based on 364,000 observations for single target-date fund investors; 27,000 for balanced fund investors; 50,000 for managed account investors; and 1.4 million for all other participants.

Source: Vanguard, 2017.



How to read a box and whisker chart:

This box and whisker chart shows the range of outcomes. Plot values represent the 95th, 75th, 50th, 25th, and 5th percentile values. The average value is represented by a white + and the median value by a white line. An example of how to interpret the data in **Figure 86** is: For the 1-year period, 5% of participants had total return rates (TRR) greater than 12.7%; 25% had TRRs greater than 9.0%; half had TRRs greater than 8.4%; 75% had TRRs greater than 7.1%; 95% had TRRs greater than 2.0%; and 5% had TRRs less than 2.0%. The average 1-year TRR was 8.3%.

Dispersion of outcomes

These differences are also apparent when examining both return and risk outcomes in scatter plots. For ease of presentation, we created a random sample of 1,000 participants for each group of investors.

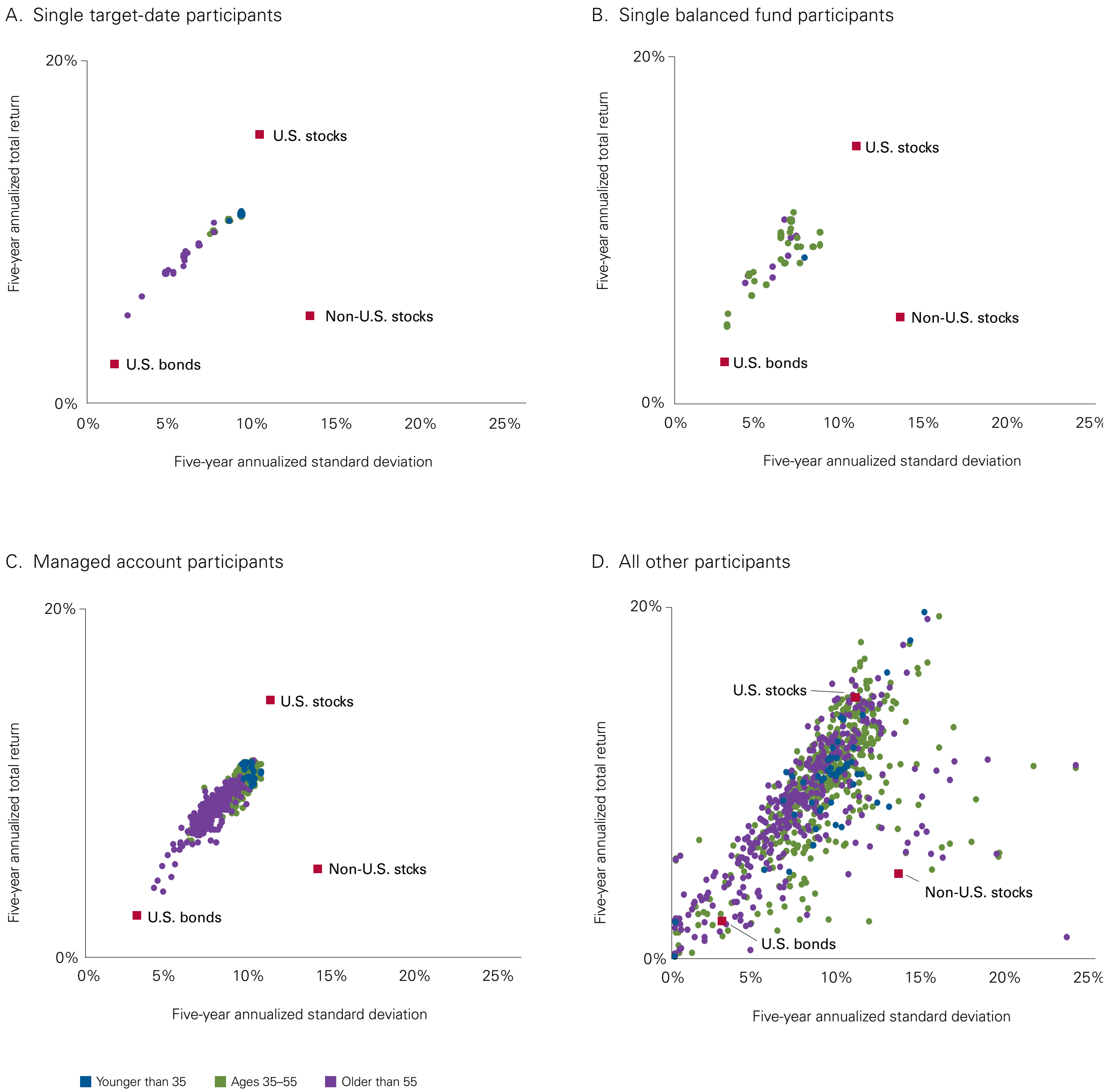
During the 5-year period ended 2016, outcomes for single target-date investors were distributed among major market indexes (Figure 88, Panel A), and upward sloping reflecting a positive equity risk premium. These results are consistent with the fact that most of the target-date portfolios in our sample are a specific combination of indexed U.S. equities, international equities, U.S. bonds, and international bonds. In the target-date scatter plot, younger participants (represented by blue dots and in long-dated portfolios) are to the right of the chart; older participants (represented by purple dots and in near-dated portfolios) are to the left.

The figure includes about 1,000 observations, although there appear to be far fewer. The reason is that while there are many observations in our sample, they are all invested in a limited set of target-date portfolios, which means that the range of portfolio outcomes are also limited. For example, if a plan offered 12 target-date options, then 1,000 participants invested solely in a single target-date fund would have 12 outcomes, not 1,000.

The results for single balanced fund investors reflect the fact that most balanced funds have similar equity allocations, typically around 35% to 65% of assets (Figure 88, Panel B). Managed account investors are more dispersed, reflecting the customized nature of managed account advice (Figure 88, Panel C). The greatest dispersion of risk/return outcomes is among participants making their own investment choices (Figure 88, Panel D). Over time, due to the growing use of professionally managed allocations in DC plans, this population is expected to decline.

Figure 88. Risk and return characteristics, 2012–2016

Vanguard defined contribution plan participants for the 5-year period ended December 31, 2016



Note: Includes 1,000 random sample of participant accounts drawn from respective samples.
Excludes ½% top and ½% bottom outliers for both risk and return, for a net sample of 980 observations.

Source: Vanguard, 2017.

Trading activity

Participant trading or exchange activity is the movement of existing account assets from one plan investment option to another. This transaction is distinct from a contribution allocation decision, in which participants decide how future contributions to the plan should be invested. Exchange activity is a proxy for a participant's holding period for investments, as well as a measure of the participant's willingness to change their portfolio in response to short-term market volatility.

Exchange provisions

Daily trading is nearly universal for Vanguard DC plans, with virtually all plan sponsors allowing it. While assets can be traded daily, Vanguard and other investment companies serving DC plans typically have "round-trip" restrictions designed to thwart the minority of individual participants who seek to engage in active market-timing or day-trading.

Volume of exchanges

Despite the ongoing market volatility of 2016, only 12% of participants made one or more portfolio trades or exchanges during the year, down from 16% in 2008 (Figure 89).[5] When participants using the managed account program are excluded, only 8% of participants initiated an exchange. As in prior years, most participants did not trade. Not only did participant trading activity remain low during 2016, trading activity between 2009 and 2016 was lower than the trading activity during 2007 and 2008.

Another measure of trading is the volume of dollars traded. We measure dollar volume movements as a fraction of total recordkeeping assets in order to scale them to growth in assets and growth in the underlying recordkeeping business. In effect, the fraction of assets traded is a measure of portfolio turnover.

In 2016, traders exchanged the dollar equivalent of 11.4% of average DC recordkeeping assets at Vanguard. On a net basis, 1.5% of assets were shifted from equities to fixed income in 2016, compared with a 0.8% shift from equities to fixed income in 2015.

Since 2007, dollar-trading levels have generally remained stable, with the exception of periods of high market volatility (Figure 90). The most notable spikes in dollars traded occurred in months of high market volatility: January, September, and October 2008; March 2009; and August 2011.

5 Our trading statistics are generally adjusted for sponsor-initiated trading—e.g., replacement of one plan option with another. On the date the option is eliminated and the balances are moved to a different fund, we are able to capture and adjust for the fund replacement effect. However, some participants initiate exchanges either before or after the fund is eliminated. We are not able to isolate this participant activity but estimate that it could account for up to one-third of the trading activity.

Figure 89. Participant trading summary

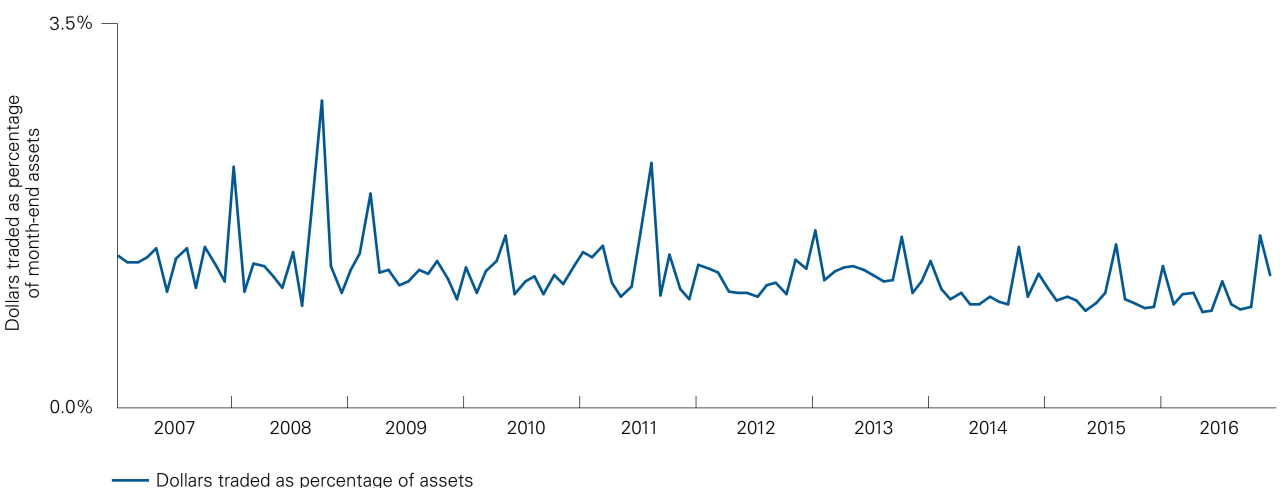
Vanguard defined contribution plans

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Percentage of participants										
Percentage trading including managed account investors	15%	16%	13%	12%	11%	12%	13%	14%	13%	12%
Percentage with participant-directed exchanges	14	14	11	10	10	9	10	10	9	8
Percentage of average recordkeeping assets										
Percentage traded	14.7%	16.6%	14.1%	13.4%	14.8%	12.6%	14.0%	11.6%	10.7%	11.4%
Percentage moved to equities (fixed income)	(1.5)	(3.9)	(0.6)	(1.1)	(2.5)	(1.7)	0.2	(0.6)	(0.8)	(1.5)
Dollar flows (in billions)										
Dollars traded	$36.2	$39.7	$29.0	$32.5	$40.6	$36.2	$44.8	$41.8	$40.9	$44.7
Dollars moved to equities (fixed income)	(3.7)	(9.3)	(1.2)	(2.8)	(6.9)	(4.9)	0.5	(2.3)	(3.0)	(6.0)
S&P 500 Index volatility										
Percentage of days up or down 3% or more	0.4%	16.8%	8.7%	3.2%	4.8%	0.0%	0.0%	0.0%	1.2%	0.8%
Percentage of days up or down 1% or more	26	54	46	30	37	20	15	31	29	19

Source: Vanguard, 2017.

Figure 90. Trading activity, January 2007–December 2016

Vanguard defined contribution plan participants



Source: Vanguard, 2017.

Direction of money movement

Summary statistics may sometimes give the impression that all participant trading is in one particular direction. However, in any given month, participants who trade are trading meaningful dollar amounts both into and out of equities **(Figure 91)**. Even in volatile markets, as some traders shift their portfolios toward fixed income assets, there are others who shift toward equities.

During the past decade, which includes the 2008–2009 bear market, the net movement of money among participants trading in their accounts has been generally toward fixed income investments. Nonetheless, even at the height of the market volatility, there were significant gross flows toward equities among some participants.

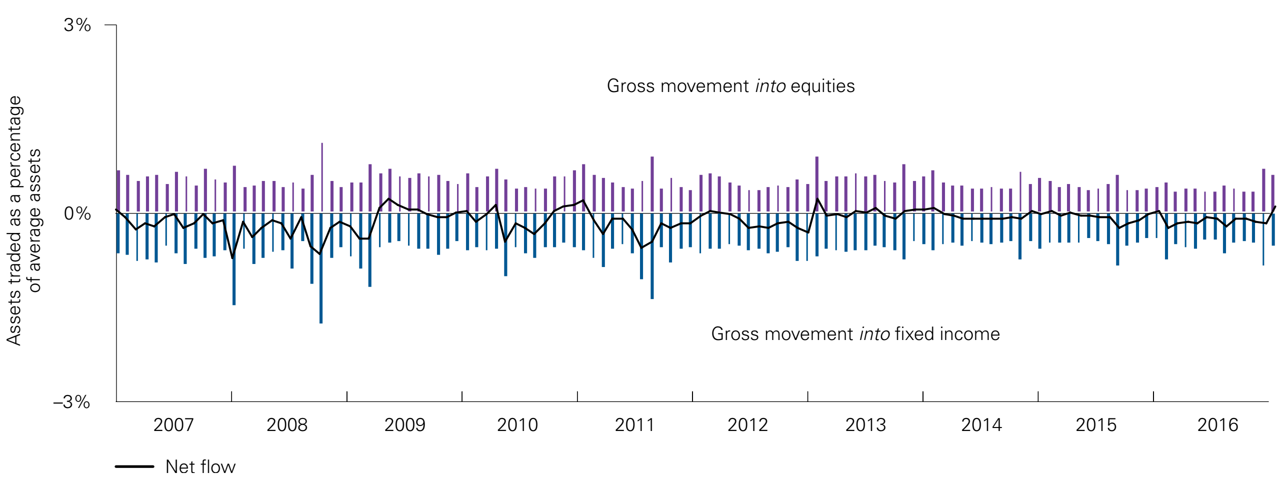
The growing reliance on single-fund investment programs, such as target-date funds, has likely contributed to lower trading levels by participants. Pure target-date and single balanced fund investors trade much less frequently than all other participants, although their portfolios are rebalanced daily by the fund managers **(Figure 92)**.

Men are more likely to trade than women **(Figure 93)**. However, participants enrolled in the managed account program trade much more frequently than all other participants as their investments are rebalanced periodically to the target asset allocation.

Figure 91. Direction of money movement, January 2007–December 2016

Vanguard defined contribution plan participants

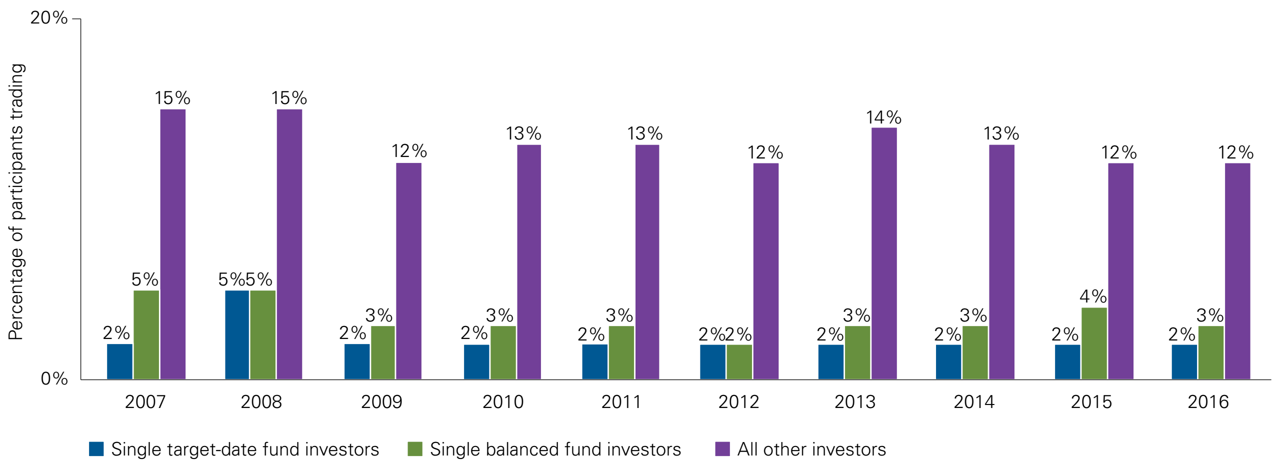
Money movement as a percentage of average assets



Source: Vanguard, 2017.

Figure 92. Participant trading by investor type

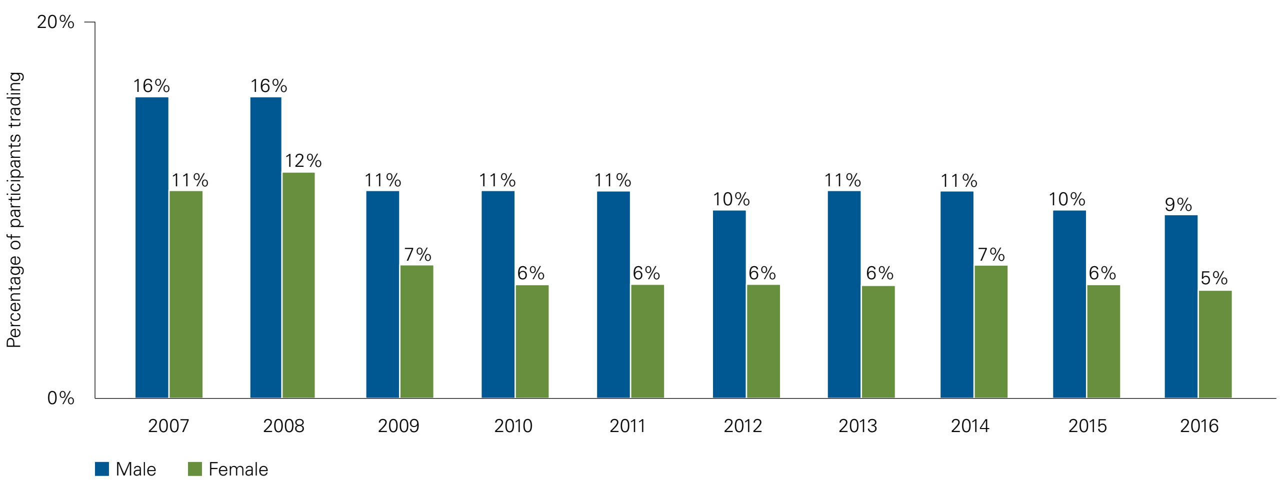
Vanguard defined contribution plan participants



Source: Vanguard, 2017.

Figure 93. Participant trading by gender

Vanguard defined contribution plan participants



Source: Vanguard, 2017.

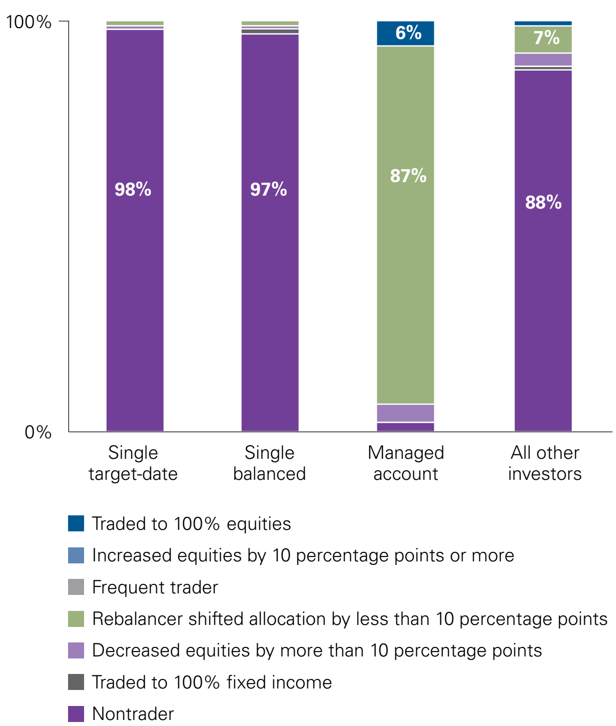
Types of trading activity

Among participants who trade in their accounts, the types of exchanges made by participants are varied. In 2016, 98% of single target-date investors and 97% of single balanced fund investors did not trade to other fund options and instead retained their single holding (Figure 94). However, the fund managers for these strategies rebalanced the underlying assets of the funds daily.

On the other hand, nearly all participants using a managed account had exchanges. In a managed account, the advisor oversees multiple fund holdings in a typical participant's account. The trading activity reflects the advisor rebalancing the participant's portfolio (or, with those initially signing up for the service, portfolio changes needed to arrive at the target portfolio strategy).

Figure 94. Participant trading decisions, 2016

Vanguard defined contribution plan participants



Source: Vanguard, 2017.

Among "do-it-yourself" investors, most participants do not trade—not even to rebalance their account. In 2016, only 1% of all other participants abandoned equities.[6] Even among all other investors, most participants trading were rebalancing their portfolios.

Over a longer time frame, 2012–2016, 27% of participants initiated trades. Seven in 10 participants (excluding managed account investors) made no trades in their workplace retirement plan account, not even to rebalance to a target asset allocation. Again, single target-date and balanced fund investor portfolios are rebalanced by the fund managers. However, 47% of participants were making their own investment decisions in 2016.

6 A participant who abandoned equities is one who shifted his or her entire portfolio into fixed income investments during the year. Only participants with some equity exposure in their portfolio who shifted to all fixed income assets during 2016 are included in this category.

Accessing plan assets

Participants can access their plan assets by taking a loan or a withdrawal while they are working, or through a withdrawal or rollover when they change jobs or retire.

Accessing plan assets

Participants can access their plan assets by taking a loan or a withdrawal while they are working, or through a withdrawal or rollover when they change jobs or retire.

Plan loans

Plan loans allow DC participants to access their plan savings before retirement without incurring income taxes or tax penalties. If permitted by the plan, participants can borrow up to 50% of their balance (up to a maximum of $50,000) from their DC plan account. Loans are more common in plans accepting employee contributions and less common for employer-funded DC plans, such as money purchase or profit-sharing plans.

Offering loans appears to have a beneficial effect on retirement savings, raising contribution rates above what they would otherwise be. Yet they also come with risks. Cash that has been borrowed earns fixed income rather than equity market returns. Also, participants who leave their employer must typically repay any loan balance immediately—or risk paying taxes as well as a penalty and incurring a reduction in retirement savings by the amount of the loan outstanding.[7]

Loan availability

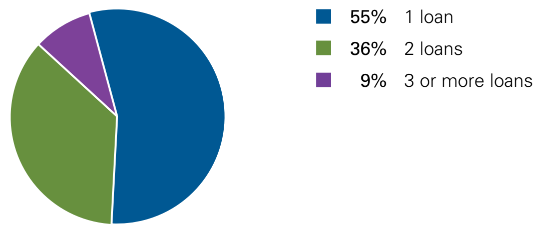
Loans are widely offered by employee-contributory DC plans. In 2016, 79% of Vanguard 401(k) plans permitted participants to borrow from their plan and 88% of active participants had access to a loan feature. The availability of loans depends on plan size. Large plans tend to offer loans; small plans often do not. Loans are expensive to administer, and loan origination and maintenance fees are increasing. With loan fees, sponsors can allocate costs directly to those participants incurring loan-related expenses. Most plans allow participants to have only one loan outstanding. In 2016, 55% of Vanguard 401(k) plans offering loans permitted only one loan at a time (Figure 95). Thirty-six percent of plans allowed two, and 9% of plans allowed three or more.

Loan use by participant demographics

Fewer than 1 in 5 participants had a loan outstanding at year-end 2016 (Figure 96).[8]

Figure 95. Number of loans allowed, 2016

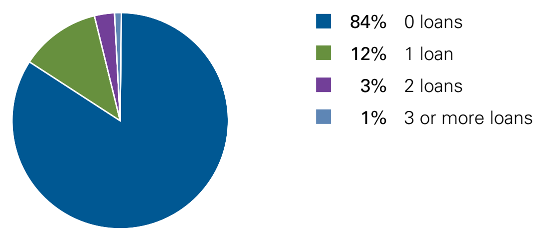
Vanguard defined contribution plans offering loans



Source: Vanguard, 2017.

Figure 96. Participant loan use, 2016

Vanguard defined contribution plans offering loans



Source: Vanguard, 2017.

7 For a comprehensive analysis of loans, see Timothy (Jun) Lu, Olivia S. Mitchell, Stephen P. Utkus, and Jean A. Young, *Borrowing from the Future: 401(k) Plan Loans and Loan Defaults*. pensionresearchcouncil.org/publications

8 Our analysis of the percentage of participants with loans considers all participants with an account balance in plans offering loans. Some of these participants no longer work for the plan sponsor and are not eligible for a new loan. Some participants with loans also no longer work for the plan sponsor but are repaying loans. Loan use would likely be about five percentage points higher if based solely on active employees.

Figure 97. Participant loan demographics, 2016

Vanguard defined contribution plans offering loans

	Participants with loans					Participants with no loans
	Percentage of participants with loans	Percentage of account balance in loans	Average loan amount	Average account balance	Total average account balance including loans	Average account balance
All	**16%**	**10%**	**$9,693**	**$88,647**	**$98,340**	**$103,076**
Household income						
<$30,000	21%	12%	$7,469	$55,439	$62,908	$64,539
$30,000–$49,999	21	11	8,333	65,250	73,583	72,942
$50,000–$74,999	19	10	9,873	85,530	95,403	96,599
$75,000–$99,999	15	9	11,672	120,257	131,929	136,778
>$100,000	11	7	13,728	175,735	189,463	204,486
Age						
<25	3%	21%	$2,230	$8,440	$10,670	$4,076
25–34	11	18	5,991	27,099	33,090	22,854
35–44	20	14	9,552	59,813	69,365	66,535
45–54	21	9	10,980	106,250	117,230	127,531
55–64	16	7	10,965	148,608	159,573	195,525
>65	5	6	9,187	137,544	146,731	206,415
Gender						
Male	17%	9%	$10,424	$103,825	$114,249	$126,830
Female	16	11	8,755	70,367	79,122	80,023
Job tenure (years)						
0–1	3%	18%	$5,513	$24,698	$30,211	$12,460
2–3	10	18	4,828	21,945	26,773	30,445
4–6	16	16	6,883	34,893	41,776	58,520
7–9	21	14	9,327	56,767	66,094	98,520
>10	25	8	11,638	126,113	137,751	232,343
Account balance						
<$10,000	9%	31%	$2,360	$5,323	$7,683	$3,057
$10,000–$24,999	20	25	5,465	16,832	22,297	16,599
$25,000–$49,999	23	21	9,378	36,162	45,540	36,110
$50,000–$99,999	22	15	12,859	71,555	84,414	71,870
$100,000–$249,999	19	9	15,607	156,692	172,299	160,437
>$250,000	12	4	17,825	452,433	470,258	550,888

Source: Vanguard, 2017.

On average, the outstanding loan account balance equaled 10% of the participant's account balance, excluding the loan, and the average participant had borrowed about $9,700 (Figure 97). Outstanding loans are typically excluded from measures of plan and participant assets because these assets have, in effect, been withdrawn from the plan and are not currently available as a retirement resource. However, more than 90% of loans are repaid and outstanding loans do represent participant and plan assets. Only about 2% of aggregate plan assets were borrowed by participants at the end of 2016.

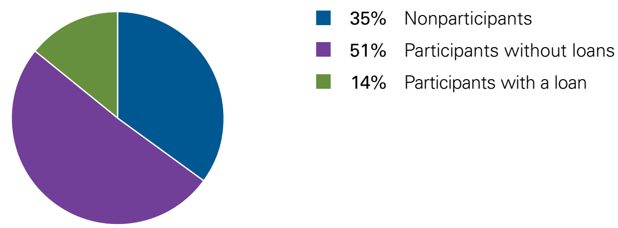
Loans are sometimes criticized as a form of revolving credit for younger, lower-income workers. While that may be partly true, loan use by age follows a hump-shaped profile, with loan use highest among participants in their prime working years. Among workers ages 35–54, loan use averaged slightly more than 20% in 2016. Men and women used loans at the same rate.

Income appears to have a greater influence on loan use than age does. In 2016, 21% of participants with household incomes of less than $30,000 had a loan, while only 11% of participants with household incomes of more than $100,000 did. This difference reflects liquidity constraints among those with low wealth and income—i.e., higher-income households have less need for borrowing because of their higher income or other savings.

In 2016, loans were most common among participants with a balance between $10,000 and $100,000. Participants with account balances of less than $10,000 were actually somewhat less likely to have a loan, yet they borrowed the largest percentage of their account balances. Only 9% of participants in this group had a loan, but the loan accounted for 44% of their account balance on average.

Figure 98. **Participation and loans, 2016**

All employees earning less than $30,000



Source: Vanguard, 2017.

Across many demographic groups, participants with no loans outstanding in 2016 appear to have accumulated more in retirement savings than those with loans. However, among participants younger than 35, participants with outstanding loans appear to have greater retirement savings accumulations. These differences in part reflect the interplay of demographic differences in terms of age, income, and tenure between borrowers and nonborrowers.

Loan use is highest among participants who earn less than $30,000—about 1 in 5 of these participants has a loan outstanding. However, earlier in this report, we noted that participation rates are lowest among this group, with only 65% of these workers joining their plan. Arguably, participants who earn less than $30,000 but have borrowed from their retirement savings (14% of these workers) are better off than those employees who earn less than $30,000 and do not participate in their employer plan (Figure 98).

Loan use by industry group

Loan use varies significantly by industry group (Figure 99). Participants in the media, entertainment, and leisure fields, as well as those in the business, professional, and nonprofit industries, use loans at a lower rate than other participants, suggesting that more highly educated participants might use loans less frequently.

Trends in new loan issuance

Among Vanguard plans, the fraction of participants taking loans from their DC plans fell during 2007 and 2008 (Figure 100). However, in 2009, the rate of new borrowing rose by 19%. New borrowing rose again in 2010. In 2011, loan-taking was on par with the level in 2010, and it declined modestly in 2012. Loan-taking grew again in 2013, and then declined modestly in 2014 and declined further in 2015 and 2016. There is a pronounced seasonality to loan-taking, with borrowing typically peaking in the summer months. The reasons for this pattern, as well as the reasons for the decline and then rise in loan use in recent years, are not well understood. We speculate that loan use first fell with the overall decline in consumer spending in the economic downturn, along with the decline in housing transactions (loans are often used for housing-related expenses). Loan use may have jumped sharply in 2009 and 2010 as the effects of the recession lingered.

Figure 99. Participant loans by industry sector, 2016

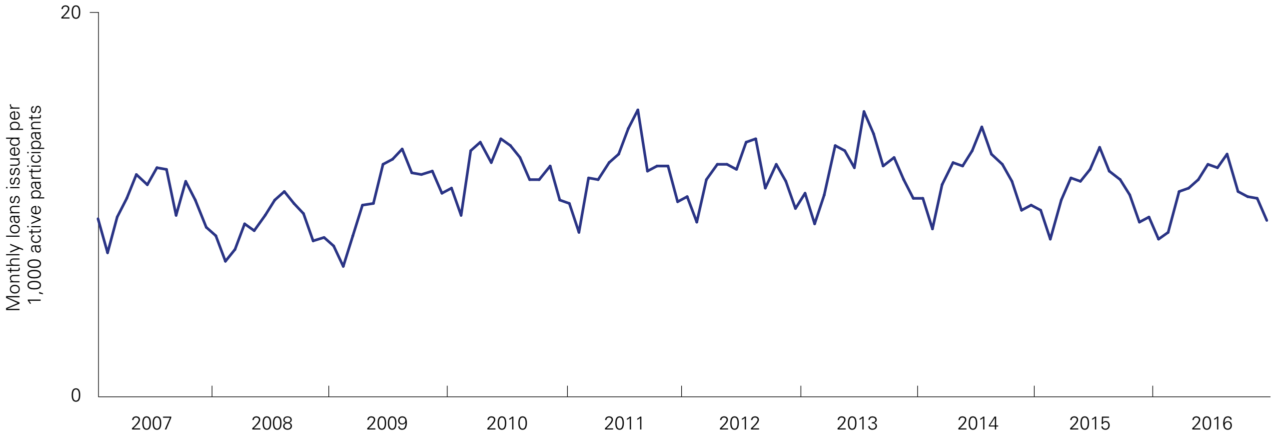
Vanguard defined contribution plans offering loans

	Participants with loans					Participants with no loans
	Percentage of participants with loans	Percentage of account balance in loans	Average loan amount	Average account balance	Total average account balance including loans	Average account balance
All	16%	10%	$9,693	$88,647	$98,340	$103,076
Industry group						
Transportation, utilities, and communications	22%	10%	$8,961	$76,663	$85,624	$93,486
Agriculture, mining, and construction	20	8	14,796	181,682	196,478	273,196
Finance, insurance, and real estate	19	11	10,664	83,016	93,680	105,375
Manufacturing	19	9	9,211	90,249	99,460	110,088
Wholesale and retail trade	18	10	7,322	62,804	70,126	56,188
Education and health	14	13	9,146	60,029	69,175	63,702
Media, entertainment, and leisure	10	11	9,707	81,309	91,016	79,920
Business, professional, and nonprofit	9	8	10,881	118,632	129,513	121,638

Source: Vanguard, 2017.

Figure 100. Loan origination trend

Vanguard defined contribution active participants in plans offering loans



Source: Vanguard, 2017.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Monthly average (per 1,000 participants)	9.8	8.5	10.1	11.5	11.4	11.1	11.5	11.0	10.2	10.2
Annual increase (decrease) in loans issued per 1,000 participants	(7%)	(14%)	19%	14%	(1%)	(3%)	4%	(4%)	(7%)	0%

Source: Vanguard, 2017.

Plan withdrawals

Plan withdrawals allow participants to access their plan savings before a job change or retirement. Withdrawals are optional plan provisions and availability varies from plan to plan. They can be broadly classified into two categories—hardship and nonhardship withdrawals.

Hardship withdrawals allow participants to access a portion of their savings when they have a demonstrated financial hardship, such as receipt of an eviction or home foreclosure notice, but may also be used for such purposes as college education and purchase of a first home.

Nonhardship withdrawals include both post-age-59½ withdrawals and other withdrawals. Post-age-59½ withdrawals allow participants age 59½ and older to access their savings while they are working and are exempt from the 10% penalty on premature distributions. Some plans may also allow participants to withdraw employer profit-sharing contributions, after-tax contributions, or rollover assets while they are working.

Among all Vanguard DC plans in 2016, 84% allowed hardship withdrawals and 87% allowed plan withdrawals for those who have reached age 59½ (Figure 101). In 2016, less than 4% of Vanguard participants in plans offering any type of withdrawal used the feature, and the average portion of account balance withdrawn was about one-third (Figure 102).

About one-fifth were for hardship and four-fifths for nonhardship reasons. Assets withdrawn totaled 1% of Vanguard recordkeeping assets. Of the participants who took withdrawals, 91% took the money in cash, withdrawing on average about one-sixth of account savings. They had a median age of 52. Meanwhile, 9% of participants taking withdrawals rolled over their assets from the plan to an IRA.

A major contributor to this is likely participants older than 59½ rolling over their plan savings even as they continue to work and participate in the plan. Participants choosing a rollover had a median age of 61 and on average they rolled over about 75% of their account balances. These participants rolling over assets account for more than half of the assets being withdrawn.

In the aftermath of the Great Recession, the rate of new nonhardship withdrawals, such as post-age-59½ in-service or other withdrawals, has more than doubled from 2007 to 2016 (Figure 103). Nonhardship withdrawals also have a seasonal pattern and often spike in the first quarter of the year. This spike in activity is likely due to the withdrawal of employer profit-sharing contributions, which are frequently made early in the calendar year.

Over the same 2007-to-2016 period, the rate of new hardship withdrawals rose modestly and then fell modestly, while remaining at a low absolute level of 2% of participants. One of the reasons a participant can take a hardship withdrawal is to avoid foreclosure or eviction from a home. We believe that the surge in foreclosures resulting from the housing bubble did, in part, drive this increase. Hardship withdrawals have fluctuated within a relatively narrow range from 2008 to 2016.

Plan withdrawals are used infrequently in the aggregate. However, about half of participants taking a withdrawal in 2016 had also taken plan withdrawals in 2015, and about 1 in 10 in this group had taken a plan withdrawal in each of the past five years. Certain participants could, over time, jeopardize their retirement program if they continue to rely on this feature throughout their working careers.

Figure 101. Plan withdrawals, 2016

Vanguard defined contribution plans

Percentage of plans offering	
Hardship withdrawals	84%
Withdrawals after age 59	87

Source: Vanguard, 2017.

Figure 102. Use of all plan withdrawals, 2016

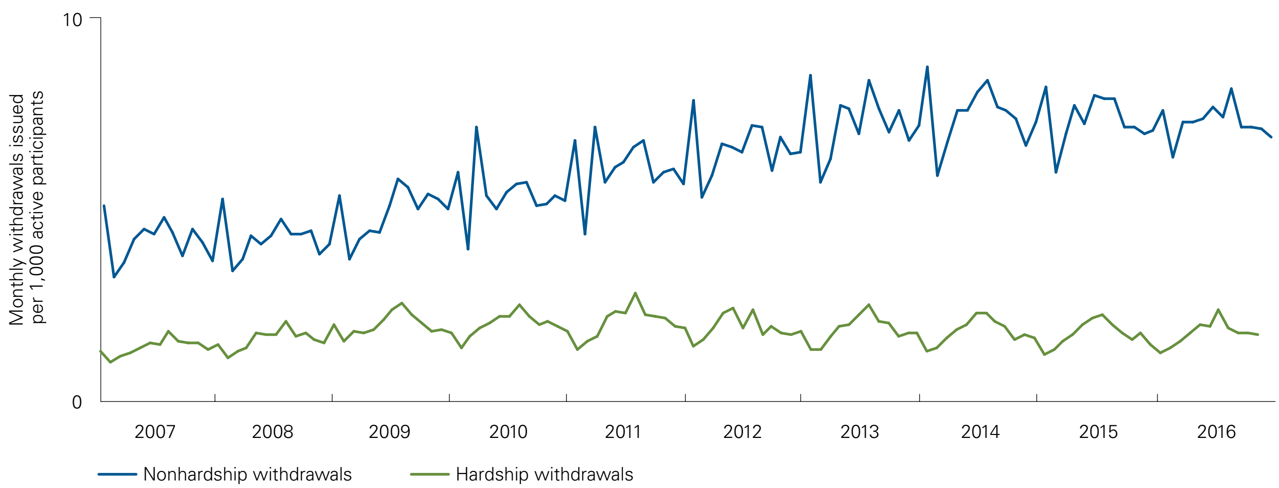
Vanguard defined contribution plans

	All	Cash	Rollover
Percentage of participants using	3.4%	3.1%	0.3%
Percentage of assets withdrawn	0.9	0.4	0.5
Percentage of participant account assets withdrawn	32.3	18.4	74.7
Median age	52	52	61

Source: Vanguard, 2017.

Figure 103. In-service withdrawal trend

Vanguard defined contribution active participants in plans offering loans



Source: Vanguard, 2017.

Average per 1,000 active participants	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nonhardship withdrawals	4.1	4.2	5.0	5.6	6.4	7.0	7.8	8.0	7.9	8.4
Hardship withdrawals	1.8	2.0	2.2	2.2	2.2	2.1	2.0	2.0	1.9	2.0

Annual increase (decrease) per 1,000 active participants										
Nonhardship withdrawals	5%	2%	19%	12%	14%	9%	11%	3%	(1%)	0%
Hardship withdrawals	6	11	10	0	0	(5)	(5)	0	(5)	0

Source: Vanguard, 2017.

Plan distributions and rollovers

When changing jobs or retiring, DC plan participants have the choice of preserving their savings for retirement (by retaining them in the plan or rolling them over to an IRA or another DC plan) or taking a cash lump sum (and spending or investing it). If they choose to roll over their savings to an IRA or another qualified retirement plan, participants avoid paying taxes on the accumulated balance. If participants spend the lump-sum distribution or invest it in a taxable account, they incur a possible income tax liability (and a 10% penalty if they are younger than 59½).

The problem of leakage from the retirement system—the spending of plan savings before retirement—is a concern for the future retirement security of plan participants. In the short run, participants incur taxes and possibly penalties on any amounts they spend. In the long run, because of the lost opportunity for compound earnings, they significantly increase the amount they need to save during the remainder of their working years.

Policymakers have attempted to discourage leakage in several ways. Generally, participants may keep their plan savings in their employer's plan if their account balance is more than $5,000. Also, plan distributions between $1,000 and $5,000 are generally rolled over automatically to an IRA, unless the participant elects otherwise. Balances less than $1,000 may be distributed to the terminated participant. Most plans have adopted these provisions—only 4% of plans permit deferral within the plan when balances are less than $1,000 (**Figure 104**). In some cases, the sponsor may allow participants to retain a balance of $1,000 or more in the plan—16% of plans permit these balances to remain in the plan.

Figure 104. Frequency of automatic distributions, 2016

Vanguard defined contribution plans

	Number of participants				
	All	<500	500–999	1,000–4,999	>5,000
Percentage of plans					
Remain in plan (no automatic distribution)	4%	4%	2%	4%	5%
Automatic cash-out if balance is <$1,000; remain in plan if balance is higher	16	13	16	18	27
Automatic cash-out if balance is <$1,000; rollover if balance is $1,000+ or <$5,000	80	83	82	78	68
Percentage of participants offered					
Remain in plan (no automatic distribution)	3%	4%	2%	4%	3%
Automatic cash-out if balance is <$1,000; remain in plan if balance is higher	30	14	16	18	36
Automatic cash-out if balance is <$1,000; rollover if balance is $1,000+ or <$5,000	67	82	82	78	61

Note: This analysis excludes approximately 100 403(b) plans and approximately 360,000 participants in those plans. Most 403(b) plan sponsors retain the right to execute these automatic distributions within their plan documents. However, due to the multiprovider environment many 403(b) plans operate within, and the coordination required to process these distributions, most 403(b) plan sponsors do not process them.

Source: Vanguard, 2017.

Most sponsors permit indefinite deferral of savings, meaning that participant balances can remain in the employer plan as long as they are above the $5,000 (or $1,000) threshold. However, 4% of sponsors require terminated participants to leave the plan by age 65 or age 70 **(Figure 105)**.

Six in 10 sponsors allow participants to establish installment payments and about 2 in 10 offer an annuity option for at least a portion of the plan assets. Nine percent of plans offered an annuity for a grandfathered source only and these annuity features are mostly associated with plan assets relating to a prior money purchase plan.

Twelve percent of plans offered an annuity as a general distribution option and one-third of these plans offered the annuity for statutory reasons or as a general market practice such as with 403(b) plans.

Finally, 19% of sponsors permit terminated participants to take partial ad hoc cash distributions. These plans cover 4 in 10 participants. If a plan does not offer ad hoc distributions, it requires any terminated participant seeking to use any part of retirement savings to withdraw or roll over the entire account balance. When it offers an ad hoc distribution feature, a plan can be used directly as a flexible source of income and withdrawals.

Figure 105. **Distribution options, 2016**

Vanguard defined contribution plans

	Number of participants				
	All	<500	500–999	1,000–4,999	>5,000
Percentage of plans					
Deferral	100%	100%	100%	100%	100%
Deferral only to age 65	3	3	3	2	4
Deferral only to age 70	1	<0.5	1	1	1
Installments other than RMDs	61	60	60	61	72
Annuity	12	13	9	10	15
Annuity grandfathered source only	9	10	8	8	6
Ad hoc partial distributions	19	9	24	30	45
Percentage of participants offered					
Deferral	100%	100%	100%	100%	100%
Deferral only to age 65	3	4	3	2	3
Deferral only to age 70	6	<0.5	1	1	8
Installments other than RMDs	70	62	60	62	73
Annuity	15	14	10	9	17
Annuity grandfathered source only	1	3	2	2	1
Ad hoc partial distributions	41	11	25	33	46

Source: Vanguard, 2017.

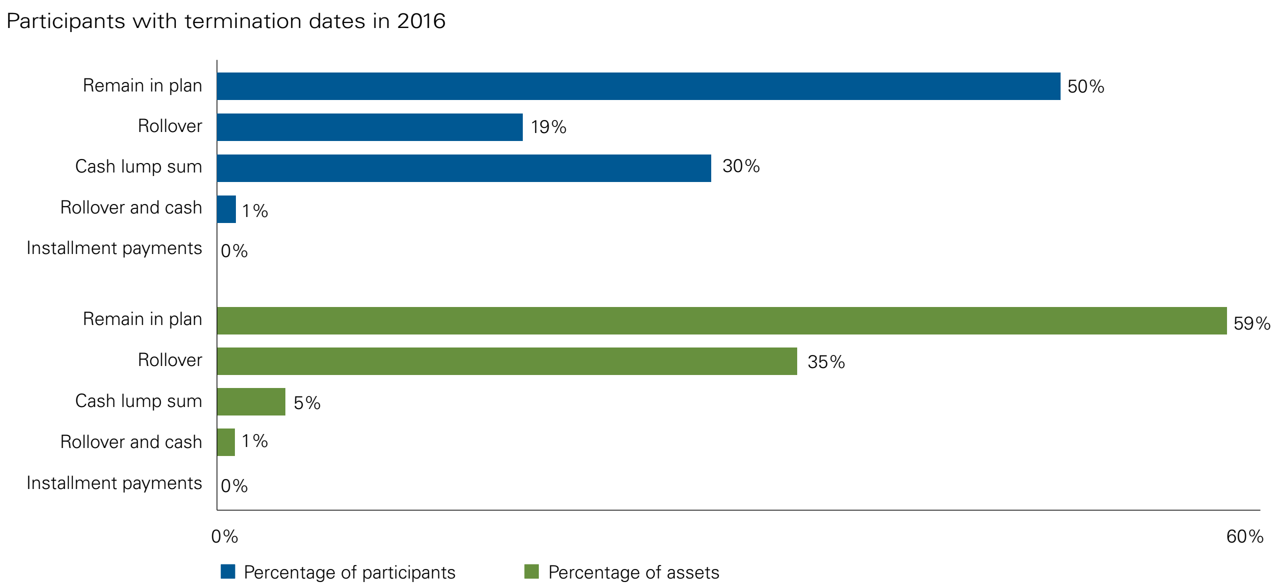
Participant and asset flows

Plan distributions can occur somewhat frequently as participants change jobs or retire, and they represent a large portion of total plan and participant assets. In 2016, 10% of participants left their employer and were eligible for a distribution. Their assets totaled 7% of Vanguard recordkeeping assets. In 2016, 69% of participants terminating employment preserved their assets and 31% took a cash distribution (Figure 106). More than 90% of the assets available for distribution were preserved for retirement because they were either retained in the prior employer's plan, were rolled over to an IRA, or rolled over to a new employer's plan. The percentage of participants choosing to take cash and presumably spending their savings has been fairly stable (Figure 107).

These figures differ from other reported statistics on plan distributions because they include participants who chose to retain their assets in their prior employer's plan when they changed jobs or retired. Among only those participants who took a distribution from their plan, more took cash distributions (31%) than rolled over their assets to another plan or IRA (19%). But in our view, a full assessment of plan distribution behavior must include participants who kept their assets within their prior employer's plan at the time of a job change or retirement.

Figure 106. Plan distributions, 2016

Vanguard defined contribution plans



Source: Vanguard, 2017.

Figure 107. Trends in distribution of plan assets

Vanguard defined contribution plans

Participants with termination dates in the given year

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Percentage of participants choosing										
Remain in plan	47%	48%	48%	48%	49%	48%	49%	49%	51%	50%
Rollover	24	21	21	22	21	21	22	22	20	19
Installment payments	0	0	0	0	0	0	0	0	0	0
Participants preserving assets	**71%**	**69%**	**69%**	**70%**	**70%**	**69%**	**71%**	**71%**	**71%**	**69%**
Cash lump sum	28%	30%	30%	28%	28%	29%	28%	28%	28%	30%
Rollover and cash	1	1	1	2	2	2	1	1	1	1
Percentage of assets available for distribution										
Remain in plan	51%	50%	59%	55%	54%	53%	54%	53%	56%	59%
Rollover	42	42	33	37	38	39	39	40	37	35
Installment payments	0	0	0	0	0	0	0	0	0	0
Assets preserved for retirement	**93%**	**92%**	**92%**	**92%**	**92%**	**92%**	**93%**	**93%**	**93%**	**94%**
Cash lump sum	5%	6%	6%	6%	5%	5%	5%	5%	5%	5%
Rollover and cash	2	2	2	2	3	3	2	2	2	1

Source: Vanguard, 2017.

Determinants of distribution behavior

Age has a significant impact on distribution behavior. Younger participants are more likely than older participants to cash out, rather than save, their plan distributions. Yet most of the assets available for distribution are still preserved for retirement, even by younger individuals. In 2016, 36% of participants in their 20s chose to cash out their plan assets, compared with 18% of participants in their 60s (Figure 108). In terms of assets, 85% of assets owned by participants in their 20s and 97% of assets owned by participants in their 60s were preserved. Account balances also have a significant impact on distribution behavior. Participants with smaller account balances are less likely to preserve their assets for retirement. Only about half of participants with balances of less than $1,000 kept their balance in a tax-deferred account (Figure 109). However, once balances reach $100,000, more than 90% of participants chose to preserve their assets.

A more nuanced view emerges when you consider both age and account balance. At most asset levels, younger participants are more likely to preserve their assets (Figure 110). While participants in their 40s did overwhelmingly preserve their assets for retirement, at most asset levels they are slightly more likely than any other age group to cash out their DC plan when changing jobs.

Our analysis thus far reflects the behavior of individuals who terminated employment in a given year, either by changing jobs or retiring. But it is also true that participants who terminated in previous years retain the right to withdraw their plan assets from their prior employer's plan at any time and roll over or spend the money.

Figure 108. Plan distribution behavior by age, 2016

Vanguard defined contribution plans

Participants with termination dates in 2016

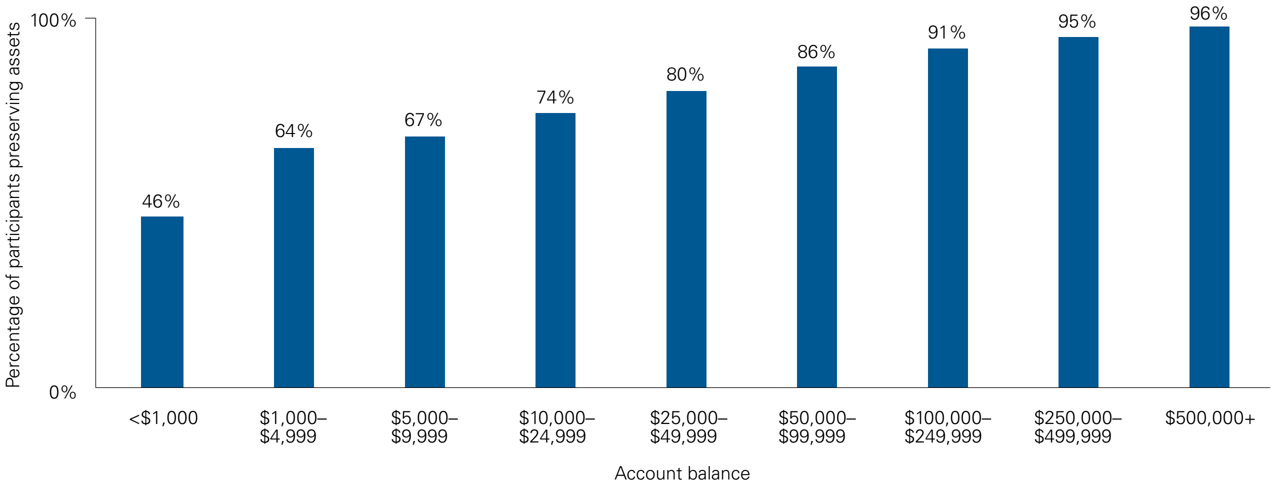
	20s	30s	40s	50s	60s	70s	All ages
Percentage of participants choosing							
Remain in plan	51%	52%	50%	51%	46%	24%	50%
Rollover	13	15	17	23	34	32	19
Installment payments	0	0	0	0	1	18	0
Participants preserving assets	**64%**	**67%**	**67%**	**74%**	**81%**	**74%**	**69%**
Cash lump sum	36%	32%	32%	24%	18%	24%	30%
Rollover and cash	0	1	1	2	1	2	1
Percentage of assets available for distribution							
Remain in plan	66%	67%	64%	62%	51%	34%	59%
Rollover	19	22	26	32	46	59	35
Installment payments	0	0	0	0	0	1	0
Assets preserved for retirement	**85%**	**89%**	**90%**	**94%**	**97%**	**94%**	**94%**
Cash lump sum	14%	10%	8%	4%	2%	4%	5%
Rollover and cash	1	1	2	2	1	2	1

Source: Vanguard, 2017.

Figure 109. Plan distribution behavior by account balance, 2016

Vanguard defined contribution

Participants with termination dates in 2016

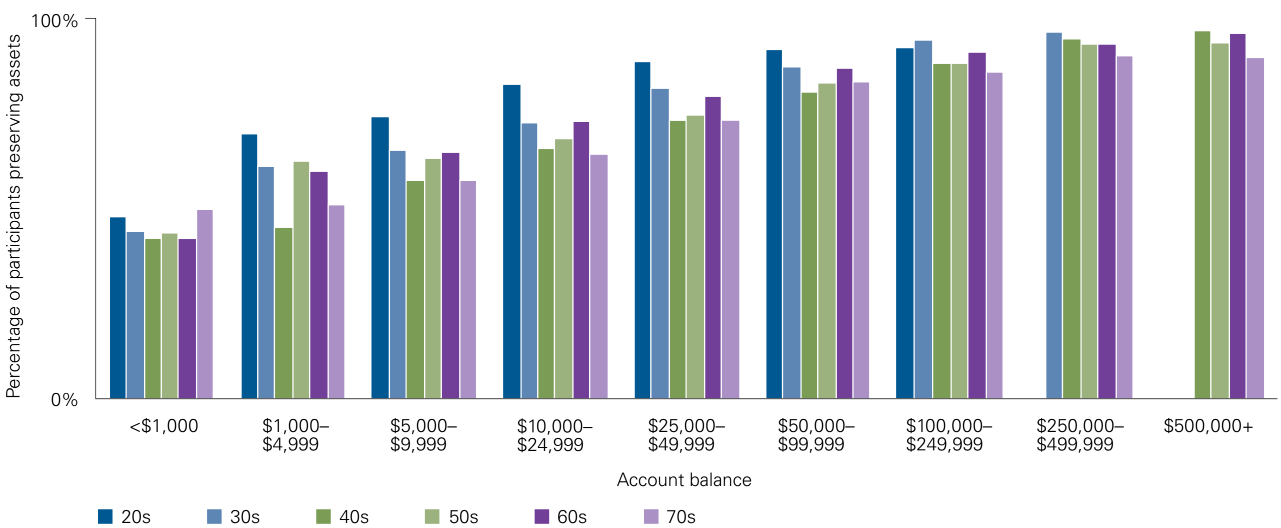


Source: Vanguard, 2017.

Figure 110. Plan distribution behavior by age and account balance, 2016

Vanguard defined contribution plans

Participants with termination dates in 2016



Note: Cells with less than 100 data points are omitted.

Source: Vanguard, 2017.

A more optimistic picture of plan distribution behavior emerges if we analyze the total plan assets available for distribution at any given time. During 2016, one-third of all Vanguard qualified plan participants could have taken their plan account as a cash distribution because they had separated from service in the current year or prior years. However, just 17% of participants eligible for a cash distribution took one, while the vast majority (82%) continued to preserve their plan assets for retirement (**Figure 111**). In terms of assets, 97% of all plan assets available for distribution were preserved—either rolled over to an IRA or other qualified plan, or left in the former employer's plan. Only 3% of assets were distributed in cash.

Access methods and the internet

Within DC plans, a variety of services have evolved to foster participant control over plan savings and to facilitate savings, investment, and withdrawal decisions—including phone associates, voice-response systems, and internet and mobile access.

Participant access to retirement accounts is quite varied, ranging from those who do not contact their provider at all in a given year to those who do so multiple times a month.

Frequency of account access

In 2016, 36% of plan participants never contacted Vanguard regarding their plan account (**Figure 112**). However, 64% did contact Vanguard—a ratio that has improved from 2007, when 56% of participants contacted Vanguard (**Figure 113**). One reason for this may be the broad adoption of internet and mobile options; another may be the strong equity markets, which may have led to higher levels of investor attention to their accounts. For participants who did not contact Vanguard, their sole method for reviewing plan balances was quarterly account statements. These participants also received Vanguard's participant electronic newsletter, fee and other regulatory disclosures, and education or communication programs in print or via electronic means.

Figure 111. Alternative view of distribution of plan assets, 2016

Vanguard defined contribution plans

All terminated participants with access to plan savings in the given year

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Percentage of participants choosing										
Remain in plan	65%	66%	67%	65%	68%	67%	68%	68%	69%	67%
Rollover	16	14	13	14	13	13	14	14	13	12
Installment payments	2	2	2	2	2	2	3	3	3	3
Participants preserving assets	**83%**	**82%**	**82%**	**81%**	**83%**	**82%**	**85%**	**85%**	**85%**	**82%**
Cash lump sum	16%	17%	17%	18%	16%	16%	14%	14%	14%	17%
Rollover and cash	1	1	1	1	1	2	1	1	1	1
Percentage of assets available for distribution										
Remain in plan	74%	72%	78%	75%	75%	75%	76%	76%	77%	78%
Rollover	22	23	17	20	20	20	20	20	19	18
Installment payments	1	1	1	1	1	1	1	1	1	1
Assets preserved for retirement	**97%**	**96%**	**96%**	**96%**	**96%**	**96%**	**97%**	**97%**	**97%**	**97%**
Cash lump sum	2%	3%	3%	3%	3%	3%	2%	2%	2%	2%
Rollover and cash	1	1	1	1	1	1	1	1	1	1

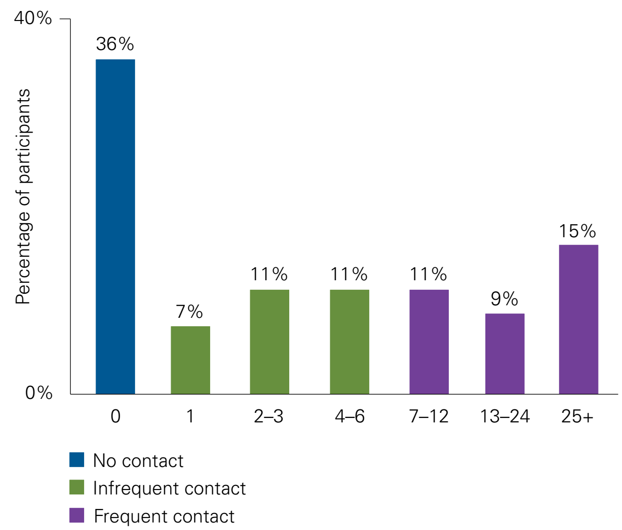
Source: Vanguard, 2017.

Three in ten participants contacted Vanguard intermittently. This group interacted with Vanguard between one and six times per year through a phone associate, an automated voice-response system, mobile application, or the internet. Thirty-five percent of participants contacted Vanguard frequently. This group, using all channels, contacted Vanguard monthly, if not two or three times a month or more. This level of contact may seem high, but keep in mind, for those using a mobile application or the internet, a brief logon to examine account balances constitutes a unique contact event.

Account balances are a strong influence on contact behavior. The larger a participant's balance, the more likely they are to be proactive in obtaining information about their Vanguard plan account. Participants with account balances of more than $100,000—about one-quarter of all Vanguard participants—contacted Vanguard at least monthly, if not more, compared with a median level of two contacts per year for the entire participant population.

Figure 112. Participant contact frequency, 2016

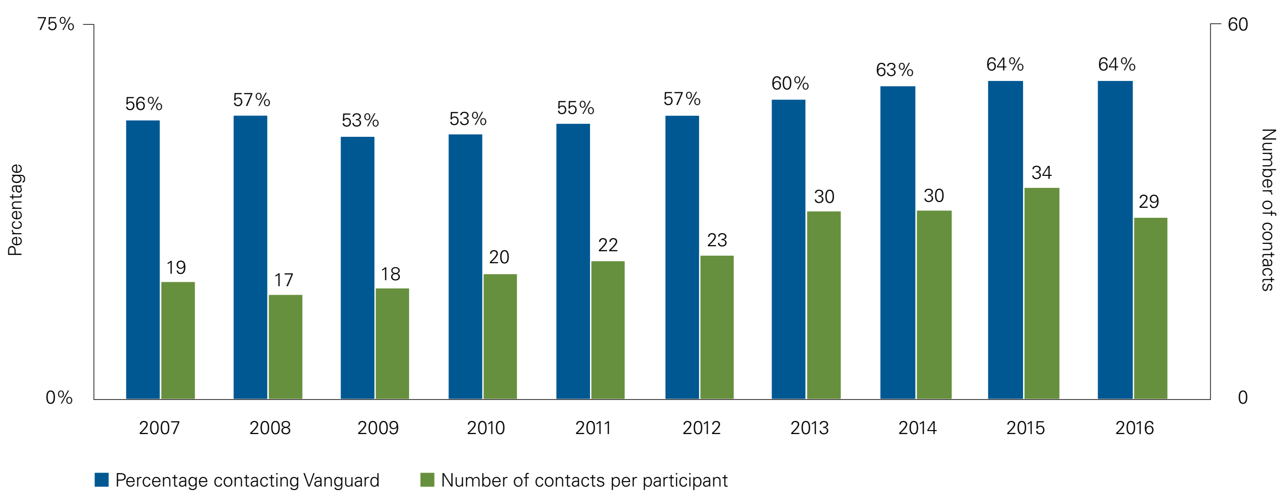
Vanguard defined contribution plans



Source: Vanguard, 2017.

Figure 113. Participant contract trend

Vanguard defined contribution plans



Source: Vanguard, 2017.

Types of account access

Participants have four access channels at their disposal: toll-free phone calls to telephone associates, toll-free phone calls to an automated voice-response system, a mobile application, and the internet. When measured in terms of total participant use, the internet remained the most widely used channel in 2016—59% used the internet, compared with 17% who used telephone associates (**Figure 114**). Introduced between 2009 and 2011, mobile applications were used by 21% of participants.

In terms of total contacts, the internet clearly dominates. Web interactions accounted for 73% of all participant contacts in 2016. Participants using this contact method averaged about 23 web interactions per year. Each distinct logon is counted as a unique contact event. Mobile access, though relatively new, was the second most common channel, accounting for 22% of all contacts—or eleven times the number of phone contacts.

The portion of participants selecting the internet as an access channel has grown by 37% since 2007 (**Figure 115**). During this interval, the portion of participants selecting a phone associate as an access channel has declined by about 40%, and the portion choosing the voice-response system has increased modestly. Given current trends, the dominance of the internet as a contact channel is likely to continue. We also expect adoption of the mobile applications will continue to grow dramatically over the next few years.

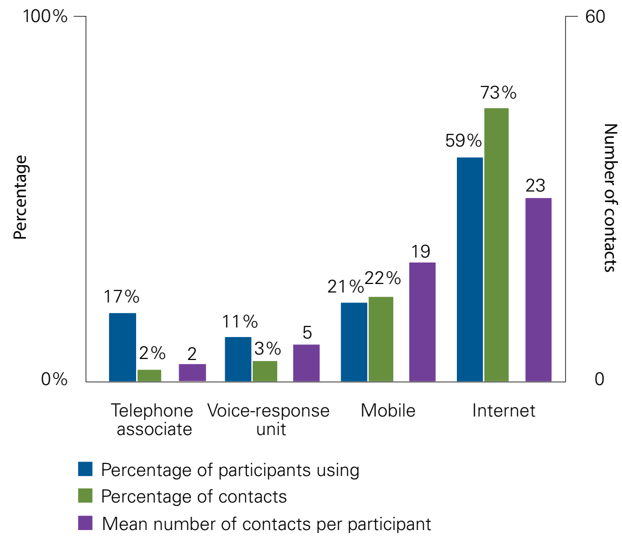
Participant registration for internet access to their DC plan account has fueled this growth. Seventy percent of participants were registered for the internet in 2016, about 20% higher than in 2007 (**Figure 116**).

Increasingly, participants are choosing the internet as the preferred access channel for transactions, as 75% of all transactions were processed via the internet during 2016, and another 13% were processed via mobile devices (**Figure 117**). Moreover, more than 90% of all exchanges, payroll deferral, and contribution allocation changes occurred on the internet or mobile devices.

Figure 114. Account access methods, 2016

Vanguard defined contribution plans

Participant account access



Source: Vanguard, 2017.

Figure 115. Account access trend

Vanguard defined contribution plans

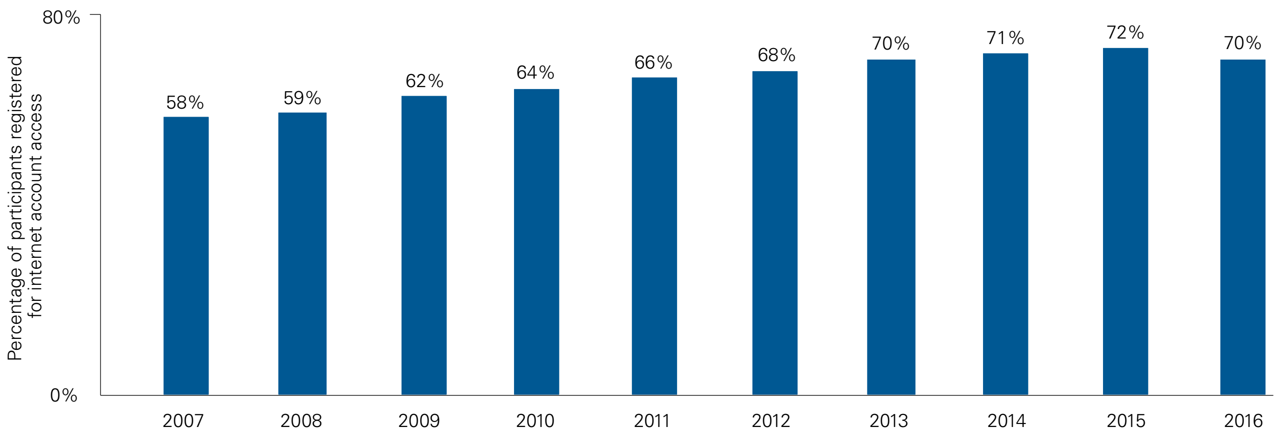
Percentage of participants contacting Vanguard via . . .

	2007	2016	Change
Voice, telephone associate, or internet	56%	64%	14%
Telephone associate	28	17	(39)
Voice-response unit	7	11	57
Mobile		21	
Internet	43	59	37
Participants registered for internet access	58	70	21

Source: Vanguard, 2017.

Figure 116. Internet access trend

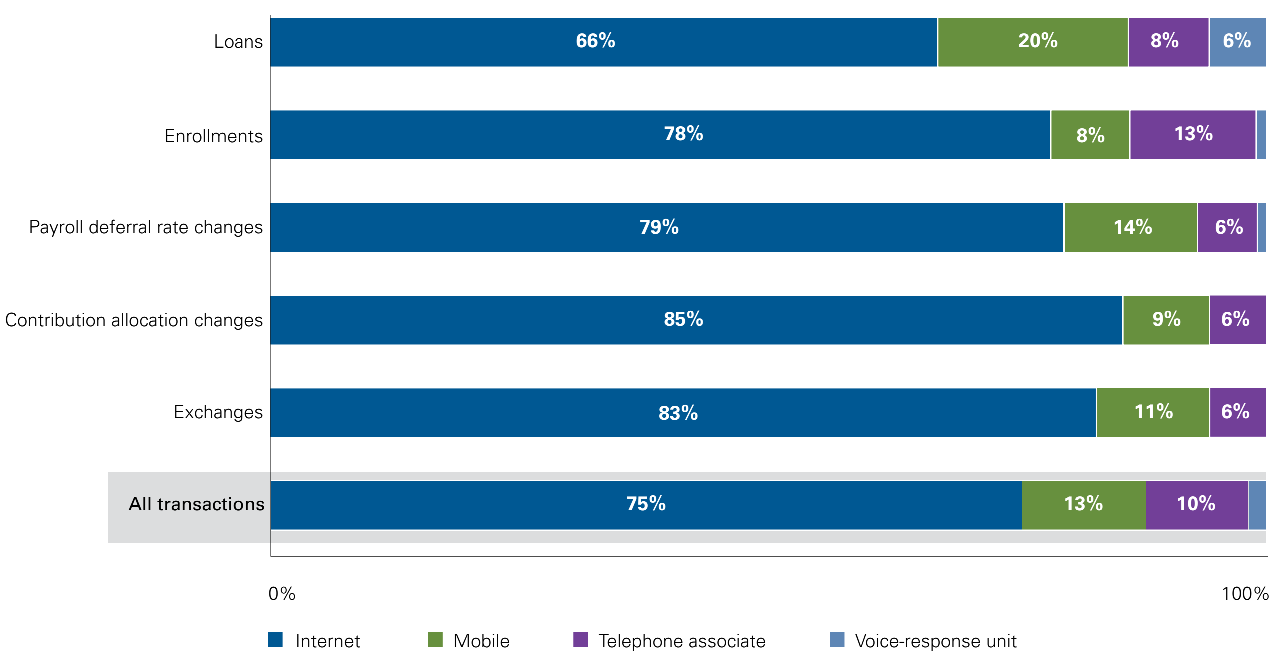
Vanguard defined contribution plans



Source: Vanguard, 2017.

Figure 117. Participant channel utilization, 2016

Vanguard defined contribution plans



Source: Vanguard, 2017.

Methodology

The Vanguard data included in this report is drawn from several sources.

Defined contribution clients. This universe consists of about 1,900 qualified plans, 1,500 clients, and 4.4 million participants for which Vanguard directly provides recordkeeping services. About 9 in 10 of these plans have a 401(k) or 403(b) employee contributory feature; the other 1 in 10 is an employer contributory DC plan, such as a profit sharing or money purchase plan, in which investments are directed by participants. Unless otherwise noted, all references to "Vanguard" are to this universe, and all data is as of December 31, 2016.

Vanguard participation and deferral rates. Data on participation and deferral rates is drawn from a subset of Vanguard recordkeeping clients for whom we perform nondiscrimination testing. Selected plan design features are also derived from this data. For the 2016 analysis, the subset is composed of plans that complete their testing by March and represents approximately one-third of the clients for whom we perform testing. Plans that complete their testing by March generally have lower participation rates and generally include plans with concerns related to passing testing. When all plans have completed their testing by the end of 2017, the participation rates improve. Plan design features derived from this data also improve. Interestingly, the deferral rates do not change significantly.

Based on the trends experienced over the prior three years we have estimated participation rates for 2016. The estimations use a combination of linear extrapolation and subjective estimation. The same approach is applied to plan design features derived from this data. We will continue to restate these results in the following year based on the final compliance testing results.

The 2015 restated analysis includes approximately 1,000 plans and 1.6 million participants and eligible nonparticipants. Almost all of these plans are 401(k) or paired 401(k)/profit-sharing plans. Our 2014 data includes 900 plans and 1.9 million participants and eligible nonparticipants. Our 2013 data includes 900 plans and 1.8 million participants and eligible nonparticipants. Income data used in participation and deferral rate analyses also comes from this subset of plans.

Household income data. Household income data for asset allocation, account balance, and loan demographics is from an external source overlaid onto Vanguard participant data. This external household income data covers approximately 55% of the Vanguard participant universe and is the most recent data available.

How America Saves: Small business edition

We also make available *How America Saves: Small business edition* which is a benchmarking analysis for the small business plan we provide services to. Launched in 2011, the Vanguard Retirement Plan Access™ (VRPA) offer is a comprehensive service for retirement plans with up to $20-plus million in assets. Ascensus, Inc.—a nationally recognized recordkeeping firm—provides the administration of these plans on Vanguard's behalf. Through Vanguard Retirement Plan Access we served an additional 6,500 plan sponsors with more than 270,000 participants as of year-end 2016.

Industry benchmark data supplements to *How America Saves*

Industry benchmark data supplements to *How America Saves* are available for the following sectors:

- Ambulatory health care services
- Engineering
- Finance and insurance
- Information firms
- Legal services
- Manufacturing
- Mining, oil, and gas extraction
- Technology

If the sector you are interested in is not available at this time, please contact your sales executive or relationship manager.

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