Stretching the match: Unintended effects on plan contributions

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- One strategy proposed to increase plan contributions, in plans not opting for automatic enrollment, is to "stretch the match." When defined contribution plan sponsors stretch the match, they apply an existing dollar match to a higher contribution rate. For example, instead of matching 100% on the first 4% of pay, they match 50% on the first 8% of pay. The idea is that the higher match threshold will encourage participants to contribute more to the plan.

- We find that higher match thresholds are typically associated with lower plan participation and lower employee contribution rates. However, higher match values are typically associated with higher participation and higher employee contribution rates.

- Absent a case study of a plan that stretched the match, we analyze a group of plans with match formulas that mimic or simulate this strategy. We find that contribution rates decline by 25% to 50% when the match is stretched.

- Automatic enrollment remains a superior strategy for plan sponsors seeking to raise plan contributions. Counterintuitively, stretching the match does not appear to lead to higher plan contribution rates. Any incentive to obtain the full stretched match is more than offset by a reduction in plan participation rates.

Introduction

The idea behind stretching the match in a defined contribution plan is that a higher match threshold—for instance, a match of 50% on 8% of pay instead of 100% on 4% of pay—will encourage participants to contribute more to their plan.

The level where the match is maximized acts as an anchor for some individuals, and research has found that highlighting higher savings thresholds raises contributions relative to highlighting lower thresholds.[1] In previous research, we found that 1 in 5 participants in voluntary enrollment plan designs selected a deferral rate at the match maximization level, and half chose a higher rate.[2] These findings, and others, have led to the idea that stretching a match is a strategy to increase overall contribution rates for plan participants at no additional cost to the employer.

When plan sponsors stretch the match, they apply an existing dollar match to a higher contribution rate. For example, instead of matching the first 4% of employee-elective deferrals at 100%, the plan sponsor would match the first 8% of employee-elective deferrals at 50%. In each of these two designs, the employer would contribute a maximum match of 4%. Under the first scenario, the individual contributing at the match maximization level has a total plan contribution rate of 8%. In the second scenario, if the individual selected a deferral rate where the match was maximized, the total plan contribution rate would rise by 50% under the stretched match to 12%.

In this paper, we assess the effectiveness of stretching the match on plan participants' overall contribution rates.

Empirical approach

Our study is based on 328 voluntary enrollment plans with 452,783 eligible nonhighly compensated employees (NHCEs) in 2016 (**Figure 1**).[3] Each of these plans has a single- or multi-tier match formula.[4] We limit our study to eligible employees in voluntary enrollment plans, because it is well-known that the defaults chosen in automatic enrollment plan designs have a strong effect on plan participant behaviors.[5] We examine the eligible NHCE population, including those eligible employees who were not participating and, therefore, had a 0% employee-elective deferral rate. We limit our study to eligible NHCEs because we are interested in strategies that increase broad-based retirement saving and not just contributions by highly compensated participants. In our view, the ultimate test is whether stretching the match influences the contribution behavior of this important constituency.[6]

1 For an exploration of this effect, see Choi, James J., Emily Haisley, Jennifer Kurkoski, and Cade Massey, 2012. *Small Cues Change Savings Choices*, NBER Working Paper No. 17843. Cambridge, Mass.: National Bureau of Economic Research; available at http://www.nber.org/papers/w17843.

2 See Utkus, Stephen P., and Young, Jean A., 2018 How America Saves 2018. Valley Forge, Pa.: The Vanguard Group.

3 We are examining a subset of the 4.4 million participants on our platform who are in voluntary enrollment plans for which we have completed compliance testing for the 2016 plan year. We use 2016 data because the 2017 compliance testing data will not be available until January 2019. Plans have until the end of 2018 to complete 2017 compliance testing. NHCEs in 2016 were those who earned less than $120,000 in the prior plan year.

4 Plans with single-tier matching formulas provide a match based on one threshold—for example, $0.50 per dollar on the first 6% of pay. Multi-tier formulas provide a varying match threshold—for example, $1.00 per dollar on the first 3% of pay and $0.50 per dollar on the next 2% of pay. Match formulas may also be structured as single- or multi-tier formulas with a maximum dollar contribution—for example, a $2,000 maximum. Finally, match formulas may be based on age, tenure, or similar variables.

5 For an exploration of this effect, see Clark, Jeffrey W., and Jean A. Young, 2018. Automatic Enrollment: The Power of the Default, Valley Forge, Pa.: The Vanguard Group.

6 We acknowledge the potential bias of this empirical approach. Plans with higher match thresholds may be reflective of higher taste for unobserved saving (among employers or workers) and/or observed higher wages of those employee populations. These factors empirically might bias our results to be more favorable to stretching the match than they otherwise might be. So in this sense our approach, if biased, would be in favor of stretching the match.

The study population had a participation rate of 56% and a median deferral rate of 2%. The median income for these NHCEs was $48,264, the median age was 42, the median tenure was 5 years, and 62% were male. As expected, plan participants' wages were about 70% higher than nonparticipants'. Participants also were older and had longer tenure.

We first assess the potential effectiveness of stretching a match by comparing the effect of match values and thresholds on employee-elective deferral rates for eligible NHCEs.[7]

Next we analyze plans with formulas that mimic a stretched match. We refer to these as plans with paired match formulas. Our paired plan match formulas are: 100% on 3% of pay paired with 50% on 6% of pay, 100% on 4% of pay paired with 50% on 8% of pay, and 100% on 5% of pay paired with 50% on 10% of pay.

The ideal empirical method for testing the effectiveness of stretching the match would be to evaluate the contribution behavior of plan participants in one or more plans that have adopted the strategy. Unaware of plans in our dataset that have stretched the match, we chose a second-best strategy, comparing the effects of different match structures across plans.

Figure 1. Characteristics of study sample

Vanguard defined contribution plan eligible nonhighly compensated employees as of December 2016

Number of plans	328
Number of eligible employees	452,783
Number of participants	253,989
Participation rate	56%

Participants	Median
Deferral rate	6.0%
Account balance	$24,112
Income	$59,167
Age	44
Tenure (years)	8
Percentage male	61%

Nonparticipants	Median
Deferral rate	0%
Account balance	$0
Income	$34,913
Age	39
Tenure (years)	3
Percentage male	63%

Eligible employees	Median
Deferral rate	2.0%
Account balance	$4,087
Income	$48,264
Age	42
Tenure (years)	5
Percentage male	62%

Note: Nonhighly compensated employees are those who earned less than $120,000 in the prior plan year.
Source: Vanguard, 2018.

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[7] Highly compensated employees may be limited in the amount they can save in their 401(k) plans by the level of participation and savings of NHCEs. Our systems do not enable us to identify which highly compensated participants are constrained by nondiscrimination testing results. In addition, the employee-elective deferral rates for highly compensated participants may also be constrained by the annual limit on contributions to defined contribution plans ($53,000 in 2016). The annual limit on contributions encompasses employee-elective deferrals, employer matching contributions, and any other employer contributions.

Employer matching contributions

The 328 plans in our study utilized 70 unique single- and multi-tier match formulas. Given the array 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 50% on the first 6% of pay promises the same matching contribution—3% of pay—as a formula of 100% on the first 3% of pay.
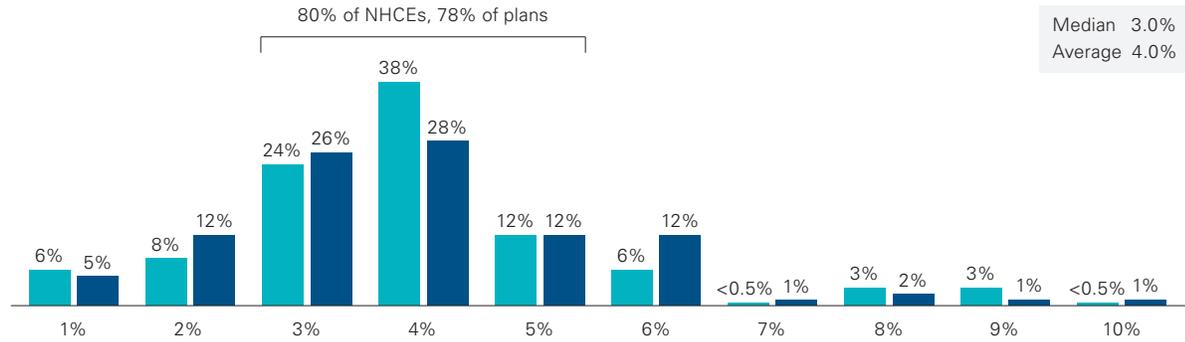
The promised value of the match varies substantially from plan to plan. Among plans with single- or multi-tier match formulas, 78% of plans (covering 80% of NHCEs) promised a match of between 3% and 6% of pay (**Figure 2, Panel A**). The median value of the promised match was 3.0% of pay; the average value, 4.0%.

Another way to assess matching formulas is to calculate the employee-elective deferral needed to realize the maximum value of the match. Eight in 10 plans (covering about 7 in 10 NHCEs) required participants to defer between 4% and 6% of their pay to receive the maximum employer-matching contribution (**Figure 2, Panel B**). The median employee-elective deferral required to maximize the match was 5.0% of pay; the average value, 5.1%.
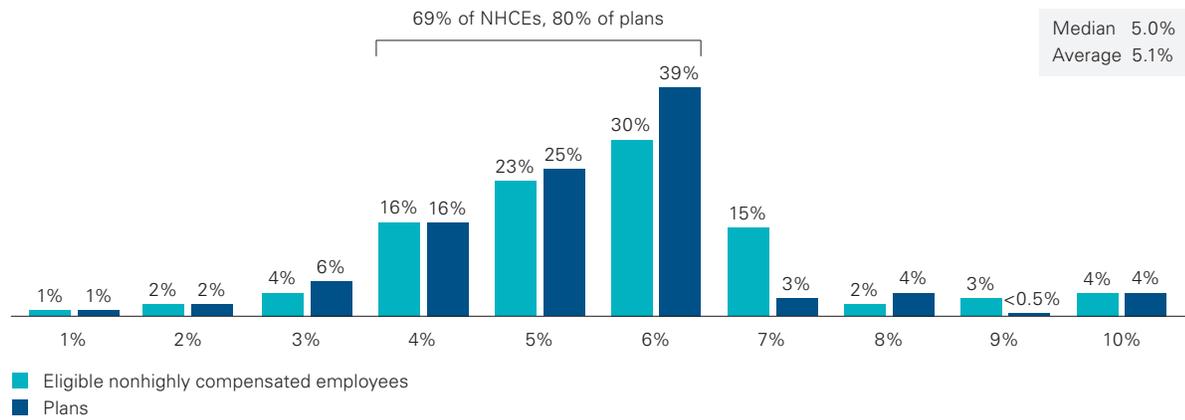
Figure 2. Distribution of promised match values and thresholds

Vanguard voluntary enrollment defined contribution plans as of December 2016

a. Match value

80% of NHCEs, 78% of plans

Median 3.0%
Average 4.0%

	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Eligible NHCEs	6%	8%	24%	38%	12%	6%	<0.5%	3%	3%	<0.5%
Plans	5%	12%	26%	28%	12%	12%	1%	2%	1%	1%

b. Threshold value

69% of NHCEs, 80% of plans

Median 5.0%
Average 5.1%

	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Eligible NHCEs	1%	2%	4%	16%	23%	30%	15%	2%	3%	4%
Plans	1%	2%	6%	16%	25%	39%	3%	4%	<0.5%	4%

■ Eligible nonhighly compensated employees
■ Plans

Source: Vanguard, 2018.

Employee-elective deferral model

To better understand the factors influencing employee-elective deferral rates for NHCEs in these plans, we used a regression model to investigate the interaction between employee deferral rates and demographic and plan design features.[8] This statistical technique helps us distinguish the unique effect of a given factor on deferral rates, controlling on the broad differences that exist among eligible NHCEs and plan designs. We model both participants and the eligible employee population; the former includes only those actively contributing, while the latter includes both contributors and nonparticipants with a 0% deferral rate. The predicted employee-elective deferral rate in our model was 3.9% for the typical individual in our study (**Figure 3**). The predicted participant deferral rate in our model was 7.1% for the typical individual in our study.

It is well-established that employee demographics have an effect on deferral and participation rates in voluntary enrollment plans. In our model, deferral and participation rates generally rose with age. Eligible employees age 60 or older had deferral rates 2.2 percentage points higher—a relative increase of 56%. Deferral rates also rose with tenure. Eligible employees with less than 2 years of tenure had deferral rates 2.2 percentage points lower—a relative decrease of 56%. Deferral rates rose with compensation as well. Eligible employees earning less than $30,000 had deferral rates that are 2.9 percentage points lower (a relative decrease of 74%), while eligible employees earning more than $90,000 had deferral rates that are 4.7 percentage points higher (a relative increase of 121%). Finally, consistent with prior findings, women had higher deferral rates than men.[9]

It is also well-established that plan designs have an effect on deferral rates in voluntary enrollment plans. As noted previously, the match threshold level serves as a signal, frame, or anchor for some individuals. Lower match thresholds appear to raise deferral and participation rates, while higher match thresholds generally appear to have the opposite effect. The reverse occurs with match values: Higher match values appear to incent higher deferral and participation rates, while lower match values appear to lead to lower deferral rates. Finally, larger employers had lower participation rates.

Controlling for employee demographic variables, plan design features, and employer characteristics, we find that higher match thresholds are typically associated with lower employee saving rates.

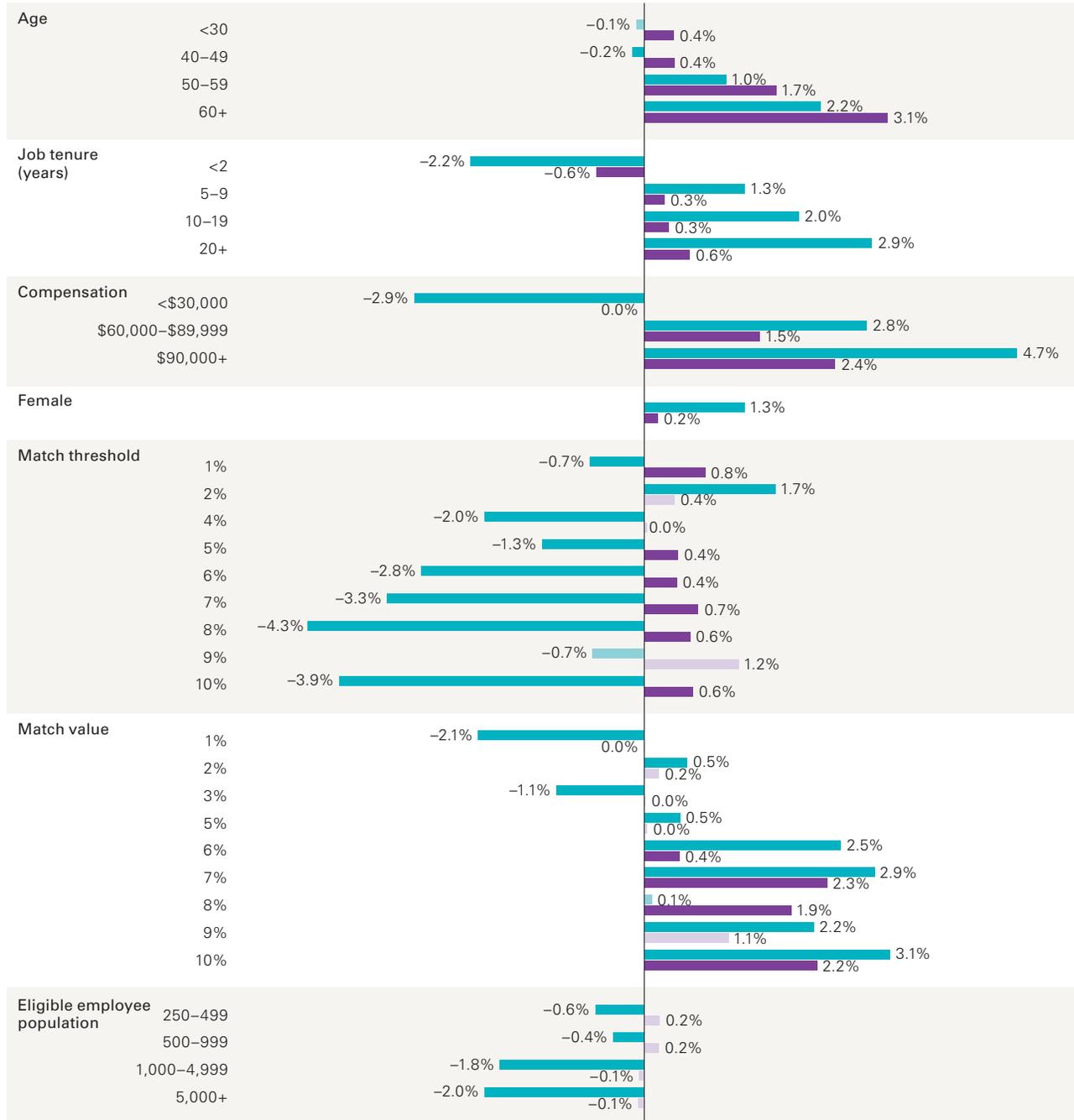8 See the Appendix for a detailed explanation of the regression models.

9 See Young, Galina, and Young, Jean A., 2019. Women Versus Men in DC Plans, Valley Forge, Pa.: The Vanguard Group.

Figure 3. Predicted employee-elected deferral rates in voluntary enrollment plans

Vanguard defined contribution plan eligible nonhighly compensated employees as of December 2016

Predicted eligible employee deferral rate: 3.9%

Predicted participant deferral rate: 7.1%

Category		All eligible employees	Plan participants
Age	<30	−0.1%	0.4%
	40–49	−0.2%	0.4%
	50–59	1.0%	1.7%
	60+	2.2%	3.1%
Job tenure (years)	<2	−2.2%	−0.6%
	5–9	1.3%	0.3%
	10–19	2.0%	0.3%
	20+	2.9%	0.6%
Compensation	<$30,000	−2.9%	0.0%
	$60,000–$89,999	2.8%	1.5%
	$90,000+	4.7%	2.4%
Female		1.3%	0.2%
Match threshold	1%	−0.7%	0.8%
	2%	1.7%	0.4%
	4%	−2.0%	0.0%
	5%	−1.3%	0.4%
	6%	−2.8%	0.4%
	7%	−3.3%	0.7%
	8%	−4.3%	0.6%
	9%	−0.7%	1.2%
	10%	−3.9%	0.6%
Match value	1%	−2.1%	0.0%
	2%	0.5%	0.2%
	3%	−1.1%	0.0%
	5%	0.5%	0.0%
	6%	2.5%	0.4%
	7%	2.9%	2.3%
	8%	0.1%	1.9%
	9%	2.2%	1.1%
	10%	3.1%	2.2%
Eligible employee population	250–499	−0.6%	0.2%
	500–999	−0.4%	0.2%
	1,000–4,999	−1.8%	−0.1%
	5,000+	−2.0%	−0.1%

■ All eligible employees
■ Plan participants

Notes: Nonhighly compensated employee variables are measured against a reference of: age 30–39, tenure 2–4 years, compensation $30,000–$59,999, and male. Plan effects are measured against a reference of: match threshold 3%, match value 4%, and plans with less than 250 eligible employees. The darker bars are statistically significant at the 95% level. The lighter bars are statistically insignificant. See the Appendix for model specification.

Source: Vanguard, 2018.

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Paired formula plans analysis

As noted previously, unaware of plans in our dataset that have stretched the match, we chose in this paper a second-best strategy, comparing the effects of different match structures across plans. However, among the 70 match formulas used by these plans, nearly one-third have designs with match formulas that mimic a stretched match. We refer to these as plans with paired match formulas. Our paired plan match formulas are: 100% on 3% of pay paired with 50% on 6% of pay, 100% on 4% of pay paired with 50% on 8% of pay, and 100% on 5% of pay paired with 50% on 10% of pay.

The 100% match plans had participation rates that are 20% to more than two times higher than the plans that stretch the same match value to a higher threshold (**Figure 4**). Participant employee-elective deferral rates

Figure 4. Characteristics of paired plans

Vanguard defined contribution plan eligible nonhighly compensated employees as of December 2016

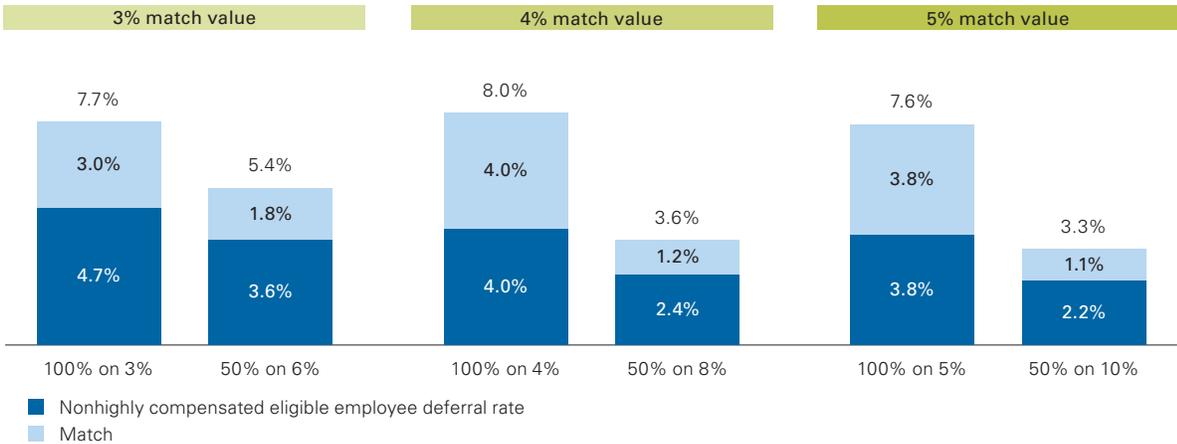|	Match value 3%		Match value 4%		Match value 5%	
	100% of first 3% of pay	50% of first 6% of pay	100% of first 4% of pay	50% of first 8% of pay	100% of first 5% of pay	50% of first 10% of pay
Number of plans	11	59	23	6	20	5
Number of eligible employees	5,159	82,155	12,979	2,252	20,438	15,879
Number of participants	3,153	42,333	8,336	757	12,796	5,523
Participation rate	61%	52%	71%	34%	63%	35%
Participants						
Median deferral rate	5.0%	6.0%	4.0%	6.0%	5.0%	5.0%
Median account balance	$18,968	$25,618	$19,434	$14,177	$25,668	$12,131
Median income	$62,635	$68,276	$55,962	$61,452	$48,840	$48,571
Median age	35	46	44	45	42	38
Median tenure (years)	3	9	6	6	9	6
Percentage male	45%	72%	42%	74%	59%	57%
Nonparticipants						
Median deferral rate	0%	0%	0%	0%	0%	0%
Median account balance	$0	$0	$0	$0	$0	$0
Median income	$34,932	$58,831	$38,417	$40,393	$30,165	$20,797
Median age	42	43	38	35	33	30
Median tenure (years)	5	6	3	2	3	2
Percentage male	59%	83%	42%	96%	58%	64%
Eligible employees						
Median deferral rate	3.0%	1.0%	3.0%	0%	3.0%	0%
Median account balance	$8,367	$4,392	$6,655	$0	$7,190	$0
Median income	$58,824	$63,564	$48,950	$45,177	$39,999	$26,889
Median age	39	45	41	38	39	33
Median tenure (years)	4	7	4	3	6	3
Percentage male	50%	78%	42%	89%	58%	61%

Source: Vanguard, 2018.

are 20% to 50% higher in two of the stretch match plans, and in the other plan they are identical. In two of the paired matches, employees are between 3 and 6 years older in the 100% match plans, and in the other pair employees are younger. In two of the paired matches, tenure is longer for the 100% match plans; in the other pair, tenure is shorter.

For each of these three paired matches we used regression models to estimate deferral rates controlling for demographic and plan design features.[10] We include both participants and eligible nonparticipants with a 0%

deferral rate. NHCEs had higher predicted employee-elective deferral rates in 100% match designs than in the paired stretched match designs (**Figure 5**). Elected deferral rates were 73% higher in designs with a 5% match value, 67% higher in the 4% match value plans, and 31% higher in the 3% match value plans. The estimated deferral rate for the 100% match designs results in participants' receiving more of the full promised match. Plan contribution rates, which include the value of the employer match, were more than double in designs with a 5% or 4% match value and about 40% higher in the 3% match value plans.

Figure 5. Stretching the match paired plans

Predicted nonhighly compensated employee contribution rate by match formula as of December 2016

	3% match value	4% match value	5% match value

	100% on 3%	50% on 6%	100% on 4%	50% on 8%	100% on 5%	50% on 10%
Total	7.7%	5.4%	8.0%	3.6%	7.6%	3.3%
Match	3.0%	1.8%	4.0%	1.2%	3.8%	1.1%
Deferral	4.7%	3.6%	4.0%	2.4%	3.8%	2.2%

■ Nonhighly compensated eligible employee deferral rate
■ Match

Source: Vanguard, 2018.

Implications

Our comparison of contribution rates in paired plans promising identical match values suggests that 100% matches on lower match thresholds are associated with higher aggregate plan contribution rates. Seemingly counterintuitively, plan sponsors with voluntary enrollment plans seeking to raise plan contribution rates should consider designs with 100% match formulas. Stretching a match may have unintended consequences for NHCEs.

Alternatively, strategies such as automatic enrollment with strong initial default deferral rates and automatic annual deferral rate increases, coupled with stretched matches, could be used to improve saving rates. Our research shows that higher initial default deferral rates in automatic enrollment plan designs are the most effective way to raise employee-elective deferral rates.

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Appendix

Our analysis is based on Vanguard recordkeeping data as of December 2016. Recordkeeping services were provided for 1,900 plans. There were 4.4 million participants in these plans. Our interest is in how demographic and plan design features affect employee-elective deferral rates in the plans with voluntary enrollment. Accordingly, we limit our analysis to a subset of 328 plans for which we have completed compliance testing for the 2016 plan year. These plans had approximately 452,800 nonhighly compensated eligible employees with annual compensation over $7,500 and less than $120,000. No single plan's population exceeds 5% of the total observed population due to restrictions placed on the size of the represented population. Plans with match formulas with match values or match thresholds extending beyond 10% were not included in the study, as they occur infrequently.

For our plan participant and eligible-employee empirical models, we ran a Tobit model where the deferral rate was left censored at 0%. The general form of the regression for plan participant or eligible employee i in plan j is:

$$Employee\ contribution\ rate^*_{ij} = \beta_0 + \beta_1{}^*\ plan\ design\ features_j + \beta_2{}^*\ demographic\ variables_i + \beta_3{}^*\ employer\ characteristics_j + \varepsilon_{ij}$$

$$Employee\ contribution\ rate_{ij} = max\ (0,\ Employee\ contribution\ rate^*_{ij})$$

Plan design features include the participant contribution required for maximum match and the promised match contribution value as a percentage of compensation. *Demographic variables* include age, tenure, annual compensation, and gender. *Employer characteristics* include a plan size indicator.

For our paired plan analysis we ran a similar Tobit model with the outcome left censored at 0%. Instead of including plan design features and employer characteristics, we used plan indicators to account for plan fixed effects:

$$Employee\ contribution\ rate^*_{ij} = \beta_0 + \beta_1{}^*\ demographic\ variables_i + \beta_2{}^*\ plan\ indicator_j + \varepsilon_{ij}$$

$$Employee\ contribution\ rate_{ij} = max\ (0,\ Employee\ contribution\ rate^*_{ij})$$

Demographic variables include age, tenure, annual compensation, and gender. *Employer characteristics* include a plan level identifier.

Complete regression results, including coefficients, standard errors, and marginal effects, are available from the authors.

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