Vanguard

Are employers optimizing their 401(k) match?

- We propose criteria that employers can use to evaluate their match formula: equity, efficiency, and cost. Recognizing that plan sponsors have different objectives and constraints, we offer the criteria to help sponsors make the trade-offs in plan design explicit and help them meet their goals.

- In two-thirds of plans, employer contributions exacerbate pay inequity. Employer contributions are highly concentrated, with 44% of dollars accruing to the top 20% of earners. Many common formulas, including safe harbor designs, disproportionately benefit higher-income employees.

- An employer match is efficient if it encourages workers to save more. Employee saving rates vary little across plans with different levels of employer matches. The majority (59%) of employer contributions accrue to the 41% of employees who save more than the match cap, suggesting they would have saved just as much without the match.

- Employer contribution costs vary widely. No single formula is a clear winner in terms of efficiency, but dollar caps are more equitable and contain costs. Nonelective contributions that decouple employer contributions from employee choices can also be designed to achieve equity objectives.

- Policymakers could do more to promote equity. Adopting additional safe harbor standards with equity considerations could nudge plans toward more equitable designs.

Authors

Fiona Greig	Anna Madamba	Guillermo Carranza	Cormac O'Dea	Taha Choukhmane	Lawrence D.W. Schmidt

—— **Vanguard** ——   —— **Yale University** ——   **Massachusetts Institute of Technology**

Introduction

In 2021, employers contributed $212 billion to defined contribution (DC) retirement plans, roughly 58 cents for every dollar that participants saved (Department of Labor, 2023). Participants' contributions are tax-advantaged, which makes contributing to a DC plan, especially one with an employer match, one of the best investments a worker can make. Not only do DC plans provide a tax-efficient way to receive compensation and save, but in most cases, a worker who participates can also benefit from an employer match, which is offered by about 87% of plans with more than 100 participants (Investment Company Institute, 2023) and roughly 95% of plans at Vanguard (Vanguard, 2023).

Although employer matches may be intended to incentivize workers to contribute to companies' DC plans, most of the evidence (Choi, 2015) suggests that they have only small effects on participation and saving. In recent years, other plan features, such as automatic enrollment and automatic escalation, have been widely adopted to get workers to save for retirement (Madrian and Shea, 2001; Thaler and Benartzi, 2004). These have been shown to increase participation substantially in the short run, though recent evidence suggests that much of the short-run savings gains created by autoenrollment is attenuated in the medium run (Choukhmane, 2023).

Employer contributions are a ripe target for innovation. They disproportionately accrue to those with higher incomes, white workers, those with more access to liquid wealth, and those with richer parents (Engen and Gale, 2000; Benjamin, 2003; Choukhmane et al., 2023), leading some to argue that they are poorly targeted (see, for example, Marr, Frentz, and Huang, 2013). Many employer match formulas contribute to inequity

in earnings, because employees who do not take full advantage of their employer match effectively get paid less than their peers who, for a variety of reasons, can and do save more.

Plan sponsors may have different objectives and constraints when they design their retirement plan. Some may aim to win the war for talent, promote employee financial wellness and retirement security, or contain costs. Others wrestle with constraints such as collective-bargaining agreements or a need to maintain parity with a legacy defined benefit plan. Plan sponsors may worry that promoting equity might reduce incentives for certain workers to save or might drive up costs. Our goal is to make these trade-offs more explicit for employers as they design their plan and match formula.

In this brief, we outline three criteria that firms might consider in designing their retirement match schedules:

1. **Equity:** Are employer contributions equitably distributed?

2. **Efficiency:** Does the plan design encourage savings?

3. **Cost:** How costly is the plan?

We suggest simple metrics that employers might use to evaluate their plans against these criteria and show these measures for the most common plan formulas in the U.S. Specifically, we use them to evaluate 1,352 large employer-sponsored plans record-kept by Vanguard over the 10 years between 2013 and 2022.[1] We average outcomes for all employees, including nonparticipants, for the 10 most common match formulas (see "What is a match formula?" on page 4).[2]

---

[1] In total, we observe 8,497 plan-years for which we have information on income from compliance testing data, match formula, employer contributions, and participation rates. We also restrict our analysis to plans with employer contributions, more than 20 employees, and participation rates higher than 20% to ensure we capture active plans and remove very small plans. This results in higher participation rates in our sample (Figure 8) than reported for Vanguard plans generally (Vanguard, 2023). We restrict our analysis to employees who were employed the entire year and earned more than $7,500 (the federal minimum wage for a worker earning 20 hours or more per week).

[2] We report participant-weighted averages across plans. This effectively weights plans in proportion to their employee population size. Our conclusions do not change when we weight plans equally regardless of size or when we consider a larger set of match formulas.

Our first criterion is equity. We find that in two-thirds of plans, employer contributions exacerbate pay inequity. Employer contributions are highly concentrated, with 44% of dollars accruing to the top 20% of earners. Even among co-workers with similar incomes, employer contributions are concentrated among those who save more, suggesting that factors other than income also influence workers' ability and inclination to save. Dollar cap match formulas, used in 4% of plans, distribute employer contributions more equitably than other common match formulas. Nonelective contribution schemes that decouple employer contributions from employee choices on whether to contribute can also be designed to achieve equity objectives.

Our second criterion is efficiency. Our measure of efficiency considers the extent to which plans target employer contributions in a way that encourages employees to save more. Employers may have other objectives, such as attracting talent and increasing retention, when offering a match. Here, we focus on savings as the primary goal and present some prima facie evidence against the effectiveness of these incentives in the current regime. Many workers save little despite the match, and many save more than the match cap, suggesting they would have saved just as much (if not more) in the absence of the match. Just 13% of workers contribute exactly at the maximum match level and they receive only 17% of employer contributions.

We find that overall employee saving varies little across plans with different employer match formulas, a result consistent with academic evidence that matches only modestly affect saving decisions (Choi, 2015). Other plan features that boost participation and savings particularly among lower-income workers (for example, autoenrollment) may more efficiently target employer dollars, though the effectiveness of these policies at promoting savings may be affected by the match formula.

Finally, matching formulas vary substantially in cost, our third criterion. Dollar caps emerge as a potentially useful tool for containing costs without necessarily reducing savings, because the high-income workers most likely affected are also those most likely to have been saving above the matching cap to begin with.

While one size may not fit all and no single formula is a clear winner, these three criteria of equity, efficiency, and cost can help plan sponsors better use their employer contribution budgets. For example, employers could prioritize plan features that promote savings for lower-income workers, such as autoenrollment, a higher default savings rate, or immediate eligibility and vesting. Dollar caps could help pay for such features. Nonelective contributions can be a useful tool for ensuring that all employees receive some retirement contributions. Our findings can inform policymakers in setting additional options for safe harbor plan design and nondiscrimination testing to promote equity.

What is a match formula?

In 2022, Vanguard administered plans with 100-plus distinct match formulas. Among the 10 most common plans, six plans are safe harbor plan designs, which allow the plan sponsor to bypass nondiscrimination testing (**Figure 1**). The 10 most common formulas account for 64% of plan-years over the 10-year time frame and take one of three forms:
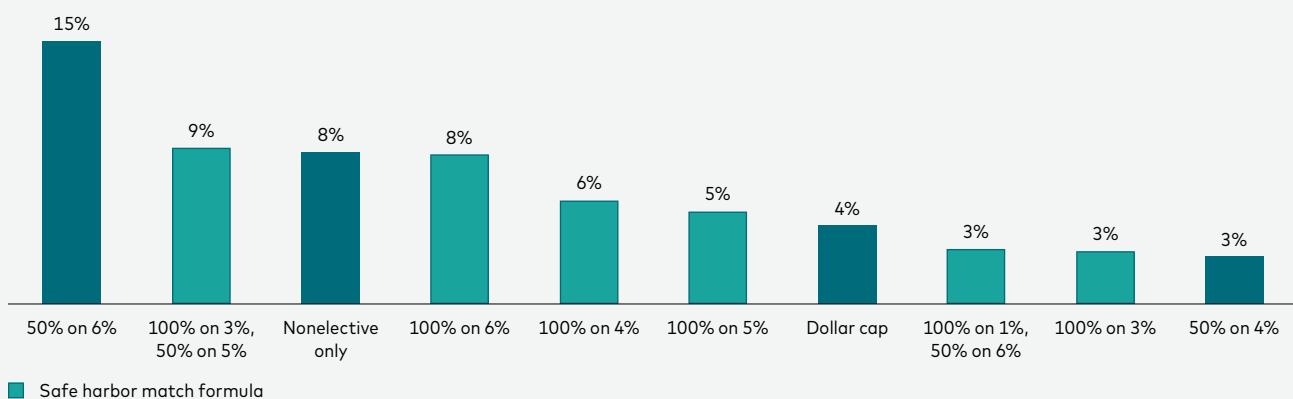
1. **Percentage match:** The most common match formulas adopt a percentage match—for example, "50% on 6%," which indicates that the employer matches 50% of an employee's contributions up to 6% of her pay. Eight of the 10 most common formulas use a percentage match design. Two of these are two-tiered match formulas, whereby, for example, the employer matches 100% of an employee's contributions up to 3% of her pay and an additional 50% of contributions for an incremental 2% of her pay (for a maximum match of 4%).

2. **Nonelective contribution:** In these plans, the employer contributes to the retirement plan on behalf of the employee (for example, 3% of pay) regardless of whether she contributes. We show outcomes for plans that have only nonelective contributions.

3. **Dollar caps:** These formulas, present in 4% of plans, allow for employer contributions subject to a dollar cap that is below the maximum contribution limits per statute. For example, a plan may offer a 10% match on 6% of pay, subject to a dollar cap of $6,000. Dollar caps were more common 15–20 years ago, accounting for 28% of plans in 2005. Dollar cap formulas vary by the match formula that undergirds them as well as the value of the cap (**Figure 14** in the Appendix).

Recognizing that these formula types are not mutually exclusive, we classify plans in the following order: First, we label as "dollar cap" any plan with a cap on the dollar amount of the employer's contribution; second, we classify plans that have only nonelective contributions as such; finally, we label all remaining plans according to their percentage match design. This means that plans with percentage match designs might also have nonelective contributions. Indeed, many plans (36% in 2022) offer nonelective contributions on top of the match (Vanguard, 2023).

Six of the 10 most common match formulas are designated as safe harbor plan designs

10 most common employer contribution formulas (2013–2022), percent of plans

Bar chart values: 50% on 6% — 15%; 100% on 3%, 50% on 5% — 9%; Nonelective only — 8%; 100% on 6% — 8%; 100% on 4% — 6%; 100% on 5% — 5%; Dollar cap — 4%; 100% on 1%, 50% on 6% — 3%; 100% on 3% — 3%; 50% on 4% — 3%.

▪ Safe harbor match formula

Notes: The chart shows the 10 most common formulas among 8,497 plan-years between 2013 and 2022. These types of formulas are not mutually exclusive, so we classify plans in the following order: First, we label all plans that have a dollar cap as "Dollar cap"; second, we classify plans with nonelective contributions only as such; third, we categorize all remaining plans according to their match formula. This means that plans with percentage match designs might also have nonelective contributions. In addition, all nonelective-only contributions that have a dollar cap will be labeled dollar cap plans.

Source: Vanguard.

Equity: Are employer contributions equitably distributed?

In two-thirds of plans, employer contributions exacerbate pay inequity

We assess equity in employer contributions by evaluating how employers distribute their match contributions to their employees in different income groups (**Figure 2**). Throughout our analyses, "income" refers to a worker's benefit-eligible income that can qualify for employee or employer contributions.[3] The top 20% of earners (Income Quintile 5) receives 44% of employer contributions, while the bottom 20% (Income Quintile 1) receives just 6%.

It is not surprising that a greater share of employer matching *dollars* accrues to those who are paid more, given that matching contributions are typically awarded as a proportion of salary.

It is less obvious, though, whether those at the top of the pay distribution receive a larger share of employer contributions than their *share of income*. To evaluate this, **Figure 3** shows the "excess share" of employer contributions accruing to each income quintile—the percentage difference between the share of matching contributions and the share of income received.[4] Employer contributions are less equally distributed than income: The top 20% of earners (Income Quintile 5) receives an 11% larger share of employer contributions than income, while those in the bottom pay quintile (Income Quintile 1) receive a 29% smaller share of matching dollars than income.

Employer contributions are highly concentrated in the hands of top earners

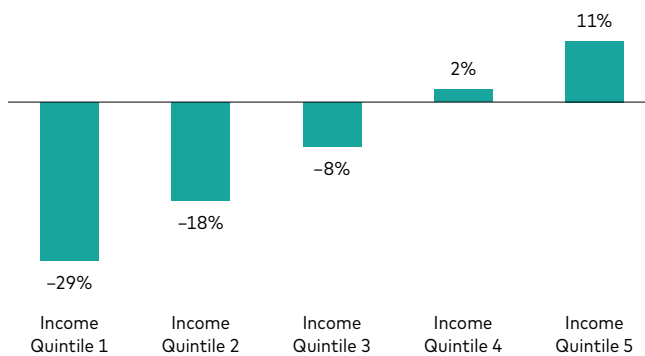*Share of employer contributions, by within-firm employee income quintile*
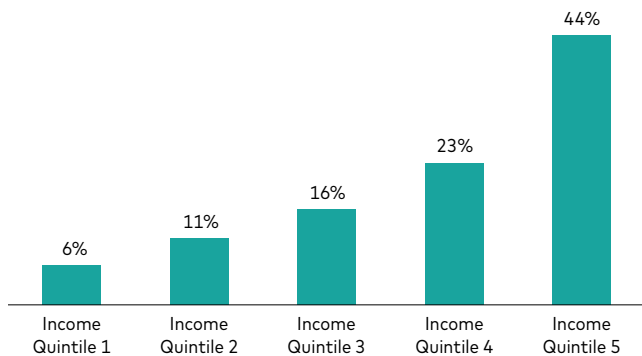
Notes: The chart shows the share of employer contributions accruing to workers, by within-plan income quintile. "Income" refers to a worker's benefit-eligible income that can qualify for employee or employer contributions (for example, subject to the benefit compensation limit, which was $330,000 in 2022). Results are participant-weighted among 8,479 plan-years between 2013 and 2022.

Source: Vanguard.

Top earners received an 11% larger share of employer contributions than benefit income

Excess share of employer contributions accruing to top 20% of earners, by income quintile

Notes: The chart shows the excess share of employer contributions accruing to workers, by within-plan income quintile. The excess share is calculated by dividing the share of employer contributions by the share of income minus one. Results are participant-weighted among 8,497 plan-years between 2013 and 2022. "Income" refers to a worker's benefit-eligible income that can qualify for employee or employer contributions subject to the benefit compensation limit (for example, $330,000 in 2022).

Source: Vanguard.

---

3   For example, the benefit compensation limit was $330,000 in 2022.

4   The excess share is calculated by dividing the share of employer contributions by the share of income minus one. For example, the top 20% of earners receives 44% of employer contributions but 39% of income, implying that top earners receive an 11% higher share of employer contributions than income.

Next, we assess inequity in employer contributions at the plan level. We consider a plan to be regressive if the top 20% of earners receives a larger share of employer contributions than of income.[5]

Figure 4 shows the distribution of the excess share of employer contributions received by the top 20% of earners across plan-years in our sample. The degree of equity varies substantially across plans. Across all 10 years, in 68% of plans, the top 20% of earners received a larger share of employer contributions than income. In 2022, 66% of plans, accounting for 78% of participants, regressively allocated employer contributions.

This degree of inequity is noteworthy considering the industry standard used to allocate employer contributions as a *proportion* of a worker's salary. Moreover, the regressivity of employer contributions occurs despite policies already in place to cap the level and share of employer contributions available to high earners (see "Existing policies that support equitable use of employer contributions and tax incentives," page 7), as well as industry and policy efforts to drive adoption of autoenrollment and immediate eligibility and vesting, which disproportionately benefit lower-income workers.[6]

In two-thirds of plans (68%), the top 20% of earners received a larger share of employer contributions than income

Distribution of plans by excess share of employer contributions accruing to top 20% of earners (percentages may not total 100% due to rounding)
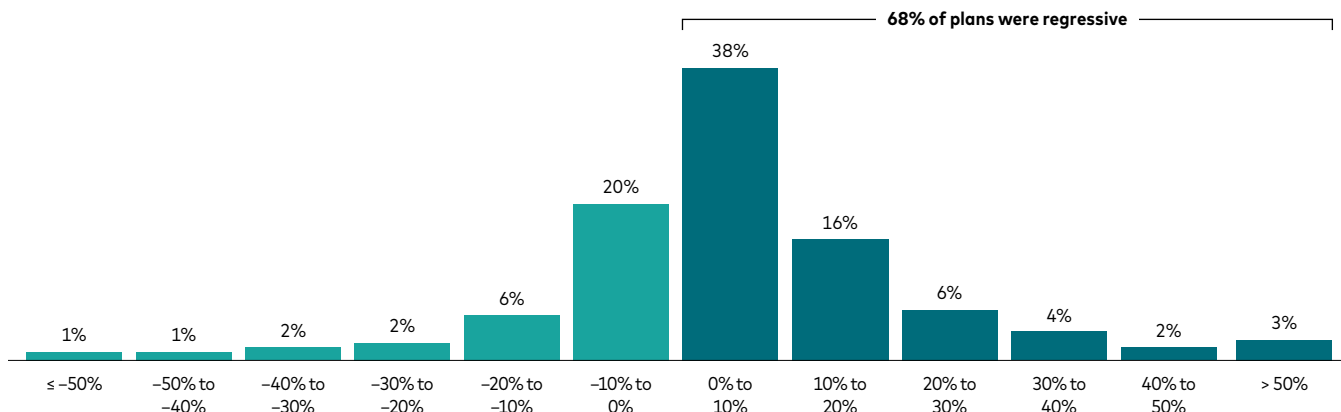
Notes: The chart shows the distribution of plans by excess share of employer contributions accruing to the top 20% of earners. The excess share is calculated by dividing the share of employer contributions by the share of income minus one. Positive numbers reflect regressive plans. Negative numbers reflect progressive plans. "Income" refers to a worker's benefit-eligible income that can qualify for employee or employer contributions subject to the benefit compensation limit (for example, $330,000 in 2022). Results are based on a sample of 8,497 plan-years between 2013 and 2022.
Source: Vanguard.

5 Our finding that employer contributions are less equitably distributed than income remains true when we focus on other parts of the distribution than just the top 20% of earners: 73% of plans are regressive when we assess the share of plans in which the top half of earners receives a larger share of employer contributions than benefit income.

6 Our analysis already takes benefit compensation limits into account but not limits on employee salary deferrals and total contributions. Vanguard (2023) documents higher participation rates and contribution rates among employees in plans with autoenrollment, particularly among lower-income workers.

Existing policies that support equitable use of employer contributions and tax incentives

Three statutory limits cap the annual compensation and contributions that qualify for retirement savings tax benefits, each of which increases with inflation:

1. **Employee salary deferral limit:** In 2024, the maximum an employee can elect to defer from her salary toward retirement savings is $23,000 ($30,500 for employees ages 50 and older).

2. **Total contribution limit:** In 2024, the maximum allowable contribution to a participant's account from any source (employee or employer) is $69,000 ($76,500 for employees ages 50 and older).

3. **Benefit compensation limit:** In 2024, the maximum compensation that can qualify for employee or employer contributions is $345,000.

In addition to these limits, Congress establishes the standard for safe harbor 401(k) plans, which are not subject to annual nondiscrimination testing aimed at ensuring that plans do not disproportionately benefit highly compensated employees. Safe harbor employer contributions can take the following forms:

- **Nonelective:** For example, 3% nonelective contributions with immediate vesting.

- **Basic match** (4% total): For example, a 100% match on the first 3% of employee contributions and a 50% match on the next 2% with immediate vesting.

- **Enhanced match** (4%–6% total): A 100% match on 4%, 5%, or 6% of employee contributions with immediate vesting.

- **Qualified automatic contribution arrangement** (3.5%): 100% on 1% and 50% up to 6% of employee contributions with autoenrollment but up to two-year vesting of employer contributions.

Employer contributions are unequally distributed even among similarly paid workers

One reason that higher-income workers get a higher share of employer matches is that the rich save more: They are more likely to participate and save in the employer plan (**Figure 5**).

Higher-income workers are more likely to participate and save more in the plan, resulting in larger matches

401(k) plan participation and contribution rates by employee income

Notes: The chart shows employee and total (employee plus employer) contribution rates (left-hand axis) and participation rates (right-hand axis) by employee income. In this bin scatter chart, each dot reflects 1/30th of the sample, and the x-axis positions of the points reflect the distribution of income in the sample. "Income" refers to a worker's benefit-eligible income that can qualify for employee or employer contributions subject to the benefit compensation limit (for example, $330,000 in 2022). Results are based on 8,497 plan-years between 2013 and 2022.
**Source:** Vanguard.

However, additional mechanisms are at play. Figure 4 obscures the significant concentration in benefit allocation that exists *within* each income group. For example, among the bottom 20% of earners (Income Quintile 1), 70% of employer dollars flows to just one-third of workers in that group (**Figure 6**). Put simply, even among low-income workers there are high savers. Conversely, even among high-income workers there are nonsavers. Factors other than income, such as race and ethnicity, education, family structure, and parental wealth, also influence workers' ability to save and take advantage of employer contributions (Choukhmane et al., 2023).[7]

Even among workers with similar incomes, more than half of employer contributions accrue to just a third of workers

Share of employer contributions within each tercile of employer contributions, by income quintile
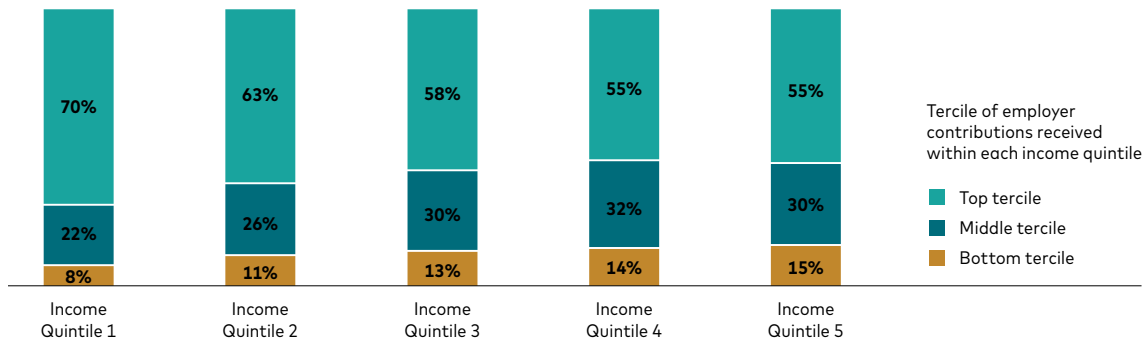
Notes: The chart shows the distribution of employer contributions by each within-plan income quintile. Within each income quintile, employees are terciled based on employer contributions. "Income" refers to a worker's benefit-eligible income that can qualify for employee or employer contributions subject to the benefit compensation limit (for example, $330,000 in 2022). Results are participant-weighted among 8,497 plan-years between 2013 and 2022. Percentages may not total 100% due to rounding.
Source: Vanguard.

[7] We observe similar distributions of employer contributions in each income quintile when we estimate the distribution of employer contributions as a share of income within each income quintile, suggesting that within-group income differences are not driving the result in Figure 6.

Dollar cap match formulas distribute employer contributions more equitably than other common formulas

Finally, we assess the equity of the 10 most common match formulas to further explore the heterogeneity in regressivity across plans with different match formulas. Dollar cap plans more equitably allocate employer dollars than the other common match formulas. Specifically, the top earners in plans with dollar caps receive, on average, a 6% smaller share of employer contributions than compensation (**Figure 7**). In contrast, the other nine most common match formulas are associated with regressive allocations of employer contributions, on average.[8]

Notable in Figure 7 is the regressivity even of plans that offer only nonelective contributions. This design provides an employer contribution to all eligible workers regardless of whether they

contribute and qualifies as a safe harbor plan under certain conditions. Therefore, it ought to allocate employer contributions more equitably. In reality, we find that plans with only nonelective contributions do not perform better than other designs in terms of equity. Several possible forces might be at play. One reason nonelective contributions could end up being regressive is that not all workers receive them. Across these plans, 88% of workers received employer contributions, and two-thirds of plans limit employer contributions based on tenure.[9] Thus, although nonelective contributions are potentially an equitable solution, in current practice we observe that eligibility restrictions and other factors may be making these plans regressive.

Dollar cap plans more equitably allocate employer dollars than other common match formulas

Top earners' excess share of employer contributions
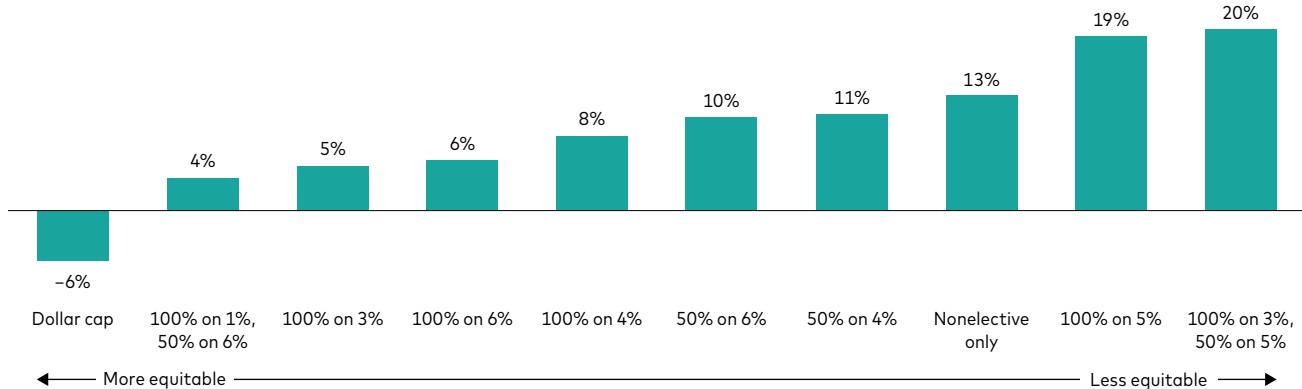
Notes: The chart shows the distribution of plans by excess share of employer contributions accruing to the top 20% of earners. The excess share is calculated by dividing the share of employer contributions by the share of income minus one. Positive numbers reflect regressivity. Negative numbers reflect progressivity. "Income" refers to a worker's benefit-eligible income that can qualify for employee or employer contributions, subject to the benefit compensation limit (for example, $330,000 in 2022). Results are participant-weighted and based on 5,480 plan-years among the 10 most common formulas between 2013 and 2022.
Source: Vanguard.

[8]   Note that this result does not have a causal interpretation. Some of the differences in Figure 7 can reflect differences in average savings rates across firms that are unrelated to the matching formula. However, given the strong positive link between income and savings rates, one would expect any proportional match formula that is increasing in the employee's savings rate to look regressive in the absence of a cap on employer and employee contributions. Only when such a cap binds for a sufficiently high number of workers—either because of an employer's self-designated dollar cap or the IRS' compensation limits on contributions to 401(k) plans—can a plan instead appear progressive by our measure. Dollar caps therefore naturally emerge as a tool to make employer contributions more progressive by income.

[9]   Among plans with nonelective contributions, 66% had restricted eligibility based on tenure—13% that required participant tenure of at least one month but less than a year, 44% that required a year of tenure, and 9% that required more than one year of tenure. Plans that required a year or more of tenure were 10 percentage points more likely to be regressive (79%) than those that required less than a year or no tenure to receive nonelective contributions (69%).

Efficiency: Does the plan design encourage savings?

Match formulas do little to encourage savings: Many workers save little despite the match, and many save more than the match cap

An employer match is more efficient if it creates financial incentives for workers to save more. These financial incentives affect only workers who contribute up to the maximum match: These workers receive an employer match for every dollar they save. A match does not, however, create financial incentives to save more for those who save above the matching cap.

As an example of this, consider an employee who contributes 10% of her salary to her 401(k) plan. A 6% match does not create an incentive for this employee to increase her contribution rate because employee contributions above 6% do not earn additional matching dollars. Furthermore, it is unlikely that the employee is choosing to contribute 10% *because* her employer matches contributions up to a lower level.
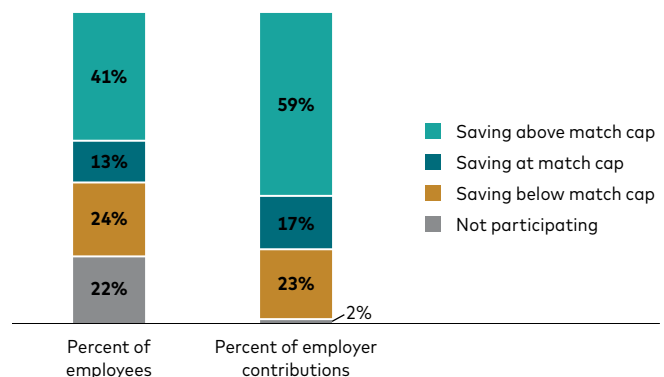
We begin by calculating the share of workers who are potentially contributing more because of the financial incentive created by the match. These are the participants contributing amounts up to the cap on matching. In our sample, just 37% of workers make contributions up to the maximum match (**Figure 8**)—13% who are saving exactly at the match cap and 24% who are contributing to the plan but at a level below the cap. Most employer contribution dollars (59%) flow to the two in five workers (41%) who contribute above the cap on matching. These workers do not

receive matching dollars for additional savings (beyond the cap), so the match does not create a financial incentive for them to save more. Finally, 22% of the employee base, mostly lower-income workers, are not participating at all despite the match incentive.

Most employer dollars are allocated to employees who are contributing above the match

Percent of employees and employer contributions, by employee contribution relative to the match

Legend:
- Saving above match cap
- Saving at match cap
- Saving below match cap
- Not participating

Percent of employees: 41%, 13%, 24%, 22%
Percent of employer contributions: 59%, 17%, 23%, 2%

Notes: We classify employees into four groups depending on their contribution rate and the match cap of their 401(k) plan. The chart compares the shares of employees in these four groups with the total amount of employer contribution dollars allocated into the four groups. Results are participant-weighted among 8,497 plan-years between 2013 and 2022.
**Source:** Vanguard.

In **Figure 9**, we show these groups by income level. Most workers are not contributing at or below the match, but the reasons differ by income. Among lower-income workers, many do not participate despite the match. Among higher-income workers, many exceed the match cap. Three reasons could explain why it would make sense for higher-income workers to save above the match: They expect lower income replacement rates from Social Security, face higher marginal tax rates, and are more likely to have sufficient short-term liquidity (Ganong et al., 2023).

Across the income distribution, less than 20% of workers contribute exactly at the maximum match

Share of participants by contribution status and income
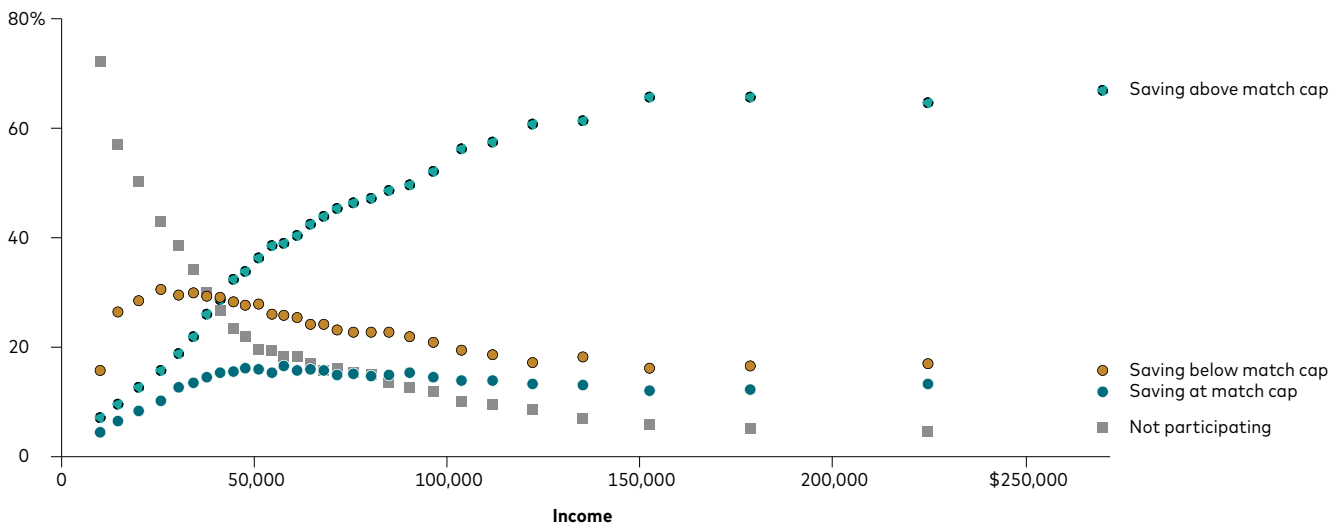
Notes: We classify employees into four groups depending on their contribution rate and the match cap of their 401(k) plan. The chart compares the shares of employees in these four groups, by employee income. In this bin scatter chart, each dot reflects one 1/30th of the sample, and the x-axis positions of the points reflect the distribution of income in the sample. "Income" refers to a worker's benefit-eligible income that can qualify for employee or employer contributions subject to the benefit compensation limit (for example, $330,000 in 2022).
**Source:** Vanguard.

Figure 10 examines efficiency by match formula, which sorts match formulas according to the generosity of the match cap (more generous matches on the left). Across all plans, few workers contribute exactly at the match maximum. The share of workers contributing above the maximum is larger for plans with lower match caps (on the right), suggesting that other plan features or interventions may be nudging participants to contribute beyond the match. Even in plans with a cap of 6%, almost half of workers (44% to 48%) contribute above the maximum.

To sum up, if the primary goal of a match formula is to create incentives for employees to contribute more, our findings suggest that, for most workers, the incentives that current matching formulas create are not effective. Put differently, for the majority of workers, reducing the generosity of the match may not translate into lower incentives for employee contributions.

Across match formulas, most participants do not contribute exactly at the match cap
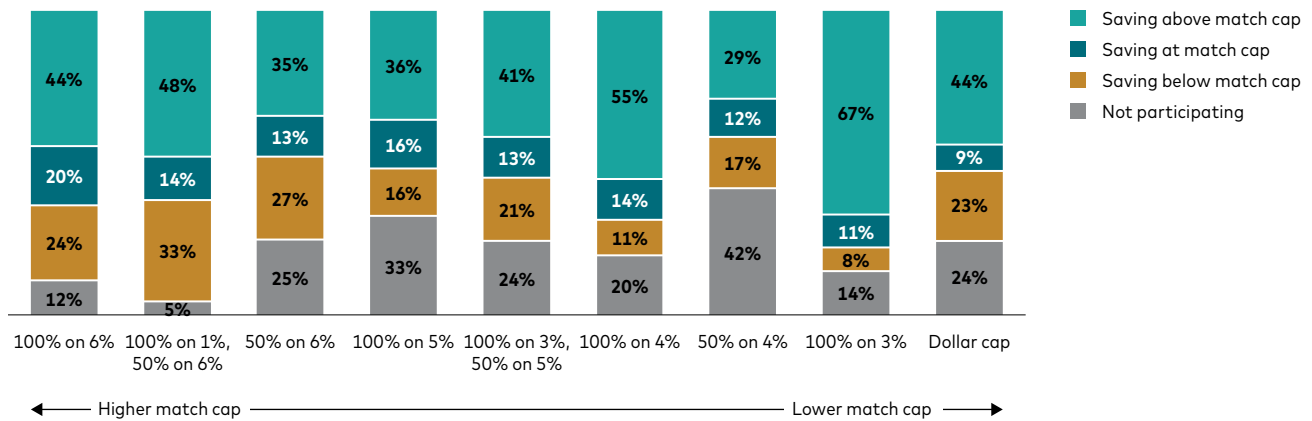
Notes: We classify employees into four groups, represented on each bar, by their contribution rate and the match cap of their 401(k) plan. The chart compares the shares of employees in these four groups, by match formula. Results are participant-weighted and shown for the nine most common formulas, reflecting 5,480 plan-years between 2013 and 2022. Percentages may not total to 100% due to rounding.
Source: Vanguard.

Overall saving varies little across plans with different employer matches

Consistent with this evidence that the match does not incentivize most workers to contribute more, we find little correlation between the generosity of the matching formula and average employee contributions. In evaluating savings rates, we must account for the fact that higher-income, older, and more tenured workers tend to save more for retirement (Vanguard, 2023). Selection effects across employers may bias savings rates higher if their workers tend to be higher-income, older, or longer-tenured. We therefore estimate average employee and total contributions controlling for income, age, and tenure. There may be other unobserved differences in savings propensities across plans that we are currently not accounting for.

We find that, consistent with the literature (Choi, 2015), employee savings vary somewhat across match formulas, but not according to the generosity of the match (**Figure 11**). Other plan features seem to play an important role in employee savings rates.

Two examples illustrate this point. First, the plan design with the highest average employee savings rate (8.1%) has a match formula of 100%

on 1%, 50% on 6%. Plans with this design tend to be safe harbor plans that require autoenrollment, leading to a very high participation rate of 95%. Second, employees contribute significantly (5.4% of their salary) even in plans with nonelective contributions only, suggesting that other plan features such as autoenrollment and automatic increases may be nudging workers to save. Dollar cap plans on average are in the middle of the range in terms of employee contributions (5.7%) but have lower total contributions than other common designs (7.4%), likely because they limit employer contributions for those typically saving the most.

In summary, current matching formulas do not create effective saving incentives for most employees. Many people save in excess of the match cap, while others choose not to save at all in spite of the strong incentives from typical match formulas. This points to potential gains from considering more innovative match formulas that may be able to provide better incentives for workers who were already saving above current caps, while being mindful of equity and cost considerations.

FIGURE 11
Employee savings do not vary a great deal across match formulas

Employee and total contributions, by formula
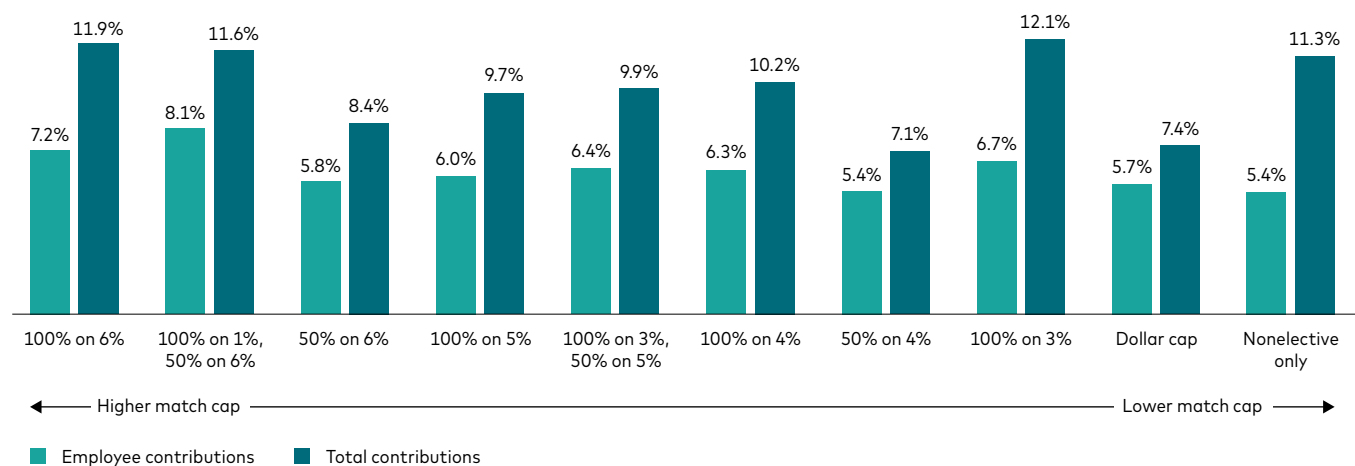
Notes: The chart shows average employee and total contributions (including both employee and employer contributions), by match formula, based on a regression controlling for employee age, income, and tenure (simple and squared). Individual rates are winsorized at the 95th percentile. We show results for the 10 most common formulas based on 8,479 plan-years between 2013 and 2022.
Source: Vanguard.

Cost: How costly is the plan?

Employer contribution budgets are large: One in four plans spends more than 6% of compensation on employer contributions

An important consideration for plan sponsors in adopting any match formula is cost. In simple terms, the match formula may be an expression of how generous the employer wants to be. The match formula, in addition to directly bearing on costs, also influences the effective price of many other plan features, because an employer will incur additional costs if it starts automatically enrolling all employees, increases the default savings rate, or eliminates eligibility or vesting requirements. The more generous the match, the higher the cost each those features will generate.

Put differently, employers may face a real tension between wanting to help workers save for retirement and containing those costs.

We begin by showing the wide variation in employer costs as a share of total benefit compensation (**Figure 12**). The average employer contribution as a share of total benefit compensation is 4.6%. The median expenditure is 3.8%, and the 75th percentile is 6.1%. Seven percent of plans spent more than 10% of total benefit compensation on employer matches.

FIGURE 12

Employer contributions as a share of total benefit compensation vary widely

Distribution of plans by employer contributions as a share of total benefit compensation
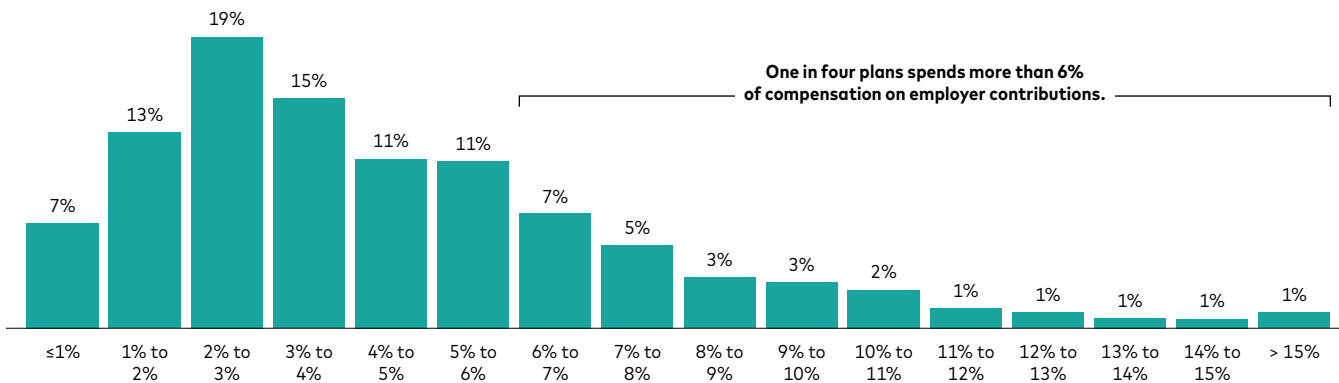
Notes: The chart shows the distribution of plans by aggregate employer costs as a share of income. "Income" refers to a worker's benefit-eligible income that can qualify for employee or employer contributions subject to the benefit compensation limit (for example, $330,000 in 2022). Results are based on a sample of 8,497 plan-years between 2013 and 2022. Percentages may not add up to 100% due to rounding.
**Source:** Vanguard.

Dollar caps contain costs

Next, we evaluate employer cost by match formula (**Figure 13**). Predictably, plans that have higher match caps, such as 100% on 5% or 100% on 6%, tend to cost more.[10] Nonelective contributions, as designed, are associated with higher employer costs, given that they don't depend on employee participation in the plan.

Match formulas with lower match rates (50% instead of 100%) and lower maximum caps (3% instead of 6%) are associated with lower costs. Dollar caps cost the least because they limit the extent to which the match subsidy flows to those with the highest earnings.

Dollar caps cost the least. Higher match caps are associated with higher costs.

Employer contributions as a share of income
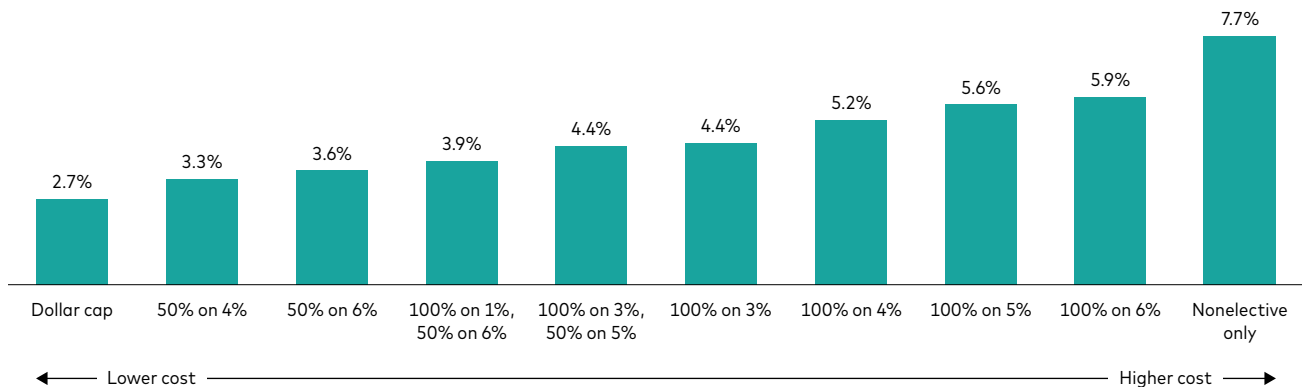
Notes: The chart compares aggregate costs as a share of income, by match formula. "Income" refers to a worker's benefit-eligible income that can qualify for employee or employer contributions subject to the benefit compensation limit (for example, $330,000 in 2022). Results are participant-weighted and shown for the 10 most common formulas, reflecting 5,480 plan-years between 2013 and 2022. Aggregate employer costs can exceed the match cap (or example, 4.4% for plans with a match of 100% on 3%) because of nonelective contributions on top of the match.
Source: Vanguard.

Taking our findings together, costs (Figure 13) do not correlate systematically with either equity (Figure 7) or efficiency (Figure 11). This raises the question whether there are other ways for employers to allocate their employer dollars more equitably *and* efficiently. There may be a cost-neutral way for employers to achieve greater equity and savings by making their match formula less generous for some, and using the savings to pay for interventions that ensure greater participation and savings for others. We discuss this further below.

---

10 In several cases, aggregate employer costs exceed the match cap (for example, 4.4% for plans with a match of 100% on 3%), likely reflecting the presence of nonelective contributions on top of the match. In 2022, 36% of all Vanguard record-kept plans offered nonelective contributions on top of the match (Vanguard, 2023).

Discussion and policy implications

We propose three criteria for plan sponsors and policymakers to evaluate match formulas: equity, efficiency, and cost. We believe that thoughtful plan design can improve outcomes along these three dimensions. Because we recognize that plan sponsors have different objectives and constraints, our three criteria and evidence can help plan sponsors better use their employer contribution budgets to meet their goals.

Overall, we find that no single formula is a clear winner, and the right formula will depend on the employer's objectives. For example, we find that a dollar cap on matching contributions correlates with greater equity and lower costs. Employers could prioritize plan features that promote savings for lower-income workers, such as autoenrollment, a higher default savings rate, or immediate eligibility and vesting. Dollar caps are a promising (and currently underused) tool that could free up employer resources to pay for such features.

That said, dollar caps may not be the right instrument for all plans. A drawback of dollar-capped formulas is that they may limit high-income earners' ability to maximize their tax benefits and may reduce their total compensation. In addition, reducing high-income workers' retirement benefits through a dollar cap might cause some employers to feel they must increase wages. Whether dollar caps are the right tool may depend on a plan sponsor's talent strategy and the competition it faces in the labor market.

Furthermore, our analysis shows that a matching formula's performance also depends on its interaction with other plan features. For example, nonelective-only contributions appeared to be quite regressive in part because tenure-based eligibility criteria are commonly used. Nonelective contribution schemes, which decouple employer contributions from employee choices about whether to participate, could be designed to achieve equity objectives. This result illustrates that a range of plan features, including the default contribution rate as well as eligibility and vesting requirements, may interact with or help determine the equity, efficiency, and costs associated with employer contributions.

Just as plan sponsors have a role to play in promoting equity and efficiency, so do policymakers. Many common match formulas, including safe harbor designs, disproportionately benefit higher-income employees, who can and already do save the most.

Safe harbor provisions are put in place to ensure that the plan is fair and equitable for all employees. They allow plan sponsors to avoid nondiscrimination testing in exchange for ensuring that all eligible participants receive an employer contribution. However, we show that safe harbor standards could do more to promote equity. Policymakers could promote equity by incorporating criteria to counter regressivity as an additional safe harbor standard for plan sponsors. Adopting safe harbor standards that incorporate stronger equity considerations could nudge employer plans toward more equitable match designs.

References

Benjamin, Daniel, 2003. Does 401(k) Eligibility Increase Saving? Evidence From Propensity Score Subclassification. *Journal of Public Economics* 87(5–6): 1259–1290.

Choi, James, 2015. Contributions to Defined Contribution Pension Plans. *Annual Review of Financial Economics* 7: 161–78.

Choukhmane, Taha, 2023. Default Options and Retirement Saving Dynamics; forthcoming, but currently available at tahachoukhmane.com.

Choukhmane, Taha, Jorge Colmenares, Cormac O'Dea, Jonathan Rothbaum, and Lawrence D.W. Schmidt, 2023. *Who Benefits From Retirement Savings Incentives in the U.S.? Evidence on Racial Gaps in Retirement Wealth Accumulation*. MIT Sloan Working Paper 6592-21. Cambridge, Mass.: Massachusetts Institute of Technology School of Management, November 2023.

Department of Labor, 2023. Private Pension Plan Bulletin: Abstract of 2021 Form 5500 Annual Reports. Department of Labor. September 2023.

Engen, Eric M., and William G. Gale, 2000. *The Effects of 401(k) Plans on Household Wealth: Differences Across Earnings Groups*. NBER Working Paper 8032. Cambridge, Mass.: National Bureau of Economic Research.

Ganong, Peter, Damon Jones, Pascal Noel, Fiona Greig, Diana Farrell, and Chris Wheat, 2023. *Wealth, Race, and Consumption Smoothing of Typical Income Shocks*. NBER Working Paper No. w27552. Cambridge, Mass.: National Bureau of Economic Research; available at SSRN.com.

Investment Company Institute, 2023. The BrightScope/ICI Defined Contribution Plan Profile: A Close Look at 401(k) Plans, 2020. September 2023.

Madrian, Brigitte C., and Dennis F. Shea, 2001. The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior. *The Quarterly Journal of Economics* 116(4): 1149–1187.

Marr, Chuck, Nathaniel Frentz, and Chye-Ching Huang, 2013. *Retirement Tax Incentives are Ripe for Reform: Current Incentives are Expensive, Inefficient, and Inequitable*. Washington, D.C.: Center on Budget and Policy Priorities.

Thaler, Richard H., and Shlomo Benartzi, 2004. Save More Tomorrow™: Using Behavioral Economics to Increase Employee Saving. *Journal of Political Economy* 112(S1): S164–S187.

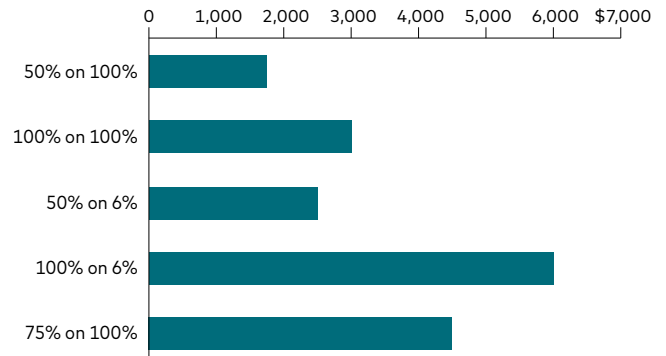Vanguard, 2023. *How America Saves*. Valley Forge, Pa.: The Vanguard Group.

Appendix

FIGURE 14

Dollar cap match formulas come in many forms

Top five most common formulas underneath the cap, share of formulas
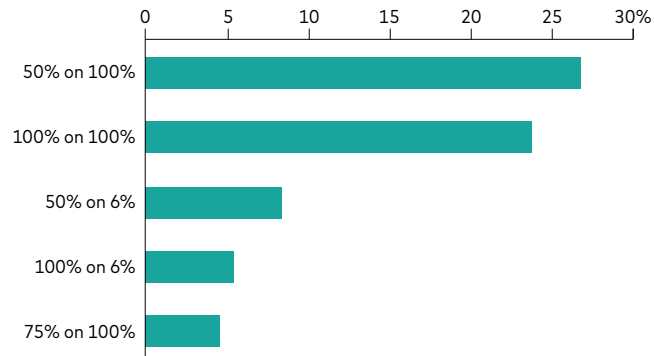
Magnitude of the cap, dollars

Source: Vanguard.

Connect with Vanguard®
vanguard.com

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

Vanguard®

ISGMAXK 052024