TIAA Institute

Research Dialogue | Issue no. 198
March 2023

# Fungibility in workplace benefits choices: Evidence from Health Savings Accounts

## Abstract

Workplace benefits now comprise roughly one-third of total employee compensation. At the same time, the choice of benefits has grown increasingly complex. Using a novel survey at 15 universities linked with administrative data on retirement accounts, we examine employee decision-making related to Health Savings Accounts. We find that employees do not use HSAs as long-term savings. Employees offset higher HSA contributions from their employer with lower contributions themselves, and the majority of employees do not know how or whether their HSA funds are invested. Employees with financial literacy and liquidity are more likely to treat their HSA as savings, but even most of this group does not. We also find employees heavily discount employer HSA deposits relative to cash and reject that they treat HSA dollars as fungible with health insurance premiums. Our results have implications for workplace benefits and financial education programs.

**Brent J. Davis**
TIAA Institute

**Adam Leive**
University of California, Berkeley

**Andrew Gellert**
TIAA Institute

## 1. Introduction

Workplace benefits account for an increasing share of employee compensation. Benefits grew from 27% in 2000 to 31% today as the share of salary and wages as a percentage of total compensation have declined (U.S. Bureau of Labor Statistics 2000; U.S. Bureau of Labor Statistics 2022). Insurance and savings benefits are among the most important for employees, spanning many domains including life, health, disability insurance, and retirement plans. The growth of these benefits has been driven by several factors including generous tax preferences, legislation mandating minimum benefits, and employer competition for workers.

In theory, workplace benefits can have advantages over direct government provision by allowing for greater choice and reducing inefficiencies in financing (Summers 1989). Employers typically offer many options, rather than a single "one size fits all" plan. In the case of health insurance, employees often choose from a menu of choices with different levels of premiums, deductibles, and co-insurance shared by the employer and employee. Standard economic models assume that employees value benefits at least as much as their cost, otherwise employers would not provide them (Goldstein and Pauly 1976, Rosen 1986, Pauly 1999, Oyer 2008, Eriksson and Kristensen 2014).

However, the growing complexity of workplace benefits raises questions about whether employees do in fact value benefits more than their costs. Navigating benefits has become more challenging for the employee as risk has shifted from employers to employees through the rise of defined-contribution pension plans and health benefits with defined-contribution features, such as Flexible Savings Accounts (FSAs), High-deductible Health Plans (HDHPs) and corresponding Health Savings Accounts (HSAs). Making informed decisions often requires both attention and greater financial and insurance literacy from employees. If employees discount the options offered to them, workers may prefer higher wages instead of more generous fringe benefits, or they may misunderstand their total compensation. Research finds that employees bear much of the incidence of fringe benefits, with more generous benefits coming at the expense of lower salaries (Gruber 1994, Baicker and Chandra 2006, Kolstad and Kowalski 2016, Lennon 2021). For employers, providing more generous benefits is often cheaper than paying higher wages because they do not pay additional Social Security, Medicare, or unemployment taxes on health insurance or retirement contributions. Some in the media have argued that the increasing cost of workplace benefits may have crowded out wage growth in recent years (Appelbaum 2018).

In this paper, we study employee decisions regarding HSAs, which are now common in the workplace. An HSA is a tax-preferred account that is paired with an HDHP, which has a higher deductible than traditional insurance that needs to be met before insurance benefits commence.[1] HSA contributions are tax-deductible and investments grow tax-deferred. Withdrawals are tax free if used to finance current or documented past health care expenses, even if the individual no longer has an HDHP. Unlike FSAs, funds in HSAs are not "use-it-or-lose-it": all contributions may roll over from one year to the next. Many employers have added a benefit where they contribute to employees' HSA accounts if they choose an HDHP. In 2021, 66% of large firms offered an HDHP, up from 5% in 2005 (Claxton et al. 2021). Over 30% of employees at large firms are now enrolled in these plans, which grant access to an HSA.

Using a novel survey linked to administrative records, we examine whether employees treat HSAs as fungible with other benefits. First, we study how HSA savings and withdrawal decisions vary by financial literacy and liquidity and by the level of employer HSA contributions. Next, we study whether employees value higher HSA contributions as equivalent to premium reductions. To answer these questions, we surveyed employees at 15 colleges and universities with different levels of employer HSA contributions. The survey measures health plan choices, financial literacy (Lusardi and Mitchell 2014), liquidity constraints (Lusardi et al. 2011), and range of behaviors and views related to insurance and saving decisions. We then link the survey data to institutional health plan data, and TIAA administrative records that include detailed information on retirement accounts.

We find most employees do not use the HSA as a savings vehicle. When employers provide larger HSA contributions, employees contribute less themselves.

1 In 2023, IRS rules set the minimum HDHP deductible as $1,500. HDHP plans provide some pre-deductible coverage. See Fronstin, Roebuck and Fendrick (2022).

Consistent with such offsetting behavior, survey respondents state preferences for using the HSA to finance current health care expenses instead of future expenses. Few employees invest their HSA in equities or bonds, and two-thirds do not know how their HSA balance is allocated. Employees with high financial literacy and liquidity are more likely to use the HSA as a savings vehicle, but most of this group still uses the account to pay for current expenses. We also find that employees discount employer HSA contributions relative to premiums. While employees exhibit significant price sensitivity to premiums, we find no evidence that higher employer HSA deposits increase the probability of choosing the HDHP.

Our paper contributes to several related literatures in household finance and consumer decision-making. Most directly, our study adds to a growing number of studies that theoretically and empirically analyze consumer decision-making in the context of HSAs (Baicker, Dow and Wolfson 2006, Cardon and Showalter 2007, Steinorth 2011, Helmchen et al. 2015, Peter, Soika and Steinorth 2016, Spiegel and Fronstin 2021, Leive 2022). We build on this research by incorporating survey data to better understand the reasons behind employee behavior. In particular, our research documents the importance of financial literacy and liquidity constraints in saving decisions, but nonetheless shows that even many people with high financial literacy and liquidity do not treat HSAs as a savings vehicle. Our results also add to studies that demonstrate the importance of frictions in choices of health insurance in the workplace (Handel and Kolstad 2015, Bhargava, Loewenstein and Sydnor 2017). Our finding that HSA dollars are discounted relative to premiums may help explain the puzzling findings that many employees choose dominated health plans, particularly when the dominant plan is the HDHP (Liu and Sydnor 2022). Finally, we add to research from various contexts that people often do not treat money as fungible, including in children's clothing (Kooreman 2000), groceries (Milkman and Beshears 2009), gasoline (Hastings and Shapiro 2013), restaurants meals (Abeler and Marklein 2017), and SNAP benefits (Hastings and Shapiro 2018). We build on this evidence by studying fungibility in workplace benefits, which involve high monetary stakes and are choices repeatedly made each year.

The rest of the paper is structured as follows. Section 2 describes our institutional setting, health insurance context, and the data. Section 3 examines saving, investment, and withdrawal choices related to HSAs. Section 4 analyzes fungibility between HSAs and premiums and Section 5 briefly concludes.

## 2. Setting and data

In this section, we first provide a brief background on the main features of Health Savings Accounts as they relate to health insurance premiums and retirement savings. We then describe the survey and administrative data.

### 2.1 Fungibility between HSAs, retirement savings, and health insurance premiums

HSAs have several features that make them tax-efficient ways to finance health care spending. Contributions are tax-deductible, accumulated investments in HSAs grow tax-deferred, and withdrawals are not taxed when used to finance qualified health expenses, including costs incurred in previous years when enrolled in an HDHP. Funds withdrawn for non-health expenses are subject to income tax, and a 20% penalty tax before age 65. HSA accumulations roll over each year, and are not "use-it-or-lose-it" like FSAs. HSAs can, therefore, be used to finance current health care consumption, future health care consumption, or both. They can also be used to pay health care costs in retirement, including Medicare premiums, out-of-pocket costs, and long-term care.

Given these features, HSA dollars are fungible with HDHP premiums under certain conditions. Both premiums and HSA contributions enjoy the same tax benefits (including being excluded from FICA taxes if made through payroll contributions).[2] A person planning to use the HSA to finance health care today should be indifferent between a lower premium of $100 versus $100 more in their HSA so long as they expected to incur at least $100 in out-of-pocket expenses this year. If $100 of health expenses is not incurred, then the premium cost is sunk but individuals still have $100 in their HSA. Most HSA providers (including all in our sample) provide account holders with a debit card, which makes the transaction costs of using the HSA to pay for care minimal. Those seeking to use the accounts to finance future health care

2 In Alabama, California, and New Jersey, HSA contributions are not exempt from state income taxation. Our survey does not include employers in these states.

expenses—either while working or in retirement—should prefer funds in their HSA because investment returns and withdrawals are tax-free. HSA assets are, therefore, at least as valuable as HDHP premium reductions if people are not liquidity constrained and have sufficiently high expected out-of-pocket payments. For financing health care costs in retirement, HSAs have advantages over 401(k)s, 403(b)s, or other retirement accounts because HSA assets are never taxed, unlike funds in other accounts.

HSAs make up an increasingly important component of compensation for American workers. In 2021 among workers with family coverage, employers contributed an average of $987 to an employee's HSA account (Claxton et al. 2021). Average contributions to HSA accounts were $2,320 for employees without any employer contributions and $1,970 for employees with employer contributions (Spiegel and Fronstin 2021).

### 2.2 Survey and administrative data

In 2021, we fielded a Qualtrics survey among participants actively contributing to a retirement account with TIAA at 15 universities. We restricted the sample outreach to participants making positive contributions (either by the employee or the employer) to a primary or supplemental employer-sponsored retirement savings account in both 2019 and 2020. This restriction ensures that we exclude any new employees, which we sought to do so that we captured the full calendar year of health and retirement decisions. The set of employers was selected to be diverse geographically and by university type and was stratified by level of employer HSA funding. Employers ranged from small liberal arts schools and mid-size private universities to flagship state public research universities and large private research universities. For confidentiality, we do not disclose the names of the employers.

Survey responses were merged with TIAA's administrative records on retirement accounts. We received responses from 2,157 individuals out of a total of 60,804 invitations sent, for a response rate of 3.9%. A total of 1,890 people completed the survey. The survey was open for fifteen days, with two reminders sent during the open period. TIAA administrative data includes the level of contributions to retirement accounts for each participant, as well as the total balance across all accounts a participant owns. The contributions are split between primary and secondary accounts as well as whether they came from employee contributions or employer contributions.

Table 1 lists the universities by the number of survey respondents in each as well as relevant aspects of their HSA offerings. HSA contributions are flat, rather than a percentage of salary as is the case with a typical DC retirement plan. Employers provide a larger contribution to the HSA for employees on a family plan than those on an individual plan in all cases except two, where the benefit is equal.

Table 2 contains summary statistics for the sample. The average age is 54.47 years, indicating a mid to late-career professional. The sample is majority female and over 70% are married. Just under 32% of the sample are in a faculty position, and of those, 85% are either tenured or tenure-track. More than half hold a graduate or professional degree.

About 20 percent of sample respondents have a defined benefit (DB) retirement plan with their current employer as their primary plan, rather than a defined-contribution (DC) plan. For their retirement contributions, the contribution amounts to $9,762, the bulk of which comes from employer dollars. Supplemental contributions are smaller and are nearly all composed of employee contributions—employers rarely provide matching or flat supplemental contributions. The average balance across TIAA retirement accounts was $380,037 with a large standard deviation, and likewise the average salary was $90,613, but with considerable variation.

## Table 1. Institutional sample

| University | *N* | Employer HSA Contributions | | |
|---|---|---|---|---|
| | | Contribution or Match | Amount by coverage type, $ | |
| | | | Employee-only | Family |
| A | 127 | None | - | - |
| B | 32 | None | - | - |
| C | 77 | None | - | - |
| D | 99 | None | - | - |
| E | 29 | None | - | - |
| F | 421 | Contribution | 200–800 | 400–1600 |
| G | 164 | Contribution | 750 | 750 |
| H | 47 | Match | 400 | 800 |
| I | 106 | Contribution | 1,000 | 1,500 |
| J | 103 | Match | 1,000 | 2,000 |
| K | 127 | Contribution | 1,000 | 2,000 |
| L | 446 | Contribution | 200 | 400 |
| M | 185 | Contribution | 1,000 | 2,000 |
| N | 132 | Contribution | 1,000 | 1,000 |
| O | 62 | Contribution | 700 | 1,400 |

Note: For each University, employer HSA contributions for employee plus spouse and employee plus child(ren) coverage are the same as that for family coverage. For University F, the employer's HSA contribution depends on employee salary. Universities H and J offer a match based on employee contributions. The table lists the maximum match amount.

## Table 2. Summary statistics

| | *N* | Mean | SD |
|---|---|---|---|
| Age | 1,676 | 54.47 | 11.17 |
| Female (%) | 1,709 | 60.74 | - |
| Married or with partner (%) | 1,712 | 70.15 | - |
| Faculty (%) | 1,707 | 31.99 | - |
| Tenured or tenure-track (%) | 540 | 85.74 | - |
| Education: Grad or Professional Degree (%) | 1,710 | 59.36 | - |
| Defined Benefit Plan (%) | 1,714 | 20.22 | - |
| Retirement Contributions ($) | 1,729 | 15,331 | 14,950 |
| Employer Primary ($) | 1,729 | 7,040 | 6,910 |
| Employer Supplemental ($) | 1,729 | 192 | 579 |
| Employee Primary ($) | 1,729 | 2,722 | 4,226 |
| Employee Supplemental ($) | 1,729 | 5,377 | 9,201 |
| TIAA Retirement Balance ($) | 1,729 | 380,037 | 599,658 |
| Salary ($) | 1,334 | 90,613 | 69,026 |
| High financial literacy (%) | 1,707 | 61.3 | - |
| Liquidity Constraints (%) | 1,706 | 12.0 | - |

Note: Table presents summary statistics of the sample. The top and bottom panels contain information obtained from the survey. The middle panel includes information from TIAA administrative records.

The final two rows in the table report two key measures in the survey: financial literacy and liquidity constraints. To test financial literacy, we pose three questions to the respondents about financial matters and note how many of them the respondent answered correctly. We use the "Big Three" methods developed by Lusardi and Mitchell (2011) asking about interest, inflation, and investment diversification. We classify people who answer all three correctly as having high financial literacy. To measure liquidity constraints, we ask how certain the respondent was that they could come up with $2,000 on short notice similar to Lusardi et al. (2011). We consider those who were certain or probably thought they could not come up with $2,000 as liquidity constrained.[3] We also consider individuals with an outstanding retirement plan loan with TIAA (4.8% of the sample) as liquidity constrained. In total, we classify 12% of those answering this question as liquidity constrained. Over 60% of respondents answered all three financial literacy questions correctly, and more than three quarters were certain that they could come up with the $2,000. These rates indicates a sample with high financial literacy and liquidity relative to the general population. Appendix Tables A.2 and A.3 report the distribution for each of the survey responses of these two measures. We also note that financial literacy and liquidity constraints are negatively correlated in our sample, consistent with other settings (Appendix Table A.4).

## 3. Evidence on fungibility with savings: Evidence from linked survey-administrative data

Our primary research question is whether employees treat the HSA as fungible with savings, and how behavior varies with financial literacy and liquidity constraints. We use the survey responses to assess whether employees treat the HSA as a savings vehicle and to further understand the reasons behind people's decisions.

### 3.1 HSA plans by time horizon

We assess whether employees view their HSA as most important for short-term, medium-term, or long-term goals. We asked individuals how they plan to use their HSA balances, ranging from i) Health expenses in current year, ii) Health expenses in the next 1 to 5 years, ii) Health expenses in the next 6 to 10 years, iv) Health expenses in retirement, and v) other expenses in retirement. Table 3 tabulates the responses for each of these uses based on a Likert scale from Strongly Agree to Strongly Disagree. Using the funds for health expenses in retirement (or reimbursements of past health expenses in retirement) maximizes the tax and growth benefits of HSAs. However, participants express the most interest in using HSAs to pay for health expenses in the current year or in the next five years. Over half of respondents strongly agreed with using the HSA to pay for current health expenses compared to a third who strongly agreed with using the HSA to pay for health expenses in retirement.

We find some differences in these views by liquidity constraints and financial literacy. Respondents with high financial literacy are significantly more likely to plan to use HSA funds in retirement for health expenses ($p$=0.028) compared to those with lower financial literacy. Not surprisingly, employees with liquidity constraints are significantly less likely to plan to use HSA funds to finance health care expenses in retirement compared to employees who are not liquidity constrained ($p$=0.003).

### 3.2 HSA decisions: contributions, balances, withdrawals, and asset allocation

We empirically study a range of behavior related to using the HSA as an additional form of savings, including contribution amounts, balances, withdrawals, HSA investments, and other decisions. In the next subsection, we run linear probability models to describe the conditional correlation between these decisions and employer HSA contributions, financial literacy, and liquidity constraints. Before presenting the regression results, we first discuss averages and raw correlations to provide a sense of the context and how our setting is similar to and different from others.

3 Lusardi et al. (2011) refer to this group as "financially fragile."

**Table 3. How employees plan to use HSA accumulations**

| | Strongly Agree | Agree | Neither Agree nor disagree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| Health expenses in current year | 52 | 24 | 8 | 5 | 9 |
| Health expenses in next 1 to 5 years | 37 | 36 | 13 | 6 | 8 |
| Health expenses in next 6 to 10 years | 31 | 30 | 20 | 9 | 10 |
| Health expenses in retirement | 33 | 26 | 21 | 10 | 11 |
| Other expenses in retirement | 8 | 10 | 33 | 21 | 27 |

Note: Table reports percentages of respondents who report agreement or disagreement with using the HSA for different time horizons reported in each row. Column totals sum to 100 across rows.

**HSA contributions:** About half of employees in the HDHP contribute more than $3,000 to their HSA account. Approximately 30.9% contribute the maximum amount, which is higher than found in other settings (Fronstin 2021). We asked respondents the reasons why they chose that contribution amount. The top three reported were based on expected health care spending, it was the most they could contribute, or to maximize the HSA's tax benefits. Perhaps surprisingly, few individuals reported making contributions to match their deductible. There are stark differences by financial literacy and liquidity constraints. 44% of employees with high financial literacy said they chose that amount to maximize the HSA's tax benefits compared to 26% of individuals with lower financial literacy (Appendix Figure A.3). Over half of employees with liquidity constraints said their contribution amount was the most they could afford, compared to 19% of employees who were not liquidity constrained (Appendix Figure A.4).

**HSA balances:** On average, 19.2% of employees in the HDHP have balances over $5,000, 24.8% have balances below $500, and 17.1% did not know their balance. Approximately 38% of individuals with high financial literacy have balances over $5,000 compared to only 13% with lower financial literacy. Perhaps more striking is that 58% of employees with lower financial literacy indicated less than a $500 balance or they did not know their balance, compared to 33% with high financial literacy. Patterns are similar when split by liquidity constraints: employees facing liquidity constraints are 91% more likely to have indicated less than a $500 balance than those who are not (Appendix Figure A.6). Overall, the modest size of HSA balances match earlier descriptive research (Fronstin 2021).

**HSA withdrawals:** Most employees use the HSA to finance short-term spending. 46.9% withdrew some portion of their HSAs in the last year and 27.9% withdrew either most or all of their balance. Not surprisingly, employees with liquidity constraints are more likely to withdraw a larger share of their HSA balance. When employees incur health expenses, they pay using their HSA. Few employees pay health expenses with other funds, which is a strategy that maximizes the tax benefits by allowing HSA expenses to grow. This is true even for the large majority of employees with high financial literacy who are not liquidity constrained (Appendix Figure A.7 and Figure A.8).

**HSA asset allocation:** We asked employees if their HSA accumulations where held in cash or money market accounts, primarily equities, primarily bonds, roughly split between equities and bonds, or whether they did not know. Less than one in five respondents reported that their balances were invested in non-cash, consistent with past work showing that few participants invest their accumulations (Fronstin 2021). Strikingly, 65% of individuals reported that they did not know—including not knowing whether their accumulations were in cash. We again find significant differences on asset allocation by financial literacy and liquidity constraints. Employees with high financial literacy were more likely to know how and if their balances are invested than employees with lower financial literacy (Appendix Figure A.10). Employees with liquidity constraints may not want to invest accumulations in order to use those funds to finance current health care consumption or to reimburse earlier medical costs to manage current liquidity needs. However, these employees are more likely to state they do not know how or if their accumulations are invested compared to employees without liquidity constraints (Appendix Figure A.9).

### 3.3 Linear probability models of HSA decisions

To focus on magnitudes and assess statistical significance of these outcomes, we estimate the following linear probability models:

$$y_{ics} = \eta_0 + \eta_1 f_i + \eta_2 l_i + \eta_3 h_{cs} + \lambda_c + u_{ics} \qquad (1)$$

where $y_{ics}$ is a binary measure of a particular HSA decision for employee $i$ with coverage type $c$ at university $s$, $f_i$ is an indicator for high financial literacy, and $l_i$ is an indicator for being liquidity constrained. We also control for employer HSA contributions in $1,000s ($h_{cs}$) and an indicator for coverage type. We exclude demographic controls because they are correlated with financial literacy and liquidity constraints, and our interest is in measuring the overall correlations of these variables with HSA decisions.[4]

We only observe these HSA outcomes for employees who choose the HDHP. We therefore also estimate selection models in Appendix Table A.8, using employer HSA contributions as an excluded variable from the outcome equation that is only included in the selection equation. The results for financial literacy and liquidity constraints are qualitatively similar, with most larger in magnitude and retaining statistical significance. In all but one outcome (choosing the HSA contribution to maximize the tax benefits), we fail to reject the null of zero correlation between the errors in both the selection and outcome equations. Our main results therefore proceed by showing results from estimating Equation 1.

Table 4 presents the regression estimates. Column 1 shows the results for contributing more than $3,000. Employees with high financial literacy are 8 percentage points more likely to do so and employees with liquidity constraints are 19.1 percentage points less likely to do so. Interestingly, employer HSA contributions are negatively correlated with employee contributions. Employees may tacitly view the employer's HSA deposit as "sufficient" and that further contributions are not needed if their goal is to finance short-term health expenses as shown earlier. In choosing their contributions, employees with high financial literacy are 13.7 percentage points more likely to do so to maximize the tax benefits while those with liquidity constraints are 15.3 percentage points less likely to do so (column 2). Employer HSA contributions are negatively correlated with the employee's decision to choose to maximize the tax benefits from their own contributions.

There are again strong differences by financial literacy and liquidity when considering HSA balances (column 3) and withdrawals (column 4). The probability of having an HSA balance over $2,000 is 28.4 percentage points higher among those with high financial literacy and 15.5 percentage points lower among those who are liquidity constrained. Consistent with these differences, the probability of withdrawing all or most of HSA assets is 16.1 percentage points lower for employees with high financial literacy and 22.2 percentage points higher for those with liquidity constraints. These magnitudes are very large relative to the mean of the dependent variable. Finally, even while many employees do not know how their HSA is invested, employees with high financial literacy are 23.4 percentage points more likely to know and those with liquidity constraints are 14.6 percentage points less likely to know (column 5). These magnitudes are again large. In addition to this main specification, we find similar results for financial literacy and liquidity constraints when including employer fixed effects instead of employer HSA contributions, as shown in Appendix Tables A.9–A.13.

To further examine financial literacy and liquidity, Figure 1 shows results from linear probability models that include interactions of these two variables. For ease of interpretation, we plot the predicted proportion of each group. The red whiskers denote the 95% confidence intervals that the group means are different relative to employees with high financial literacy who are not liquidity constrained. The largest differences are between this group and employees with low financial literacy who are liquidity constrained. The differences are always statistically significant between these groups and the magnitudes are large. For example, around 15% of liquidity-constrained employees with low financial literacy chose the HSA for its tax benefits compared to nearly 50% of employees with high financial literacy who are not constrained (panel b). Similarly, about 25% of liquidity-constrained employees with low financial literacy have balances over $2,000 versus 65% of employees with

4 It is important to note our focus is on quantifying how behavior differs by employees based on financial literacy and liquidity constraints. We are not measuring the causal effect of these variables since they do not vary exogenously in our setting, and we do not view controlling for demographics to be sufficient for this purpose.

high financial literacy who are not constrained (panel c). The rate of withdrawing all or most of the HSA is three times as high for liquidity-constrained employees with low financial literacy versus employees with high financial literacy who are not constrained (panel d), and the rate of not knowing how HSAs are invested is twice as high (panel e). Collectively, these results point to stark differences in how HSAs are used by employees with different levels of financial literacy and liquidity.

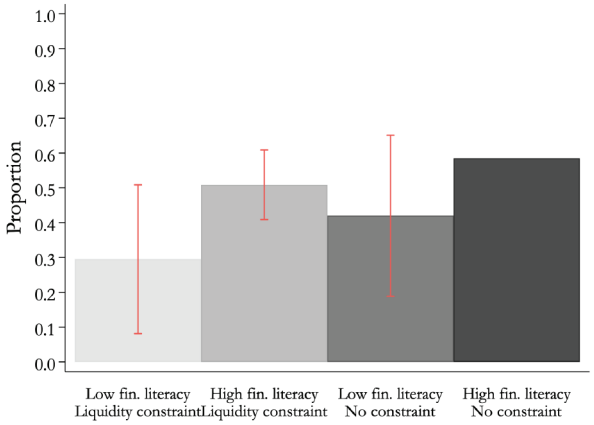
**Table 4. Linear probability models of HSA behavior**

| | Contributed $3,000 or more (1) | Chose contribution to maximize tax benefits (2) | HSA balance over $2,000 (3) | Withdrew all or most of HSA (4) | Unsure how HSA balance is invested (5) |
|---|---|---|---|---|---|
| High financial literacy | 0.080* | 0.137*** | 0.284*** | -0.161*** | -0.234*** |
| | (0.049) | (0.039) | (0.047) | (0.042) | (0.046) |
| Liquidity constrained | -0.191** | -0.153** | -0.155** | 0.222*** | 0.146* |
| | (0.082) | (0.063) | (0.078) | (0.069) | (0.075) |
| Employer HSA | -0.076** | -0.071** | -0.041 | 0.037 | 0.003 |
| contributions ($1,000s) | (0.034) | (0.028) | (0.033) | (0.029) | (0.032) |
| Dep. var. mean | 0.321 | 0.284 | 0.51 | 0.268 | 0.603 |
| *N* | 430 | 584 | 504 | 508 | 509 |

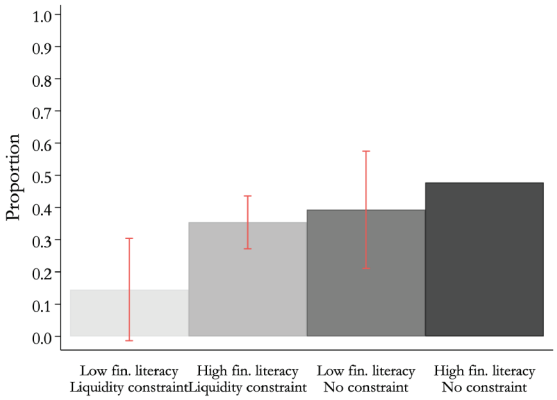
Note: Table shows results of linear probability models of different types of HSA behavior against employer HSA contributions, financial literacy, and financial fragility. High financial literacy is defined as answering all three financial literacy questions correctly. Liquidity constraints are defined as either (1) having an outstanding 403(b) loan, or (2) reporting they certainly could not or probably could not come up with $2,000 in 30 days to finance an expected expense. Regressions also include an indicator for employee-only coverage and a constant. Standard errors in parentheses. *** p<0.01, ** p < 0.05, * p<0.1.

## Figure 1. Relationship between HSA decisions, financial literacy, and liquidity

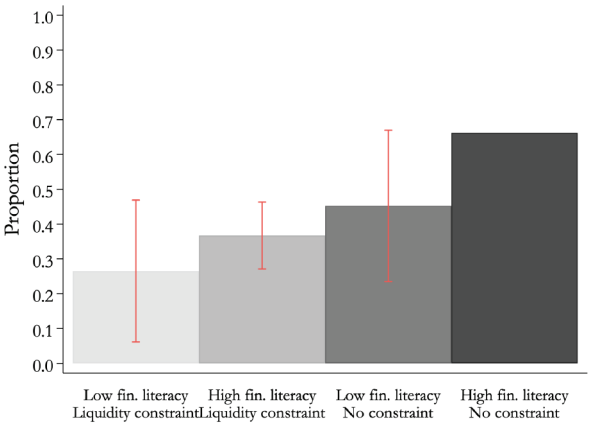
(a) Contributions over $3,000



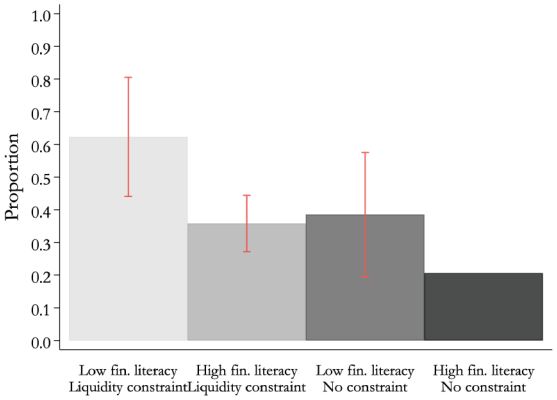

(b) Chose HSA for tax benefits



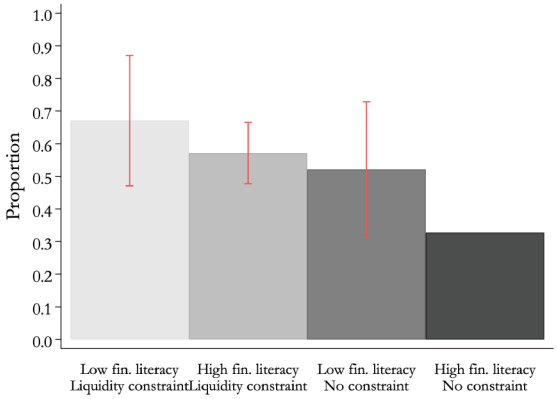

(c) HSA balances over $2,000




(d) Withdrew all or most of HSA




(e) Unsure how HSA balance is invested




Notes: Figures plot results of linear probability models of HSA decisions against types of employees based on financial literacy and liquidity. Each panel corresponds to a separation regression. The predicted proportions of employees who report the HSA decision are shown on the y-axis using the regression model. The omitted type from the model are employees with high financial literacy who are not liquidity constrained. The red whiskers on the other three bars plot the 95% confidence interval that the means between that group and the other group is equal. Regressions also include employer HSA contributions and indicators for family coverage.

## 4. Evidence on fungibility with health insurance premiums

In the previous section, we found employees do not treat HSAs as fungible with savings. In this section we test whether employees treat HSA contributions as fungible with insurance premiums. The neoclassical view is that these two sources of financing health care are fungible: a dollar reduction in premiums should be equivalent to a dollar increase in HSA funds. However, employees may value them differently due to liquidity constraints, gaps in knowledge, or other behavioral frictions. For example, if employees are especially concerned about large out-of-pocket medical expenses, a plan with a high deductible (and HSA) may be less appealing. Other employees may not fully realize the tax benefits of HSA contributions or what consumption can be financed by HSA accumulations. This section first uses the survey data to test for fungibility, explores heterogeneity in behavior, and describes reasons for choosing or avoiding the HDHP. We then supplement this analysis with administrative data that include health insurance claims from one of the survey's universities.

### 4.1 Empirical strategy

To fix ideas, we first discuss the ideal way to test fungibility in this context and then describe the variation and approach we use in practice. Consider the choice between two health plans—an HDHP with HSA and a traditional plan. Suppose the plans are only differentiated along financial ("vertical") characteristics. Provider networks and any other "horizontal" characteristics are the same. The ideal experiment to test fungibility would be to randomly assign each employee different combinations of premiums ($p$) and employer HSA contributions ($h$) to the HDHP, while holding the prices and features of the other health plan fixed. If employees value premiums and employer HSA contributions equally, then the share of people choosing the HDHP under the bundle $(p, h+1)$ should equal the share choosing the HDHP under the bundle $(p-1, h)$. If more people choose the HDHP under $(p-1, h)$ than under $(p, h+1)$, then HSA deposits are valued less than premiums. And if fewer people choose the HDHP under $(p-1, h)$ than under $(p, h+1)$, then premiums are valued less than HSA deposits.

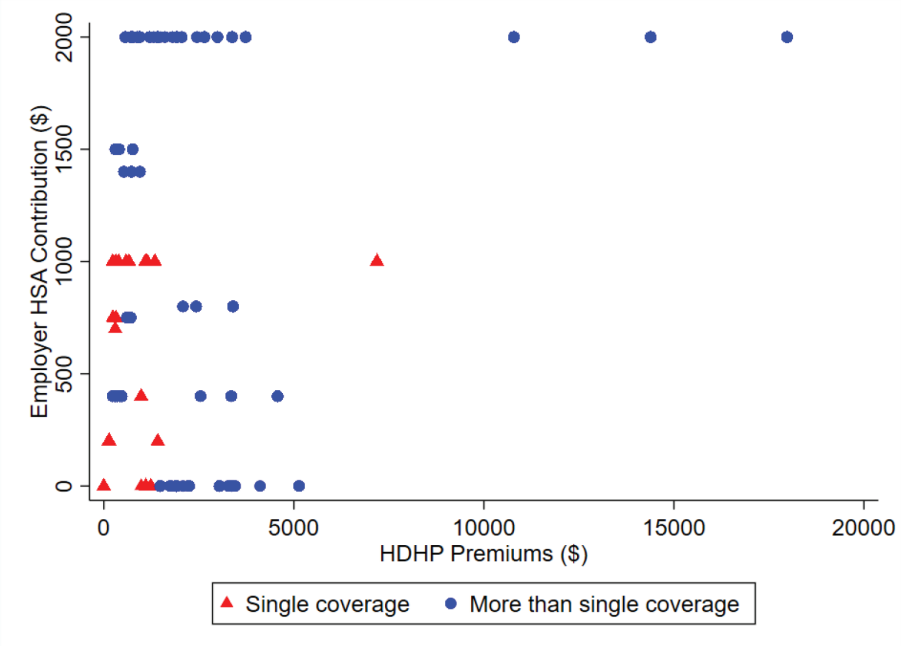
We lack randomized variation in premiums and HSA deposits, and instead exploit differences across employer offerings in our survey sample. Figure 2 visualizes this variation, with the vertical axis denoting the level of annual employer HSA contributions and the horizontal axis denoting the employee portion of the premium for the high-deductible health plan. Red triangles indicate employee-only coverage, and blue circles show plans with spousal coverage, family plans, and other plans that cover more than one person. There is considerable variation in both premiums and employer HSA contributions: some plans with the same premium differ in their level of employer HSA deposits, and some plans with the same HSA deposit differ in their level of premiums.

To operationalize this empirical approach, we estimate a linear probability model of choosing the HDHP using the following specification:

$$HDHP_{ics} = \alpha + \gamma_0 p_{cs} + \gamma_1 h_{cs} + \gamma_2 D_{cs} + \gamma_3 L_{cs} + x_{ics}\phi + \lambda_c + e_{ics} \quad (2)$$

where $HDHP_{ics}$ is an indicator for employee $i$ with coverage type $c$ at employer $s$ choosing the HDHP. $p_{cs}$ denotes premiums in the HDHP for coverage type coverage type $c$ at employer $s$ and $h_{cs}$ denotes employer HSA contributions.

**Figure 2. Variation in HSA employer contribution amounts and HDHP premiums**




Notes: Figure plots the combination of annual HSA employer contributions and annual HDHP premiums in the institutional sample. Each dot represents a coverage type, with triangles denoting employee-only coverage and circles denoting employee + child(ren), employee + spouse, or family coverage.

Under the ideal setting we described above, other characteristics of the plan are held fixed and premiums and HSA deposits are randomly assigned. Since we lack random variation, we control for the deductible $D_{cs}$ and the out-of-pocket max $L_{cs}$ of the HDHP, employee characteristics $x_{ics}$, and fixed effects for coverage types ($\lambda_c$). Appendix Table A.5 presents the $F$-statistic from balance tests of covariates against employee HDHP premiums and employer HSA contributions to assess whether the key independent variables are related to employee or employer characteristics. While education levels and faculty type do not differ systematically across schools with different HSA contributions and premiums, other individual and plan characteristics do. While we control for them in our regressions, our estimates will be biased if there are other omitted characteristics that are correlated with HSA contributions. Concerns about such omitted variable bias motivate a second approach that we describe later.

The key coefficients in Equation 2 are $\gamma_0$ and $\gamma_1$. We expect higher HSA contributions to be positively associated with choosing the HDHP ($\gamma_1 > 0$) and higher HDHP premiums to be negatively associated with choosing it ($\gamma_0 < 0$). Our test of fungibility is $\gamma_0 = -\gamma_1$.

### 4.2 Regression results

Table 5 presents our main regression results from estimating Equation 2. Column 1 includes all employees in the survey. The key independent variables are the employer HSA contribution and the HDHP premium (both of which are measured in $1,000s). As expected, premiums enter negatively and are highly statistically significant. Raising annual premiums by $1,000 reduces the probability of choosing the HDHP by 2.2 percentage points, relative to a mean of 35%. Surprisingly, the employer's HSA contribution also enters negatively: employees who would receive a higher HSA deposit for choosing the HDHP are less likely to choose it, conditional on premiums, deductibles, out-of-pocket limits, and other characteristics. In terms of magnitudes, the estimate on HSA contributions is quite large, at over five times the size of the estimate for premiums.

As shown in the last row of the table, we strongly reject the null hypothesis that $\gamma_0 = -\gamma_1$. However, the large and statistically significant negative coefficient on HSA contributions makes us reluctant to necessarily interpret this result as evidence against fungibility. One concern with the results in Table 5 might be that omitted factors vary across employers in ways that are correlated

with the size of employer HSA deposits and takeup of HDHPs. For example, if employers with generous HSA deposits pursue less promotion than employers with less generous HSA deposits, then the effect of HSA deposits may be biased downwards. Or if employers with higher HSA contributions make lower employer contributions to premiums, then the estimate on HSA contributions would again be biased downwards.

**Table 5. Linear probability models of HDHP choices**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $\gamma_0$, Employee premiums | -0.022*** | -0.023*** | -0.022*** | -0.022*** | -0.022*** |
| ($1,000s) | (0.004) | (0.005) | (0.006) | (0.004) | (0.006) |
| $\gamma_1$, Employer HSA contributions | -0.110*** | -0.105*** | -0.128*** | -0.118*** | -0.118*** |
| ($1,000s) | (0.024) | (0.031) | (0.040) | (0.027) | (0.032) |
| Coverage Controls | Yes | Yes | Yes | Yes | Yes |
| Demographic controls | Yes | Yes | Yes | Yes | Yes |
| Deductible and out-of-pocket max | Yes | Yes | Yes | Yes | Yes |
| Sample includes: | | | | | |
| High financial literacy | Yes | Yes | No | Yes | Yes |
| Low financial literacy | Yes | No | Yes | Yes | No |
| Not liquidity constrained | Yes | Yes | Yes | Yes | Yes |
| Liquidity constrained | Yes | Yes | Yes | No | No |
| Dependent variable mean | 0.356 | 0.388 | 0.322 | 0.365 | 0.379 |
| *N* | 1,211 | 719 | 485 | 1,055 | 670 |
| *p*-value of test $\gamma_0 = -\gamma_1$: | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

Note: Linear probability models of choosing the HDHP with robust standard errors in parentheses. Demographic controls include gender and indicators for 10-year age bins, income bins, and retirement asset bins. All regressions include indicators for coverage type, the HDHP deductible and out-of-pocket max, and a constant. Column 1 includes all survey employees and Columns 2-5 restrict to different sub-samples based on financial literacy and liquidity constraints. High financial literacy is defined as answering all three questions correctly. Liquidity constrained is defined as either taking out a 403(b) loan or reporting they certainly could not or probably could not come up with $2,000 for an unexpected expense within 30 days. *** p<0.01, ** p < 0.05, * p<0.1.

To investigate heterogeneity by financial literacy and liquidity, we split the sample according to financial literacy and liquidity constraints. As a reminder, we classify employees answering all three questions correctly as possessing high financial literacy and those answering at least one incorrectly as low financial literacy. We classify employees as liquidity constrained if they report certainly or probably not being able to come up with $2,000 in 30 days to finance an unexpected expense or if they have an outstanding loan from their 403(b). Columns 2 through 5 of Table 5 present the results of estimating equation Equation 2 for those with high financial literacy (column 2), low financial literacy (column 3), not being liquidity constrained (column 4), and finally those with high financial literacy who are not liquidity constrained (column 5). In each of these cases, the results are remarkably similar to those of the full sample in column 1. We continue to observe the same patterns, even for those who are not liquidity constrained and have high financial literacy.

### 4.3 Reasons for HDHP choices

In our sample, 35.6% selected the HDHP, 54.9% did not, and 9.5% did not know if they had. Of those not choosing the HDHP, only 6.2% would be likely or very likely to choose an HDHP in the future if offered while 75.6% would not.

To analyze the reasons behind people's plan choices, Table 6 shows how participants responded when asked why they chose (or did not choose) the HDHP available to them. The vast majority of those who did not choose the HDHP indicated either that the deductible was too

high or that they expected high medical expenses. About 16% indicated that they thought managing the HSA would be too confusing. Over a third of respondents said that there was no HDHP option, even though every person in the sample had an HDHP as part of their menu of health insurance options. This large share is evidence that there are considerable information and logistical barriers surrounding HDHPs and HSAs.

Among those choosing the HDHP, the most common reason was because premiums were lower (59.8%), followed by the option to have an HSA (53.7%). Just over 4% (incorrectly) reported it was the only option available.

**Table 6. Reasons for health insurance choices**

| Why did you choose the HDHP? | (%) | Why did you not choose the HDHP? | (%) |
|---|---|---|---|
| Premiums were lower | 59.8 | Expected to have high medical spending | 69.5 |
| For the option to have an HSA | 53.7 | HDHP was not an option | 35.2 |
| Expected to have little medical spending | 31.5 | Deductible was too high | 19.5 |
| Expected to have high medical spending | 10.2 | It was not recommended | 16.7 |
| It was recommended | 9.2 | Managing HSA confusing or hassle | 16.4 |
| HDHP was only option | 4.3 | Expected to have little medical spending | 13.0 |
| | | Thought HSA couldn't roll over | 0.9 |
| *N* = 587 | | *N* = 879 | |

Note: Table reports the reasons people report for either choosing the HDHP or not choosing it. Percentages sum to over 100% because respondents could select more than one reason.

### 4.4 Case study results using claims data

In this sub-section, we use within-employer variation and administrative data from a large university (one of the 15 included in the survey) to address possible concerns around omitted variable bias from Table 5. A second rationale for using this data is that observing both plan choice and spending data for all enrolled employees of the university allows us to implement a discrete choice analysis that lends itself to a structural interpretation.

The case study university began offering an HDHP alongside its two traditional health plans in 2014. We use data from 2012 to 2017 that combines plan choices, job characteristics, and annualized spending data aggregated from insurance claims. The plans are vertically differentiated, but all other features of the plans (e.g. provider networks) are identical. If the employee chose the HDHP, the university would make unconditional contributions to the employee's HSA, equal to $1,000 for employee-only coverage, $1,500 for employee plus spouse or child(ren) coverage, and $2,000 for family coverage. These contribution amounts stayed fixed while premiums increased over this time frame.[5] We use the variation within this employer in premiums (over time and across coverage types) and in HSA contributions (across coverage types) to estimate whether premiums and employer HSA contributions are valued equally. A limitation of this data is that we do not observe variation in employer HSA contributions within coverage types over our sample period.

Using the spending data, we construct measures of the expected out-of-pocket costs for each employee if they enrolled in each of the three plans. Annual health spending is split into dollars paid by insurance and dollars paid out-of-pocket by employees, and separately reported for in-network and out-of-network care. We use this information for each employee and any dependents (and also observe if an employee or dependent records zero claims) to construct a distribution of costs at the family level. We use the empirical distribution of costs by 5-year age, gender, and terciles of lagged health spending to construct expected costs. Appendix B describes the details of this procedure. Using this distribution, we calculate the variance of out-of-pocket costs at the family level.

5 In 2021, the year of our survey, the university contribution amounts were $1,000 for employee-only coverage and $1,500 for family coverage.

Our empirical approach is similar to the estimating equation of Abaluck and Gruber (2011), which specifies utility as a linear function of premiums, expected out of pocket payments, and plan characteristics. We further add employer HSA deposits and individual-level characteristics to estimate the following conditional logit model:

$$U_{ijt} = \pi_{jt}\beta_0 + \eta_{jt}\beta_1 + \mu_{ijt}\beta_2 + \sigma^2_{ijt}\beta_3 + \xi_{jt}\beta_4 + O_{jt}\beta_5 + x_{it}\delta + \phi \cdot 1(j = j^*_{t-1}) + \epsilon_{ijt} \quad (3)$$

where $\pi_j$ denotes premiums in plan $j$, $\eta_j$ denotes HSA contributions (which are zero for the non-HDHP plans), $\mu_{ij}$ denotes expected out-of-pocket payments for employee $i$ in plan $j$ and $\sigma^2_{ij}$ denotes the variance of those payments. We also include the deductible $\xi_j$ and out-of-pocket limit $O_j$ as additional plan characteristics. We include employee characteristics $x^t_i$ (quartiles of salary, 5-year age bins, tenure with the employer, and indicators for gender,academic division, and faculty). To capture the role of inertia in plan choices, $1(j = j^*_{t-1})$ is an indicator for employee choosing plan $j$ in the previous year. $\epsilon^t_{ij}$ is an i.i.d. error term with a type I extreme value distribution. We cluster standard errors at the individual level since we observe multiple years of data for most employees.

If premiums and employer HSA deposits are treated equally by the employee, then $\beta_0 = -\beta_1$. A premium reduction of one dollar is equal to an HSA increase of one dollar. We can also test whether premiums are treated equivalently to expected out-of-pocket payments by testing $\beta_0 = \beta_2$ or whether premiums are treated equivalently to the deductible by testing $\beta_0 = \beta_4$.

Table 7 presents the results from estimating Equation 3. As expected, premiums and expected out-of-pocket payments enter negatively. Now the estimate on HSA contributions is small, positive, and not statistically different from zero. We strongly reject the null that HSA contributions and premiums are valued equally by employees, as reported in the last row of the table. Appendix Table A.7 shows this same pattern is also observed regardless of employee age, faculty/staff status, or income. These results provide evidence against the hypothesis that employees view HSAs as fungible with health insurance premiums. Employees prefer a reduction in health insurance premiums to an equally-sized increase in HSA contributions.

The estimates for expected out-of-pocket payments are consistent with research from other settings. We find employees are much more sensitive to premiums than to expected out-of-pocket payments, similar to research on choices of Medicare drug plans (Abaluck and Gruber 2011). While expected out-of-pocket costs still enter negatively, the coefficient is statistically distinguishable from both zero and the coefficient on premiums. Employees are sensitive to the deductible, even conditional on expected out-of-pocket payments. The coefficient estimate on the deductible is very similar to that for premiums (-0.300 vs. -0.311), and we fail to reject they are equal.

## 5. Discussion

This paper uses a survey across 15 universities linked workplace benefits, and how behavior differs by financial literacy and liquidity.

**Table 7. Conditional logit results, case study sample**

| | (1) | (2) |
|---|---|---|
| $\beta_0$, Employee Premium (hundreds) | -0.398*** | -0.311*** |
| | (0.030) | (0.031) |
| $\beta_1$, Employer HSA contribution (hundreds) | 0.003 | 0.018 |
| | (0.018) | (0.018) |
| $\beta_2$, Expected out-of-pocket costs (hundreds) | -0.032*** | -0.013* |
| | (0.007) | (0.006) |
| $\beta_3$, Variance of out-of-pocket costs ($\times 10^6$) | 0.045* | -0.008 |
| | (0.023) | (0.023) |
| $\beta_4$ Deductible (hundreds) | | -0.300*** |
| | | (0.014) |
| $\beta_5$, Out-of-pocket limit (hundreds) | | -0.026*** |
| | | (0.006) |
| *NT* | 210,860 | 210,860 |
| *p*-value of test $\beta_0 = -\beta_1$: | <0.001 | <0.001 |

Note: Table shows results of conditional logit models estimated in Equation 3. Coefficients estimates reported are the parameters of the utility function, not marginal effects. Regressions also indicators for salary bins ($20,000), age (5-years), gender, academic vs. medical division, faculty, above-median tenure, and lags of previous plan choices. Standard errors clustered by employee reported in parentheses. ***p<0.01, **p < 0.05, * p<0.1.

We find employees do not use HSAs as a savings vehicle. Respondents state stronger preferences for using the HSA to finance current health care expenses compared to expenses in the future. Consistent with this preference, we find a negative correlation between employer HSA contributions and employee contributions. Some employers may provide larger HSA contributions to encourage employees to build up savings, but we find evidence that employees instead offset these funds through lower contributions of their own. Moreover, few people invest their HSA assets in equities or bonds, and nearly two-thirds do not know how their assets are allocated. While many HSA providers have an accumulation floor before investing is possible (often a few thousand dollars), many survey respondents forego the potential for upside growth and greater post-tax wealth. We do observe significant differences in HSA savings behavior by financial literacy and liquidity, but even most people with high financial literacy who are not liquidity constrained do not use their HSA primarily as a savings vehicle. We also find that employees value employer HSA deposits less than an equal-sized reduction in health insurance premiums. Our results reject the standard model of consumer behavior that assumes people should treat premiums and HSAs as fungible when financing health care consumption.

It is important to highlight several limitations of the study. First, we rely on survey responses for information about money in employee Health Savings Accounts. While some information cannot be obtained from administrative data, such as why an individual chose their HSA contribution amount, individual HSA administrative data on contributions and withdrawals would be more accurate than self-reported measures. Second, our sample is limited to employees in higher education who have above-average financial literacy and incomes than the US average. However, we structured our survey to obtain a sample across large and small employers that are also geographically dispersed.

The high levels of financial literacy, assets, and liquidity among our sample respondents also provides a helpful benchmark for interpreting the results. One might believe that employees in this context are better equipped to make informed decisions about benefits and to handle the possibility of high out-of-pocket exposure in

return for greater long-run savings. Our findings provide a cautionary tale regarding how workers evaluate workplace benefits that have complicated features. Many employers (including those in this setting) already provide benefit education programming and ample resources for employees to acquire more information and make decisions. Other "light-touch" interventions include targeted advice and assistance to help employees navigate choices, simplifying the financial consequences of these choices (Samek and Sydnor 2020), and defaults that could be tailored to individual circumstances (Gruber et al. 2020). Whether such interventions in the context of HSAs and retirement saving would be valuable to employees, employers, and plan sponsors, is an important direction for future research.

Further research could directly examine how well individuals understand specific workplace benefits and financial products. Additionally, knowing the value added of financial or benefit education programming would be important to employees and plan sponsors. Given the effect that liquidity has in how individuals use their HSAs, individuals may not be fully aware of how liquid HSAs are. Future work could examine if default HSA contribution rules could improve workers' financial security.

## References


Abaluck, Jason, and Jonathan Gruber. 2011. "Choice Inconsistencies among the Elderly: Evidence from Plan Choice in the Medicare Part D Program." *American Economic Review*, 101(4): 1180–1210.

Abeler, Johannes, and Felix Marklein. 2017. "Fungibility, Labels, and Consumption." *Journal of the European Economic Association*, 15(1): 99–127.

Appelbaum, Binyamin. 2018. "One Reason for Slow Wage Growth? More Benefits." *The New York Times*. accessed June 21, 2022.

Baicker, Katherine, and Amitabh Chandra. 2006. "The Labor Market Effects of Rising Health Insurance Premiums." *Journal of Labor Economics*, 24(3): 609–634.

Baicker, Katherine, William H Dow, and Jonathan Wolfson. 2006. "Health savings accounts: Implications for health spending." *National Tax Journal*, 59(3): 463–475.

Bhargava, Saurabh, George Loewenstein, and Justin Sydnor. 2017. "Choose to Lose: Health Plan Choices from a Menu with Dominated Option." *Quarterly Journal of Economics*, 3: 1319–1372.

Cardon, James H, and Mark H Showalter. 2007. "Insurance choice and tax-preferred health savings accounts." *Journal of Health Economics*, 26(2): 373–399.

Claxton, Gary, Matthew Rae, Gregory Young, Nisha Kurani, Heidi Whitmore, Jason Kerns, Jackie Cifuentes, Greg Shmavonian, and Anthony Damico. 2021. "2021 Employer Health Benefits Surveys." *Kaiser Family Foundation*.

Eriksson, Tor, and Nicolai Kristensen. 2014. "Wages or Fringers? Some Evidence on Trade-Offs and Sorting." *Journal of Labor Economics*, 32(4): 899–927.

Fronstin,Paul. 2021. "Trends in Health Savings Account Balances, Contributions, Distributions, and Investments and the Impact of COVID-19." *EBRI Issue Brief*, , (538).

Fronstin, Paul, M. Christopher Roebuck, and A. Mark Fendrick. 2022. "Premium Impact of Expanding Pre-Deductible Coverage to Chronic Disease Management Medications in HSA-Eligible Health Plans." *EBRI Issue Brief*, 563.

Goldstein, Gerard, and Mark Pauly. 1976. "Group Health Insurance as a Local Public Good." In The Role of Health Insurance in the Health Services Sector. , ed. Richard Rosett, 73–110. *National Bureau of Economic Research*.

Gruber, Jonathan. 1994. "The Incidence of Mandated Maternity Benefits." *American Economic Review*, 84(3): 622–641.

Gruber, Jonathan, Benjamin Handel, Samuel Kina, and Jonathan Kolstad. 2020. "Managing Intelligence: Skilled Experts and AI in Markets for Complex Products." *NBER Working Paper* 27038.

Handel, Ben, and Jonathan Kolstad. 2015. "Health Insurance for Humans: Information Frictions, Plan Choice, and Consumer Welfare." *American Economic Review*, 105(8): 2449–2500.

Hastings, Justine, and Jesse Shapiro. 2018. "How Are SNAP Benefits Spent? Evidence From a Retail Panel." *American Economic Review*, 108(12): 3493–3540.

Hastings, Justine S, and Jesse M Shapiro. 2013. "Fungibility and consumer choice: Evidence from commodity price shocks." *The Quarterly Journal of Economics*, 128(4): 1449–1498.

Helmchen, Lorens, David Brown, Ithai Lurie, and Anthony Lo Sasso. 2015. "Health Savings Accounts: Growth Concentrated Among High-Income Households and Large Employers." *Health Affairs*, 34(9): 1594–1598.

Kolstad, Jonathan, and Amanda Kowalski. 2016. "Mandate-based health reform and the labor market: Evidence from the Massachusetts reform." *Journal of Health Economics*, 47: 1–106.

Kooreman, Peter. 2000. "The Labeling Effect of a Child Benefit System." *American Economic Review*, 90(3): 571–583.

Leive, Adam. 2022. "Health Insurance Design Meets Saving Incentives: Consumer Responses to Complex Contracts." *American Economic Journal: Applied Economics*, 14(2): 200–227.

Lennon, Conor. 2021. "Are the Costs of Employer-Sponsored Health Insurance Passed on to Workers at the Individual Level?" Economics and Human Biology, 41: 100995.

Liu, Chenyuan, and Justin Sydnor. 2022. "Dominated Options in Health Insurance Plans." *American Economic Journal: Economic Policy*, 14(1): 277–300.

Lusardi, Annamaria, and Olivia Mitchell. 2014. "The Economic Importance of Financial Literacy." J*ournal of Economic Perspectives*, 52(1): 5–44.

Lusardi, Annamaria, and Olivia S Mitchell. 2011. "Financial Literacy and Planning: Implications for Retirement Well-being." In *Financial Literacy: Implications for Retirement Security and the Financial Marketplace*. , ed. Olivia Mitchell and Annamaria Lusardi, Chapter 2, 17–39. Oxford University Press.

Lusardi, Annamaria, Daniel Schneider, Peter Tufano, Adair Morse, and Karen M Pence. 2011. "Financially Fragile Households: Evidence and Implications." *Brookings Papers on Economic Activity*, 83–150.

Milkman, Katherine, and John Beshears. 2009. "Mental Accounting and Small Windfalls: Evidence from an Online Grocer." *Journal of Economic Behavior and Organization*, 71(2): 384–394.

Oyer, Paul. 2008. "Salary of Benefits?" In *Work, Earnings, and Other Aspects of the Employment Relation*. , ed. S.W. Polacheck and K Tatsiramos, 429–467. Emerald Group Publishing Limited.

Pauly, Mark. 1999. *Health Benefits at Work*. University of Michigan Press.

Peter, Richard, Sebastian Soika, and Petra Steinorth. 2016. "Health insurance, health savings accounts and healthcare utilization." *Health Economics*, 25(3): 357–371.

Rosen, Sherwin. 1986. "The Theory of Compensating Differences." In *Handbook of Labor Economics*. , ed. Orley Ashenfelter and Richard Layard, 642–692. Elsevier Science.

Samek, Anya, and Justin Sydnor. 2020. "Impact of Consequence Information on Insurance Choice." *NBER Working Paper* 28003.

Spiegel, Jack, and Paul Fronstin. 2021. "Health Savings Account Balances, Contributions, Distributions, and Other Vital Statistics: Evidence From the EBRI HSA Database." *EBRI Issue Brief*, No. 543.

Steinorth, Petra. 2011. "Impact of health savings accounts on precautionary savings, demand for health insurance and prevention effort." *Journal of Health Economics*, 30(2): 458–465.

Summers, Lawrence H. 1989. "Some simple economics of mandated benefits." *American Economic Review*, 79(2): 177–183.

U.S. Bureau of Labor Statistics. 2000. "Employer Costs for Employee Compensation Summary." *U.S Bureau of Labor Statistics*. accessed June 21, 2022.

U.S. Bureau of Labor Statistics. 2022. "Employer Costs for Employee Compensation Summary." accessed June 21, 2022.

# A. Appendix: Additional figures and tables

### Table A.1. Total household income and retirement assets

| Household Income | (%) | Household Retirement Assets | (%) |
|---|---|---|---|
| Less than $25,000 | 0.6 | Less than $50,000 | 7.1 |
| $25,000 to $49,999 | 9.6 | $50,000 to $99,999 | 6.7 |
| $50,000 to $74,499 | 16.7 | $100,000 to $149,999 | 6 |
| $75,000 to $99,999 | 14.9 | $150,000 to $199,999 | 5.8 |
| $100,000 to $149,999 | 23.9 | $200,000 to $499,999 | 19.8 |
| $150,000 to $199,999 | 11.6 | $500,000 to $999,999 | 16.3 |
| $200,000 to $249,999 | 6.2 | $1 million or more | 22.0 |
| $250,000 or higher | 9.3 | Don't know | 8.9 |
| Prefer not to answer | 7.1 | Prefer not to answer | 7.6 |
| *N* | 1,710 | *N* | 1,714 |

Note: Table presents distribution of household income and household retirement assets among survey respondents. Respondents were asked to report approximate amounts.

### Table A.2. Distribution of financial literacy of the sample

| | | | | |
|---|---|---|---|---|
| **Panel A. Individual questions** | **Interest** | **Inflation** | **Diversification** | |
| Correct (%) | 87.5 | 79.2 | 72 | |
| Incorrect (%) | 3.9 | 7.2 | 1.3 | |
| Don't know (%) | 7.4 | 12.0 | 24.8 | |
| Prefer not to answer (%) | 1.2 | 1.6 | 1.7 | |
| **Panel B. All questions combined** | **Zero** | **One** | **Two** | **Three** |
| Number Answered Correctly (%) | 6.5 | 10.1 | 22.0 | 61.3 |
| *N* =1,707 | | | | |

Note: Table reports the distribution of financial literacy among survey respondents. Panel A presents responses to each of the "Big 3" questions related to interest, inflation, and diversification. Panel B reports the percentage of respondents who correctly answer 0, 1, 2, or 3 questions correctly.

### Table A.3. Distribution of ability to finance emergency expense

| Response | (%) |
|---|---|
| Certain could come up with $2,000 | 76.2 |
| Could probably come up with $2,000 | 13.8 |
| Probably could not come up with $2,000 | 3.9 |
| Certain could not come up with $2,000 | 4.2 |
| Don't know | 1.9 |
| *N* =1,706 | |

Note: Table reports the distribution of responses to the question: "How confident are you that you could come up with $2,000 if an unexpected need arose within the next month?"

### Table A.4. Joint distribution of financial literacy and liquidity constraints

| | Not liquidity constrained | Liquidity constrained | Total |
|---|---|---|---|
| Low financial literacy | 519 | 137 | 656 |
| High financial literacy | 981 | 66 | 1,047 |
| Total | 1,500 | 203 | 1,703 |

Note: Table reports joint distribution of financial literacy with liquidity constraints among survey respondents. High financial literacy is defined as answering all three questions correctly, and low financial literacy is defined as answering at least one question incorrectly. Liquidity constrained is defined as either reporting they either probably could not or certainly could not come up with $2,000 within 30 days to finance an emergency expense, or having an outstanding 403(b) loan. There is a positive correlation between low financial literacy and liquidity constraints.

### Table A.5. Covariate balance

| | *F* -stat | *p*-value |
|---|---|---|
| Employee-level characteristics | | |
| Female | 3.73 | 0.024 |
| Age | 2.56 | 0.078 |
| Graduat degree | 1.16 | 0.315 |
| Faculty | 0.66 | 0.516 |
| University-level characteristics | | |
| Number of plans | 42.69 | <0.001 |
| HDHP actuarial value | 43.13 | <0.001 |
| HDHP deductible | 8.26 | <0.001 |
| HDHP out-of-pocket maximum | 5.64 | 0.005 |

Note: Table presents the $F$ -statistic and associated $p$-value from linear regressions of each covariate that is listed in rows against employee premiums in the HDHP and employer HSA contributions. Specifically, each row reports the results of running the following regression: $x_{ics} = a + \alpha 0_{pcs} + \alpha 1_{hcs} + u_{ics}$, where $x_{ics}$ is an observable characteristic for individual $i$ with coverage type $c$ at employer $s$. The table reports the p-value from the $F$ -statistic that $\alpha_0 = \alpha_1 = 0$, with each row corresponding to a separate regression. In terms of individual-level covariates, employee HDHP premiums and HSA contributions are not correlated with employee education or employee type (faculty vs. staff), but are correlated with gender and age. Premiums and HSA premiums are correlated with other features of the health insurance plan environment, such as number of plans, actuarial value of the HDHP, HDHP deductible, and HDHP out-of-pocket maximum.

### Table A.6. Linear probability models of HDHP choice: SOSD sample

| | (1) | (2) | (3) |
|---|---|---|---|
| Employer HSA Contribution | -0.178*** | -0.181*** | -0.174*** |
| ($1,000) | (0.025) | (0.025) | (0.026) |
| HDHP Premium | -0.050*** | -0.052*** | -0.051*** |
| ($1,000) | (0.015) | (0.015) | (0.015) |
| HDHP Deductible | 0.136*** | 0.135*** | 0.148*** |
| ($1,000) | (0.048) | (0.048) | (0.048) |
| Coverage: Self + Child(ren) | -0.034 | -0.030 | -0.071 |
| | (0.103) | (0.104) | (0.104) |
| Coverage: Self + Spouse | -0.044 | -0.046 | -0.053 |
| | (0.086) | (0.086) | (0.085) |
| Coverage: Family | 0.112 | 0.113 | 0.055 |
| | (0.085) | (0.086) | (0.087) |
| Female | | -0.018 | -0.032 |
| | | (0.032) | (0.032) |
| Age 35-44 | | | 0.042 |
| | | | (0.079) |
| Age 45-54 | | | -0.029 |
| | | | (0.074) |
| Age 55-64 | | | 0.004 |
| | | | (0.071) |
| Age 65+ | | | -0.174** |
| | | | (0.077) |
| Constant | 0.348*** | 0.365*** | 0.377*** |
| | (0.081) | (0.085) | (0.103) |
| *N* | 984 | 981 | 962 |

*p < 0.10, **p < 0.05, ***p < 0.01

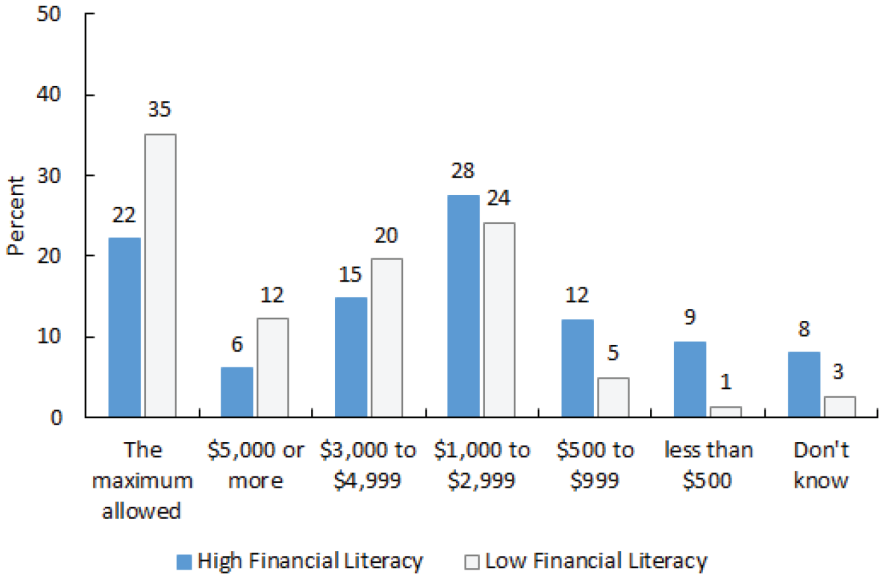
Note: Linear probability models with robust standard errors in parenthesis. Sample includes only individuals for whom the HDHP second-order stochastically dominates (SOSD) the second best plan as measured by actuarial value.

## Table A.7. Conditional logit results: Sub-samples

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $\beta_0$, Employee Premium | -0.381*** | -0.350*** | -0.257*** | -0.338*** | -0.386*** |
| (hundreds) | (0.064) | (0.040) | (0.052) | (0.045) | (0.077) |
| $\beta_1$, Employer HSA contribution | -0.006 | -0.007 | 0.006 | 0.049 | -0.043 |
| (hundreds) | (0.033) | (0.022) | (0.029) | (0.027) | (0.049) |
| $\beta_2$, Expected out-of-pocket costs | -0.025* | -0.006 | -0.046*** | 0.005 | -0.012 |
| (hundreds) | (0.012) | (0.008) | (0.012) | (0.011) | (0.012) |
| $\beta_3$, Variance of out-of-pocket costs | 0.043 | -0.008 | 0.107** | -0.095** | -0.023 |
| ($\times 10^6$) | (0.039) | (0.028) | (0.040) | (0.035) | (0.054) |
| $\beta_4$ Deductible | -0.304*** | -0.309*** | -0.286*** | -0.303*** | -0.347*** |
| (hundreds) | (0.029) | (0.019) | (0.022) | (0.023) | (0.032) |
| $\beta_5$, Out-of-pocket limit | -0.044*** | -0.048*** | 0.018* | -0.069*** | -0.092*** |
| (hundreds) | (0.011) | (0.007) | (0.009) | (0.009) | (0.016) |
| Sample | Faculty | Salary $60k+ | Ages 20-34 | Ages 35-54 | Ages 55+ |
| *NT* | 45,184 | 110,324 | 72,663 | 76,740 | 61,457 |
| *p*-value of test $\beta_0 = -\beta_1$: | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

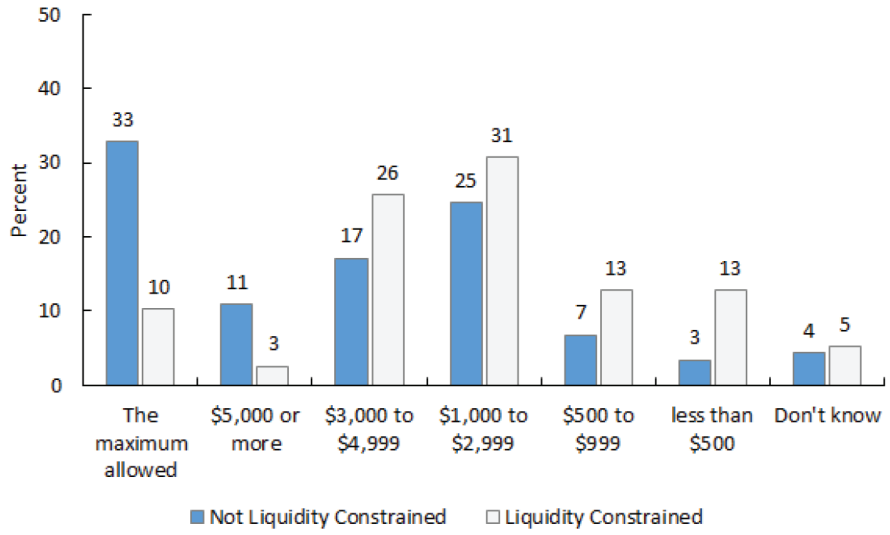
Note: Table shows results of conditional logit models estimated in Equation 3. Coefficients estimates reported are the parameters of the utility function, not marginal effects. R Regressions also indicators for salary bins ($20,000), age (5-years), gender, academic vs. medical division, faculty, above-median tenure, and lags of previous plan choices. Standard errors clustered by employee reported in parentheses.

### Figure A.1. Distribution of HSA contributions by financial literacy



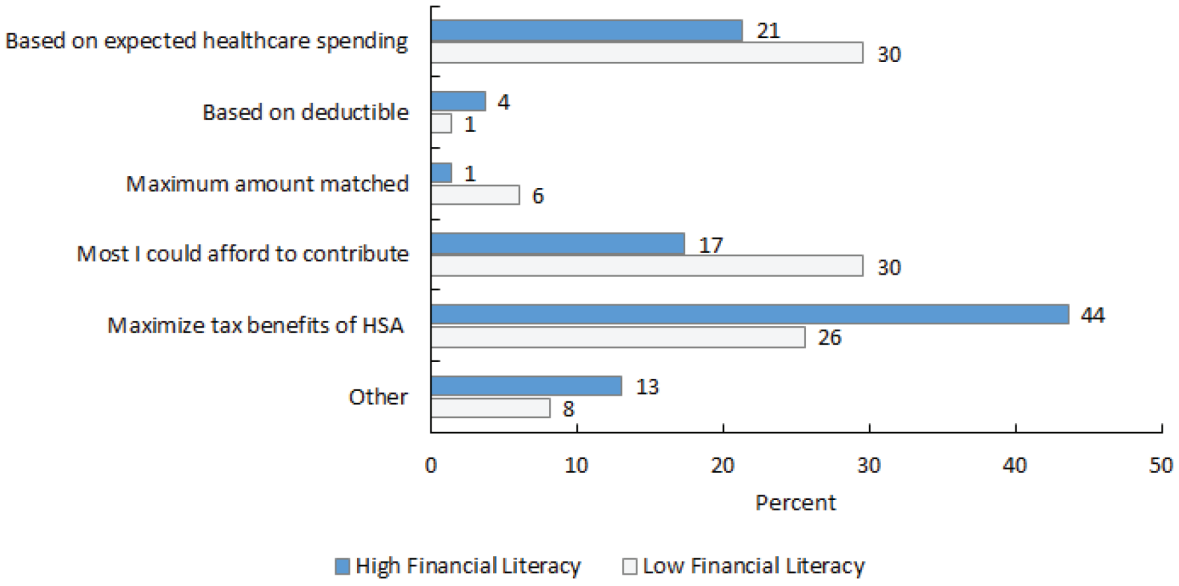

Notes: Percentages shown. $\chi^2$ test, p≤0.001

### Figure A.2. Distribution of HSA contributions by liquidity constraints



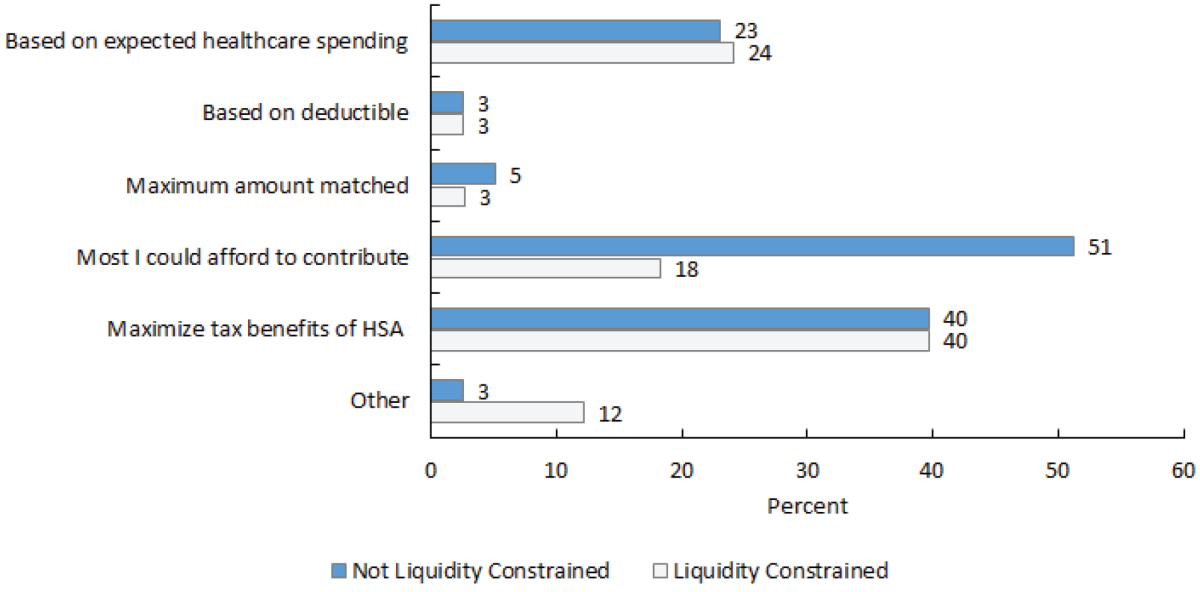

Notes: Percentages shown. $\chi^2$ test, p = 0.003

### Figure A.3. Why chose HSA contribution amount by financial literacy



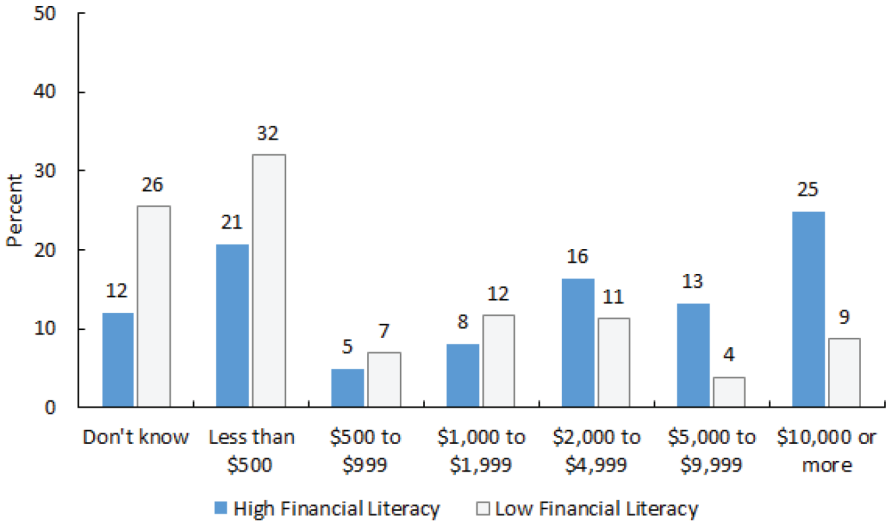

Notes: Percentages shown. $\chi^2$ test, p≤0.001

### Figure A.4. Why chose HSA contribution amount by liquidity constraints



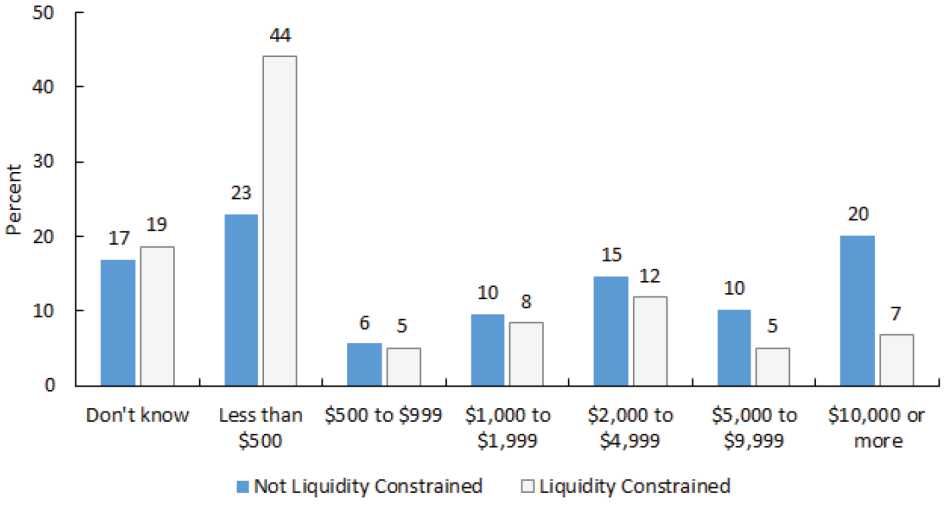

Notes: Percentages shown. $\chi^2$ test, p≤0.001

## Figure A.5. Distribution of HSA balances by financial literacy



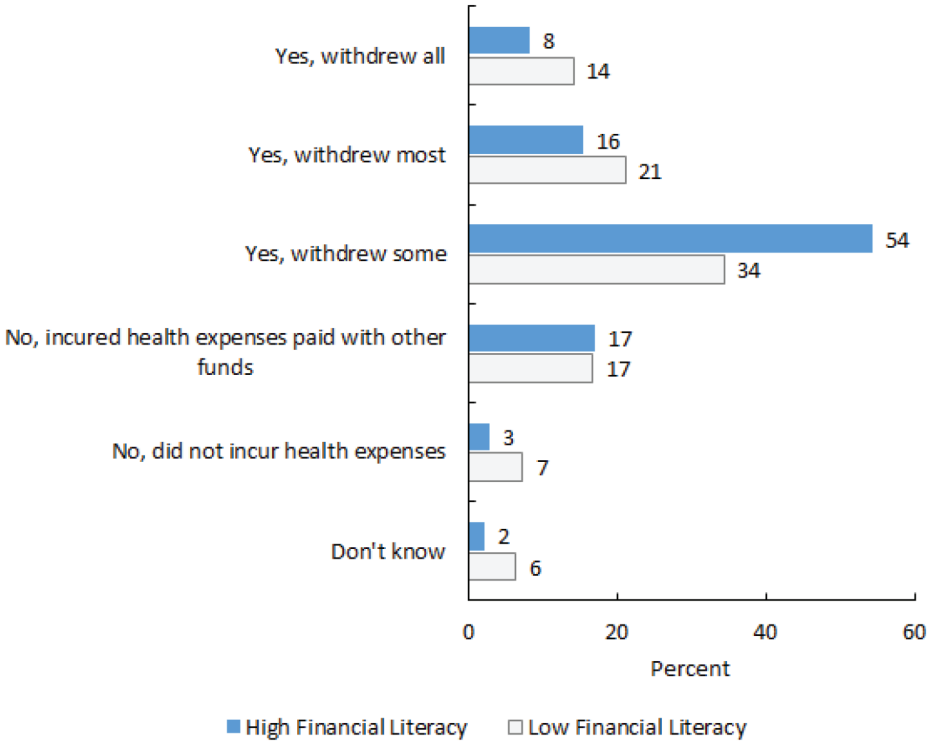

Notes: Percentages shown. $\chi^2$ test, $p < 0.01$

## Figure A.6. Distribution of HSA balances by liquidity constraints



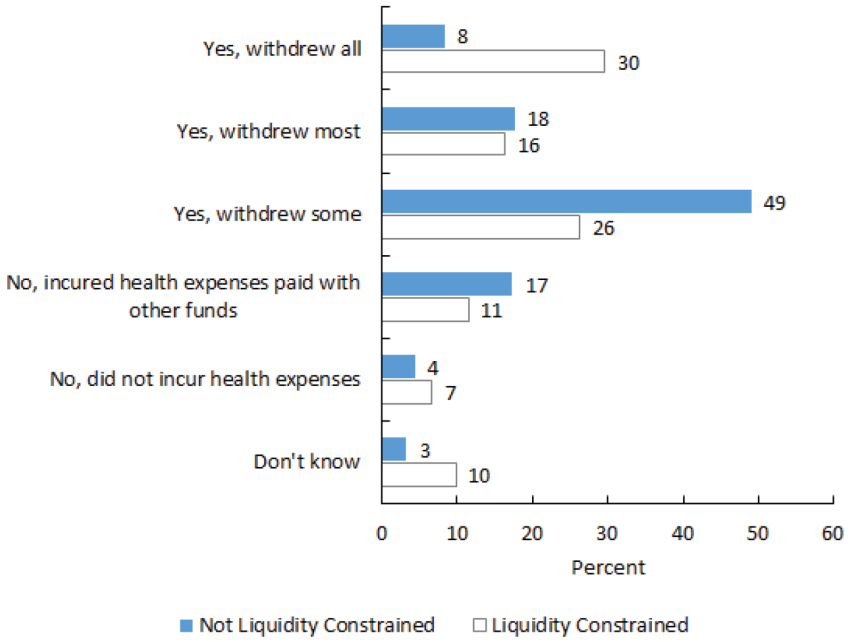

Notes: Percentages shown. $\chi^2$ test, $p = 0.010$

**Figure A.7. Distribution of HSA withdrawals by financial literacy**



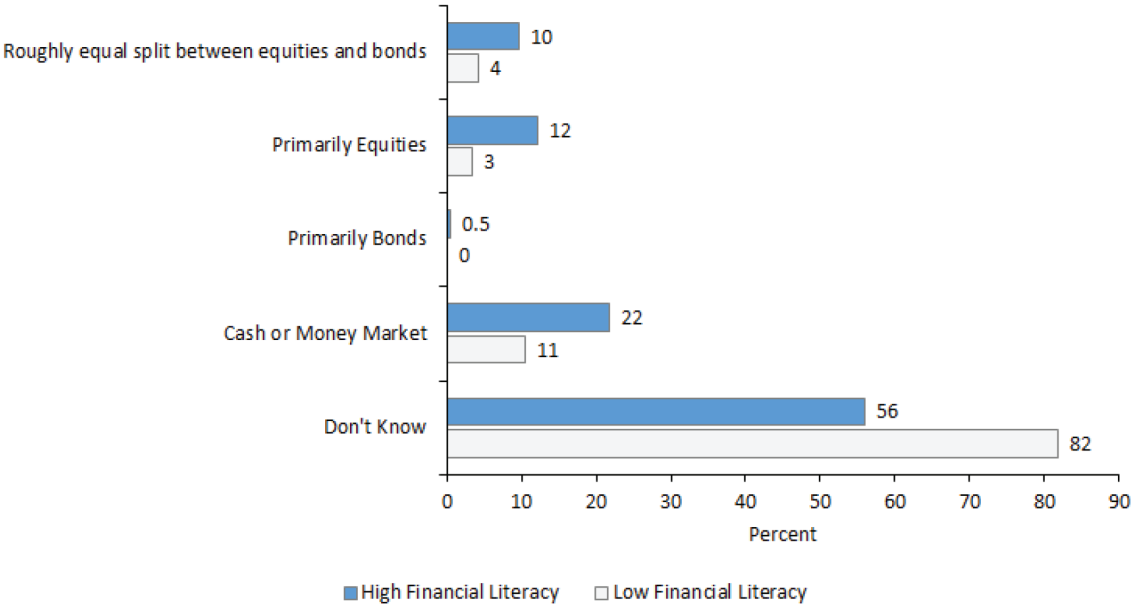

Notes: Percentages shown. $\chi^2$ test, $p < 0.001$

## Figure A.8. Distribution of HSA withdrawals by liquidity constraints



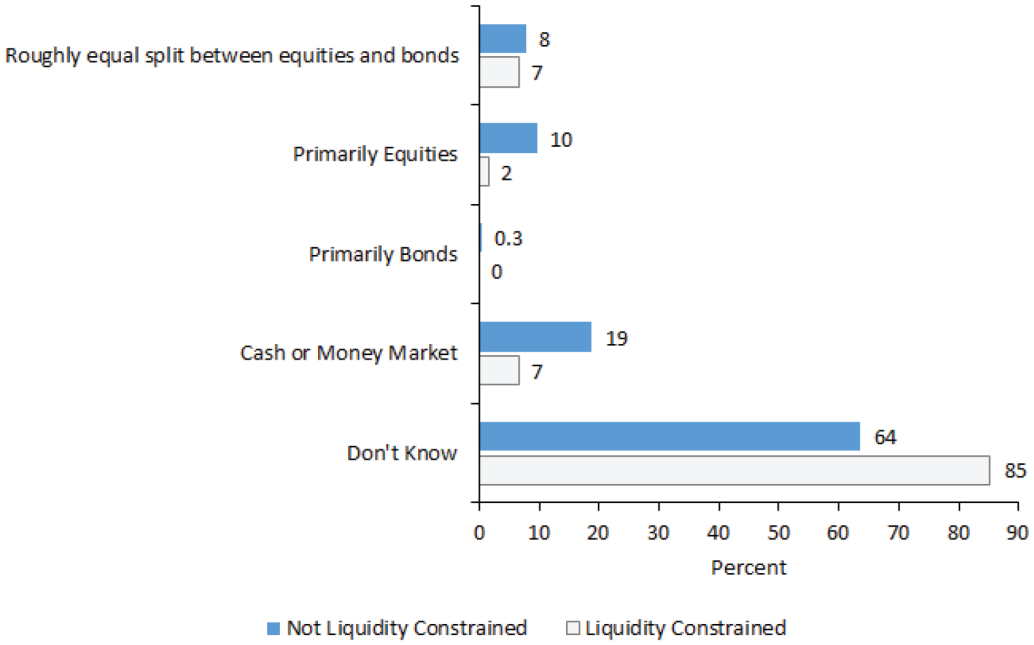

Notes: Percentages shown. $\chi^2$ test, $p < 0.001$

## Figure A.9. How HSA funds invested by financial literacy




Notes: Percentages shown. $\chi^2$ test, $p \leq 0.001$

### Figure A.10. How HSA funds invested by liquidity constraints




Notes: Percentages shown. $\chi^2$ test, p = 0.012

### Table A.8. Heckman Selection Models of HSA behavior

| | Contributed $3,000 or more (1) | Chose contribution to maximize tax benefits (2) | HSA balance over $2,000 (3) | Withdrew all or most of HSA (4) | Unsure how HSA balance is invested (5) |
|---|---|---|---|---|---|
| High financial literacy | 0.128 | 0.093 | 0.596** | -0.492*** | -0.665*** |
| | (0.180) | (0.071) | (0.243) | (0.129) | (0.158) |
| Liquidity constrained | -0.400 | -0.039 | -0.477** | 0.667*** | 0.490* |
| | (0.366) | (0.106) | (0.187) | (0.205) | (0.262) |
| $\rho$ | -0.866 | -14.761*** | 1.408 | -0.622 | -0.055 |
| | (0.712) | (1.439) | (1.741) | (0.816) | (0.829) |
| *N* | 1,388 | 1,537 | 1,460 | 1,464 | 1,465 |

Note: Table shows results of maximum likelihood probit models using sample selection corrections. High financial literacy is defined as answering all three financial literacy questions correctly. Liquidity constraints are defined as either (1) having an outstanding 403(b) loan, or (2) reporting they certainly could not or probably could not come up with $2,000 in 30 days to finance an expected expense. Regressions also include an indicator for employee-only coverage and a constant. Standard errors in parentheses. *** p<0.01, ** p< 0.05, * p<0.1.

### Table A.9. LPMs: HSA contributions of $3,000 or more

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| High financial literacy | 0.080* | | 0.096* | |
| | (0.049) | | (0.050) | |
| Liquidity constrained | -0.191** | | -0.168** | |
| | (0.082) | | (0.084) | |
| Employer HSA contribution | -0.222*** | -0.222*** | | |
| | (0.079) | (0.079) | | |
| Employee-only coverage | -0.069 | -0.069 | -0.049 | -0.050 |
| | (0.047) | (0.047) | (0.049) | (0.049) |
| **Reference group (High financial literacy & not constrained)** | | | | |
| High financial literacy & liquidity constraint | | -0.165 | | -0.112 |
| | | (0.118) | | (0.121) |
| Low financial literacy & no constraint | | -0.076 | | -0.086 |
| | | (0.051) | | (0.053) |
| Low financial literacy & liquidity constraint | | -0.290*** | | -0.305*** |
| | | (0.109) | | (0.111) |
| Constant | 0.507*** | 0.585*** | 0.309 | 0.387 |
| | (0.086) | (0.078) | (0.273) | (0.269) |
| Employer Fixed Effects | No | No | Yes | Yes |
| *N* | 430 | 430 | 430 | 430 |

*p < 0.10, **p < 0.05, ***p < 0.01

Note: Table reports regression results of linear probability models (LPMs) in which the dependent variable is an indicator of employee HSA contributions of $3,000 or more to the HSA. Columns (1) and (3) include indicators for financial literacy and liquidity constraints without an interaction. Columns (2) and (4) include interactions of financial literacy and liquidity constraints and report combinations of each type, with the reference group being those with high financial literacy who are not liquidity constrained. Robust standard errors in parentheses.

## Table A.10. LPMs: Chose HSA contribution to maximize tax benefit

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| High financial literacy | 0.138*** | | 0.149*** | |
| | (0.039) | | (0.040) | |
| Liquidity constrained | -0.153** | | -0.132** | |
| | (0.063) | | (0.063) | |
| Employer HSA contribution | -0.149** | -0.149** | | |
| | (0.063) | (0.063) | | |
| Employee-only coverage | -0.001 | -0.001 | 0.003 | 0.003 |
| | (0.039) | (0.039) | (0.039) | (0.039) |
| **Reference group (High financial literacy & not constrained)** | | | | |
| High financial literacy & liquidity constraint | | -0.085 | | -0.046 |
| | | (0.093) | | (0.095) |
| Low financial literacy & no constraint | | -0.124*** | | -0.132*** |
| | | (0.042) | | (0.042) |
| Low financial literacy & liquidity constraint | | -0.333*** | | -0.333*** |
| | | (0.081) | | (0.081) |
| Constant | 0.345*** | 0.478*** | 0.173 | 0.304* |
| | (0.068) | (0.062) | (0.159) | (0.157) |
| Employer Fixed Effects | No | No | Yes | Yes |
| *N* | 585 | 584 | 584 | 584 |

*p < 0.10, **p < 0.05, ***p < 0.01

Note: Table presents regression results of linear probability models in which the dependent variable is an indicator of whether the employee reported making their HSA contribution to maximize the tax benefits. Columns (1) and (3) include indicators for financial literacy and liquidity constraints without an interaction. Columns (2) and (4) include interactions of financial literacy and liquidity constraints and report combinations of each type, with the reference group being those with high financial literacy who are not liquidity constrained. Robust standard errors in parentheses.

### Table A.11. LPMs: HSA balance of $2,000 or more

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| High financial literacy | 0.247*** | | 0.272*** | |
| | (0.047) | | (0.048) | |
| Liquidity constrained | -0.155** | | -0.158** | |
| | (0.078) | | (0.079) | |
| Employer HSA contribution | -0.069 | -0.070 | | |
| | (0.078) | (0.078) | | |
| Employee-only coverage | 0.056 | 0.056 | 0.042 | 0.042 |
| | (0.046) | (0.046) | (0.047) | (0.047) |
| **Reference group (High financial literacy & not constrained)** | | | | |
| High financial literacy & liquidity constraint | | -0.210* | | -0.223** |
| | | (0.111) | | (0.113) |
| Low financial literacy & no constraint | | -0.295*** | | -0.282*** |
| | | (0.049) | | (0.050) |
| Low financial literacy & liquidity constraint | | -0.397*** | | -0.380*** |
| | | (0.104) | | (0.105) |
| Constant | 0.372*** | 0.662*** | -0.173 | 0.116 |
| | (0.084) | (0.076) | (0.244) | (0.242) |
| Employer Fixed Effects | No | No | Yes | Yes |
| *N* | 504 | 504 | 504 | 504 |

*p < 0.10, **p < 0.05, ***p < 0.01

Note: Table reports regression results of linear probability models in which the dependent variable is an indicator of the employee reporting an HSA balance of $2,000 or more. Columns (1) and (3) include indicators for financial literacy and liquidity constraints without an interaction. Columns (2) and (4) include interactions of financial literacy and liquidity constraints and report combinations of each type, with the reference group being those with high financial literacy who are not liquidity constrained. Robust standard errors in parentheses.

## Table A.12. LPMs: Withdrew most or all of HSA balance

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| High financial literacy | -0.161*** | | -0.148*** | |
| | (0.042) | | (0.043) | |
| Liquidity constrained | 0.222*** | | 0.231*** | |
| | (0.069) | | (0.070) | |
| Employer HSA contribution | 0.037 | 0.036 | | |
| | (0.070) | (0.070) | | |
| Employee-only coverage | -0.115*** | -0.115*** | -0.102** | -0.102** |
| | (0.041) | (0.041) | (0.042) | (0.042) |
| **Reference group (High financial literacy & not constrained)** | | | | |
| High financial literacy & liquidity constraint | | 0.179* | | 0.190* |
| | | (0.097) | | (0.100) |
| Low financial literacy & no constraint | | 0.152*** | | 0.140*** |
| | | (0.044) | | (0.045) |
| Low financial literacy & liquidity constraint | | 0.417*** | | 0.411*** |
| | | (0.093) | | (0.095) |
| Constant | 0.364*** | 0.206*** | 0.579*** | 0.443** |
| | (0.075) | (0.068) | (0.220) | (0.219) |
| *N* | 508 | 508 | 508 | 508 |

*p < 0.10, **p < 0.05, ***p < 0.01

Table presents regression results of linear probability models (LPMs) in which the dependent variable is an indicator of whether the employee reported withdrawing most or all of their HSA balance in the last year. Columns (1) and (3) include indicators for financial literacy and liquidity constraints without an interaction. Columns (2) and (4) include interactions of financial literacy and liquidity constraints and report combinations of each type, with the reference group being those with high financial literacy who are not liquidity constrained. Robust standard errors in parentheses.

### Table A.13. LPMs: Don't know how HSA funds are invested

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| High financial literacy | 0.234*** | | -0.227*** | |
| | (0.046) | | (0.047) | |
| Liquidity constrained | 0.146* | | 0.145* | |
| | (0.075) | | (0.077) | |
| Employer HSA contribution | 0.220*** | 0.220*** | | |
| | (0.076) | (0.076) | | |
| Employee-only coverage | -0.050 | -0.050 | -0.047 | -0.047 |
| | (0.045) | (0.045) | (0.046) | (0.046) |
| **Reference group (High financial literacy & not constrained)** | | | | |
| High financial literacy & liquidity constraint | | 0.193* | | 0.192* |
| | | (0.106) | | (0.109) |
| Low financial literacy & no constraint | | 0.243*** | | 0.236*** |
| | | (0.048) | | (0.049) |
| Low financial literacy & liquidity constraint | | 0.343*** | | 0.334*** |
| | | (0.102) | | (0.104) |
| Constant | 0.566*** | 0.328*** | 0.646*** | 0.405* |
| | (0.082) | (0.075) | (0.241) | (0.239) |
| Employer Fixed Effects | No | No | Yes | Yes |
| *N* | 509 | 509 | 509 | 509 |

*p < 0.10, **p < 0.05, ***p < 0.01

Note: Table reports regression results of linear probability models (LPMs) in which the dependent variable is an indicator that the employee reported being unsure or did not know how their HSA balances were invested. Columns (1) and (3) include indicators for financial literacy and liquidity constraints without an interaction. Columns (2) and (4) include interactions of financial literacy and liquidity constraints and report combinations of each type, with the reference group being those with high financial literacy who are not liquidity constrained. Robust standard errors in parentheses.

## B. Appendix: Dominated plans and distributions of health expenditures

**Characterizing dominated plans:**

In health insurance, the generosity of the plan is often summarized by its Actuarial Value (the fraction of total health spending that are covered by the plan, exclusive of premiums). Higher numbers mean more generous coverage (lower out-of-pocket payments) and lower actuarial values mean less generous coverage (higher out-of-pocket payments). The Center for Consumer Information and Insurance Oversight (CCIIO) has produced a tool that takes the various plan parameters (deductibles, copays, etc.) and calculates the actuarial value for the plan.

Using the plan information for each school that was available online, we have calculated the actuarial values for each plan to characterize how generous the different options are. We also use this information to produce graphs of employee costs as a function of total health spending and to evaluate whether the HDHP stochastically dominates the other plans. To do so, we calculate the single coinsurance rate between the plan's deductible and its out-of-pocket max that yields the same actuarial value as its full schedule of copayments and coinsurance rates for different services. This single rate then allows us to plot employee costs against total health spending. Using this simplified plan structure of the deductible, coinsurance rate, and out-of-pocket max, we determine whether the HDHP stochastically dominates the other plans.

**Construction of health expenditure distributions**

This Appendix details the procedure for constructing distributions of out-of-pocket costs for each employee and dependents. The approach is based on grouping people into "risk groups" according to demographics and previous health spending, and then to use the empirical distribution of out-of-pocket (OOP) payments among people in each risk group as a measure of beliefs. We first divide each insured individual according to discrete age bins (younger than 30, 30–39, 40–49, 50–59.5, 59.5 and older) and gender (male, female). Within these groups, we further split into terciles based on 1-year lags of total health spending, combining both plan paid spending and OOP spending. We classify people with the same grouping of age, gender, and cost tercile as being in the same risk group. To construct the distribution of out-of-pocket spending under plan $j$ for people in risk group $g$, we take the distribution of observed spending of people within risk group $g$ who chose plan $j$. We assign this distribution to people in risk group $g$ who chose a different plan $k \neq j$.

To give an example, we group women aged 30–39 together, rank them by their total health spending in year $t-1$, and divide them evenly into three sub-groups (terciles) based on year $t-1$ spending. Within each tercile, we further split them based on their observed plan choice (low coverage, medium coverage, or high coverage) in year $t$. The empirical distribution of OOP for each of the three coverage levels is taken as the OOP distribution for each woman in that sub-group if she had chosen that coverage level.

The final step is to combine OOP distributions of each member of the family. We implement this by taking 500 draws for each employee or dependent from their group-specific OOP distribution under each plan, and sum each of the 500 draws across all family members to arrive at a distribution of OOP costs for the family. If the sum of OOP within families for any draw exceeds the plan's OOP max, we replace the OOP for that draw as the OOP max. This distribution of 500 OOP draws represents the family's belief about OOP risk under each available plan.

In constructing each OOP distribution, we pool multiple years together. Doing so ensures that each risk group based on age, gender, lagged cost tercile, and plan choice has a sufficiently large number of individuals. The only plans and years for which we construct distributions from a single year of data are the high coverage and medium coverage plans in 2014. Starting in 2015, the deductibles increased for these plans, raising average OOP spending by about $100. We pool 2015–2017 for constructing distributions for the medium coverage and high coverage plans in these years. Since cost sharing in the low coverage plan remained roughly constant with the exception of a slight rise in the OOP max, we pool 2014–2017 in generating OOP distributions in the low coverage plan.

## About the authors

**Brent J. Davis** is a Senior Economist at the TIAA Institute. His research interests include behavioral economics, behavioral finance, and household financial security. Before joining the Institute, he spent several years as a postdoctoral researcher and lecturer in the Department of Public Finance at the University of Innsbruck in Austria. Davis has taught a variety of courses and published several papers in behavioral economics. He is a member of the American Economic Association, the American Risk and Insurance Association, and the National Tax Association. He earned an M.S. and a Ph.D. in economics from Florida State University, and a B.S. in mathematics and economics from St. Lawrence University.

**Adam Leive** is an Assistant Professor in the Goldman School of Public Policy at UC-Berkeley. He uses large administrative datasets to study policy-relevant questions at the intersection of health economics, public finance, and insurance. His research seeks to understand consumer behavior in complicated life-cycle decisions that impact economic security, such as health insurance and retirement saving. His research on Health Savings Accounts was awarded the 2022 Samuelson Award by the TIAA Institute for Outstanding Scholarly Writing on Lifelong Financial Security. He earned his Ph.D. from the University of Pennsylvania's Wharton School and his B.A. from Princeton University's School of Public and International Affairs.

**Andrew Gellert** is an Economist at the TIAA Institute. He is working to understand household retirement choices and the evolution of retirement planning as more retirees look to solve the problem of decumulating their wealth. Andrew previously studied aging, dementia, and cognitive interventions during a postdoctoral fellowship at the University of Pennsylvania. Prior to that, he obtained his PhD in economics from Drexel University, where he worked on tobacco taxation and price gouging in the Women, Infants, and Children (WIC) program. He also taught several courses in microeconomics.

## About the TIAA Institute

The TIAA Institute helps advance the ways individuals and institutions plan for financial security and organizational effectiveness. The Institute conducts in-depth research, provides access to a network of thought leaders, and enables those it serves to anticipate trends, plan future strategies, and maximize opportunities for success.

**To learn more, visit www.tiaainstitute.org.**

**Join the conversation online: @TIAAInstitute**

We thank Paul Fronstin and Tim Layton for helpful comments and Rich Ward and Kendra Smith for help in developing the survey and institutional sample. Any opinions expressed herein are those of the authors, and do not necessarily represent the views of TIAA, the TIAA Institute or any other organization with which the authors are affiliated.



TIAA Institute

(03/23)