Links Between Puzzles in Household Finance: Evidence from Employee Benefit Choices*

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Abstract

Many people have difficulty making financial decisions. We show that the quality of two important decisions—health insurance and retirement saving—are positively correlated using administrative and survey data. People who choose a dominated health plan are more likely to forego employer matching funds for retirement saving than those who do not. On average, choosing a dominated plan and not contributing to supplemental retirement accounts results in over $10,000 in foregone savings over five years. Frictions in acquiring and processing information about benefits are of primary importance, explaining 50–75% of choices. Secondary mechanisms involve liquidity, financial literacy, and aversion to deductibles.

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1 Introduction

People face an increasingly complex set of financial decisions in daily life. They must determine the best way to save, invest, borrow, insure, and pay for goods and services. In a variety of financial domains, behavior often departs from the standard economic model of informed consumers maximizing their expected utility of consumption (Agarwal, Chomsisengphet and Lim 2017, Ericson and Sydnor 2017, Beshears et al. 2019), and considerable research suggests that many people make low-quality choices. Such behavior can undermine the efficiency of markets and affect the distribution of surplus (DellaVigna 2009, Akerlof and Shiller 2015, Campbell 2016).

It remains unclear how a person's choice quality in one financial domain is related to their choice quality in another. The correlation might be positive if a common factor explains behavior in multiple domains, which would make the costs of low choice quality greater than is otherwise recognized. It might be negative if people concentrate effort in one domain, leaving them less time or attention to make choices in another. Or, the choices might be independent. Understanding whether choices are correlated—and what mechanisms might explain an observed correlation—is of both theoretical and policy interest. Doing so can help guide richer models of consumer decision-making, better assess the consequences of low choice quality, and inform choice architecture and policy design. Concerns about choice quality have become increasingly important as economic mobility has declined and inequality has risen.

In this paper, we analyze the correlation of choice quality in two domains with large financial consequences: health insurance and retirement saving. We consider two puzzles in decision-making that have been separately documented in each domain. In the case of health insurance, many people choose dominated plans, leading them to overpay for coverage (Handel 2013, Bhargava, Loewenstein and Sydnor 2017). In the case of retirement saving, many people forego employer matching contributions, leaving money on the table (Madrian and Shea 2001, Choi, Laibson and Madrian 2011, Choukhmane, Goodman and O'Dea 2024). Using administrative panel data from a large university and a detailed survey of its employees, we investigate how and why these puzzling choices in health insurance and retirement saving are linked.

The menu of health and retirement benefits in our setting presents employees with decisions that can lead to significant financial losses. One health insurance plan, the high-deductible health plan (HDHP) with a Health Savings Account (HSA), stochastically dominates the other two plans for almost all employees. While stochastically dominated plans are common among many employers (Liu and Sydnor 2022), the financial stakes are

particularly high in our setting; on average, employees who do not select the HDHP pay an extra $2,100 for health insurance each year.[1] We find that most people in our setting choose dominated plans. As for retirement saving, alongside the mandatory plan are supplemental voluntary saving options with an employer match. Employees receive a 50% match on 403(b) contributions, with the employer contributing up to 2% salary for some employees and up to $480 per year for others. However, over one-third of employees do not contribute to the 403(b) and so forego matching funds.[2] For brevity, we refer to the behavior of simultaneously choosing a dominated health plan while not contributing to either supplemental account as making "puzzling choices" in both domains because both choices leave substantial money on the table.

We detect a large and statistically significant positive correlation between puzzling choices in insurance and saving. The likelihood of foregoing employer matching is 27% higher among those who choose a dominated plan. We show that the positive correlation between puzzling choices generalizes beyond our particular setting.[3] Over the five years of our sample, people leave over $10,000 on the table by simultaneously choosing a dominated health plan and foregoing employer matching for retirement accounts. The employees who make puzzling choices in both domains have lower salaries and educational attainment, and are more likely to be women, compared to employees who avoid at least one puzzling choice.

After establishing this positive correlation in puzzling choices, we investigate underlying mechanisms. We first note that several mechanisms commonly studied in health insurance and retirement saving decisions—present-focused time preferences, inertia, and liquidity constraints that motivate a desire to maximize take-home pay—cannot, on their own, explain why people make puzzling choices in both domains.[4] We designed a novel survey of employees at the university to directly test four mechanisms that may explain behavior.[5]

[1]By comparison, financial losses were below $400 in Bhargava, Loewenstein and Sydnor (2017). Many other studies document evidence of low choice quality in health insurance contexts when plans are not dominated, and in those cases the difference in costs is smaller (Abaluck and Gruber 2011, Ketcham et al. 2012, Heiss et al. 2013, Ketcham, Kuminoff and Powers 2019, Gruber et al. 2020, Handel et al. 2024).

[2]Employees are immediately vested in all funds and can take in-service loans on their 403(b) contributions. The 457 plan is also tax-advantaged, and while it does not have a match, it offers complementary liquidity provisions to the 403(b) because 457 funds are illiquid while working but can be withdrawn penalty-free after separation, regardless of age. Yet, 457 plan participation is extremely low, as described in Section 2.

[3]Appendix E finds a higher correlation using survey data of employees at ten other universities linked to administrative records managed by the Teachers Insurance and Annuity Association of America (TIAA).

[4]For example, not saving in supplemental retirement accounts could reflect models of "present focus" (Ericson and Laibson 2019) or consumption commitments, but a strong preference for money today would imply choosing the HDHP because it minimizes payroll deductions – and less than 2% of employees make this set of choices that maximizes take-home pay. See Section 3.4 for additional discussion and analysis.

[5]We fielded the survey in August 2023, which was five years after the last year of our administrative records. Survey answers were anonymous and unlinkable to administrative records. Over this time, the share of dominated choices fell from 85% to just below 50% at the university, perhaps because premium differentials

First, we measure *frictions* related to how consumers acquire and process information when making financial decisions. To this end, we elicited knowledge about benefits, responses to complexity in benefits, and the choice to devote attention when faced with complexity, including through two experimental treatments. Second, we measure *financial literacy* to capture general financial knowledge related to these information frictions. Third, we measure and analyze the role of *liquidity constraints*. Fourth, we consider aversion to deductibles for psychological reasons as a form of *non-standard preferences*, which we refer to as "payment aversion."

Our analysis of mechanisms proceeds in two steps. We first test mechanisms in isolation, finding empirical support for each one. We then quantitatively assess their relative importance by estimating bivariate regressions, which allow for correlation between the residuals for health and retirement choices. By including the mechanisms as regressors, we assess the importance of each based on how they increase the model's fit to the data and reduce the correlation between the errors. We find that frictions in how consumers acquire and process information are of primary importance, explaining 50–75 percent of puzzling choices. Nevertheless, only a model with the additional set of mechanisms fully explains the positive correlation between the residuals of the two equations.

Our paper makes four contributions. First, we link the two large literatures that document puzzling choices separately in health insurance and retirement saving (Ericson and Sydnor 2017, Chandra, Handel and Schwartzstein 2019, Beshears et al. 2019). We find that it is often the same people who make choices in each domain that are inconsistent with standard economic models. This result has broader implications for modeling behavior. For example, while economic models seeking to characterize welfare often invoke the Envelope theorem, our findings call this assumption into question by showing that some people simultaneously make sub-optimal decisions across multiple contexts.

Second, we provide novel evidence on mechanisms that drive decisions in the domains we study. While prior studies typically focus on one mechanism in one domain, our survey enables us to test for the presence and importance of multiple mechanisms. Our analysis of links across domains extends prior research in these areas on the role of information (Duflo and Saez 2003, Bernheim and Garrett 2003, Chan and Stevens 2008, Loewenstein et al. 2013, Handel and Kolstad 2015, Bhargava and Conell-Price 2022), financial literacy (Hastings, Madrian and Skimmyhorn 2013, Lusardi and Mitchell 2014, 2023), complexity (Bhargava, Loewenstein and Sydnor 2017, Samek and Sydnor forthcoming), and liquidity

continued to widen and the employer introduced additional decision supports. We show in Appendix F that the positive correlation between dominated insurance choices and foregoing employer retirement matching is stronger in the 2023 survey data.

(Ericson and Sydnor 2022). Our survey provides new insights on the importance of attention in these domains, and draws a connection between attention, benefits knowledge, complexity, and choices. Our findings are complementary to Stango and Zinman (2023) who correlate lab-style elicitations of common biases and preferences.[6] Identifying the mechanisms that explain choices can guide efforts to target assistance to individuals across multiple decisions.

Third, we build on recent work that documents income and education gradients in the quality of health insurance choices (Handel et al. 2024) and the incidence of retirement matching incentives (Choukhmane et al. 2023). Our results show that high health insurance expenses combined with low choice quality may pose an unrecognized barrier to retirement preparedness for many workers.[7] These findings provide new evidence on sources of significant inequalities in lifetime financial outcomes by income, education, and financial sophistication (Lusardi and Mitchell 2008, Bosworth, Burtless and Zhang 2016, Lusardi, Michaud and Mitchell 2017). For example, in our survey, we observed differences by salary in responses to an incentivized task that mimicked attending to health and retirement choices. Lower-income respondents were more likely to attempt the questions but less likely to answer them correctly conditional on trying, and on net, lower-income respondents earned smaller incentive payments.

Fourth, our paper complements research examining other household financial decisions covering multiple domains. Jørring (2024) finds that people who incur late fees in consumer banking are more likely to lose money by misallocating credit card debt or failing to refinance their mortgage when it is optimal to do so. Brown and Previtero (2020) document that employees who wait until the final day to choose a health insurance plan save less in retirement accounts and are less likely to annuitize. Other research compares choices of employee benefits to test whether risk preferences are consistent across domains (Einav et al. 2012, Bell et al. 2018).

2 Employee Benefit Options and Data

The large public university that we study offers employees a complicated set of retirement plan and health insurance options. In this section, we first discuss how we define puzzling choices in each domain. We then discuss our administrative data on employee demographic characteristics and salary, health care spending, health insurance choices, and retirement

[6]Other studies examine within-person correlations of different preferences, cognitive abilities, and demographics (Falk et al. 2018, Dean and Ortoleva 2019, Chapman et al. 2023), but focus less on factors related to decision quality.

[7]The debate about whether Americans are saving enough for retirement has been taken up by, among others, Scholz, Seshadri and Khitatrakun (2006), Skinner (2007), Munnell, Rutledge and Webb (2014).

plan contributions.[8] As we describe below, our setting is fairly typical in terms of employee demographics and the benefit options to other large employers.

2.1 Health insurance options

2.1.1 *Plan descriptions*

The university offers three health insurance plans, all with the same provider network. Two are conventional plans that differ in their premiums and the share of medical costs they covered, and one is a high-deductible plan (HDHP) with a health savings account (HSA), which was introduced in 2014.[9] The HDHP/HSA has substantially lower premiums and, with the high deductible, is designed to offer lower coverage than the other two plans. We therefore characterize the three plans offered as the high, medium, and low-coverage plans and abbreviate them as *H, M*, and *L*, respectively.

Despite these terms, all the plans are relatively generous. Based on claims during the sample period, the actuarial value of the plans, defined as employer payments as a share of employer plus employee out-of-pocket (OOP) payments (not including premiums), is about 87% for H, with employees paying 13% out-of-pocket; about 82% for M; and about 79% for L. Plans differ in their premiums and the plan parameters that determine financial risk: deductibles, copayments, coinsurance rates, and annual out-of-pocket limits. The major differences are in premium levels and, for the low-coverage plan, the high deductible along with the employer contribution to the HSA. For example, annual premiums for family coverage in 2017 were \$6,066, \$2,064, and \$720 for H, M, and L, respectively, while the deductibles were \$800, \$1,000, and \$4,000. The employer made an unconditional HSA contribution of \$2,000 in February each year for plan L.[10]

2.1.2 *Dominated health plans*

Liu and Sydnor (2022) show that among employers offering HDHP/HSAs, the lower deductible plans are dominated in about half of cases. In our setting, we find that plan L exhibits second-order stochastic dominance over plans M and H and even exhibits first-order

[8] Appendix A provides additional details about the setting.

[9] An HSA is a tax-preferred personal savings vehicle, in which contributions are tax-deductible (even from FICA taxes when contributions are made via payroll reduction, unlike retirement saving plans), investments grow tax-deferred, and withdrawals are tax-free if used to finance health care, including costs incurred in previous years. Income tax is owed on withdrawals for non-qualified expenses, as well as a penalty if funds are withdrawn prior to age 65. Funds in HSAs are not "use-it-or-lose-it," as they are for Flexible Spending Accounts (FSAs). FSAs for services other than vision and dental are only available for the medium and high coverage plans.

[10] Other plan parameters like coinsurance and out-of-pocket limits were more similar (Appendix Table A.1).

stochastic dominance for many individuals.

Consumers should not choose a dominated plan if they seek to maximize the expected utility of consumption.[11] Given uncertainty in health care use, insurance plans that differ in their premiums, deductibles, and other features yield different distributions of costs, x, for the consumer. We focus primarily on second-order stochastic dominance (SOSD) of the cost distributions, which arises, for example, when two distributions have the same mean but one has a lower variance. Formally, this is a sufficient but not necessary condition for SOSD, which is defined as follows: for two distributions F and G, F SOSD G if and only if $\int_{-\infty}^{x} G(y)dy \geq \int_{-\infty}^{x} F(y)dy$ for all x. A risk-averse consumer prefers a gamble that is not stochastically dominated, regardless of their level of risk aversion. As a more stringent definition, we also consider first-order stochastic dominance (FOSD), in which $G(y) \geq F(y)$ for all y, so the preferred distribution always has a lower probability of exceeding any given level of costs, compared to the other. While our main results focus on SOSD, a minority of the sample faces a choice with FOSD. Appendix B describes our procedure for constructing distributions of out-of-pocket spending for each employee in each plan using the empirical distribution of claims and dividing all employees (and dependents) into cells based on age, gender and total health spending in the prior year.

We define costs for each insurance plan as the sum of premiums and OOP spending, less any employer HSA contributions. We scale premiums by $1 - \tau$, where τ is the employee's marginal tax rate, to account for the tax preference for premiums. Appendix C describes our procedure for imputing marginal tax rates for each employee. We treat the employer's HSA contribution as a premium reduction in calculating the costs of the low coverage plan. Since HSAs have superior tax preferences to all other savings products as analyzed in Leive (2022), HSA contributions are worth at least this amount.

Given these costs, we find that over 99% of the employees in our sample face a menu with a second-order stochastically dominated health plan during our sample period. The employer's large HSA contribution, along with the much lower premiums and only slightly higher risk sharing compared to the other two plans, leads to stochastic dominance. We exclude the very small group of observations from our analysis for whom we cannot determine whether a plan is stochastically dominated. For the same reason, we also exclude employees with over $500 in out-of-network spending because the plans differ in out-of-network deductibles, and no longer exhibit stochastic dominance. This restriction reduces the remaining sample by less than 1%, and we note that over 82% of employees have zero out-of-network spending.

[11] We consider the possibility of liquidity constraints explaining dominated plan choices as in Ericson and Sydnor (2022) in Section 4.

Figure 1 visually displays stochastic dominance of health insurance plans in 2017, separately by employee-only and family coverage.[12] These graphs pool employees to visually summarize the difference in costs for those facing a dominated choice.[13] Panels (A) and (B) plot total health spending and resulting costs for the three plans. The graph overlays the density of spending, which shows that the range over which L does not have the lowest costs occurs quite infrequently. Panels (C) and (D) present cumulative distribution functions (CDFs) of costs. The differences in possible spending outcomes between the three plans are stark, with plan L almost always having the lowest costs, and its CDF lies well to the left in Panels (C) and (D) over most of the range of total costs. In fact, due to the employer's HSA contribution to plan L, much of the CDF lies below zero, indicating the plan is heavily subsidized.

2.2 Retirement saving options

The university has both mandatory and supplemental (voluntary) savings plans, and our analysis focuses on the voluntary plans. We take a conservative approach in characterizing puzzles in retirement savings choices by simply focusing on foregoing an employer match. This is a choice that we can characterize for all employees who otherwise face different mandatory retirement plan features.[14] All employees can choose additional voluntary contributions regardless of their mandatory retirement plan. These voluntary contributions can be directed to a 403(b) plan and also to a state-run 457 plan, with Roth versions of both available.[15]

The employer matches 403(b) contributions at a 50% rate, with limits that differ across the academic and medical divisions. The match is substantial for most employees in the medical division: employees hired after 2002 can receive up to 2% of salary in matching contributions. The match is smaller ($480 per year) for medical division employees hired before this date and for all employees in the academic division.[16] Employees are immediately

[12] Corresponding graphs for employee-plus-children and employee-plus-spouse coverage are presented in Appendix Figure D.1.

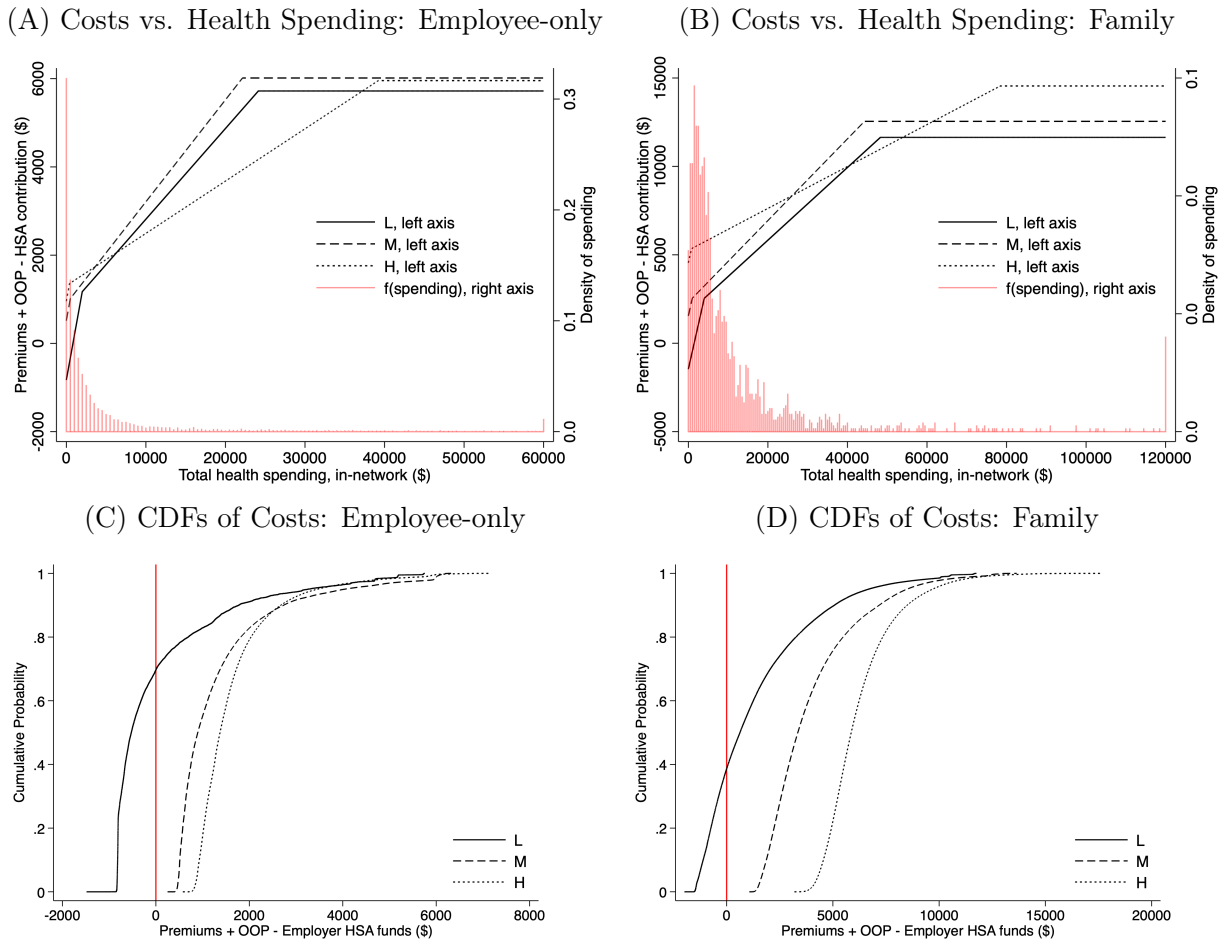
[13] As an illustration for one employee, Appendix Figure D.2 presents the CDFs for 40-year old male and female employees with employee-only coverage in the median tercile of lagged health spending with a 25% marginal tax rate.

[14] Employees differ in their eligibility for a university-sponsored defined contribution (DC) plan with required contributions and a state-sponsored hybrid plan with a defined-benefit component. Faculty have a choice for their mandatory plan while the majority of staff are enrolled in the hybrid plan.

[15] The 403(b) and 457 options are subject to separate, identical IRS contribution limits, each equal to the 401(k) limit, meaning that public-sector university employees are able to contribute twice as much to retirement plans as can most other employees. The tax-deferred and Roth options of each are jointly subject to the contribution limit.

[16] The more generous match rate for employees in the medical division hired after 2002 coincided with a reduction in the employer's contribution to the mandatory account from 8% salary to 4% salary.

Figure 1: Stochastic Dominance of Health Insurance Plans



Notes: Panels (A) and (B) plot costs against total health spending for each plan in 2017, stratified by coverage type. Costs equal premiums (net of taxes assuming a 25% marginal tax rate) plus out-of-pocket payments, less employer HSA contributions if enrolled in *L*. The coinsurance rates plotted in the graph are calculated as the rate which produces the equivalent actuarial value as full schedule of cost-sharing for the same deductible and out-of-pocket max, following the same procedure as Ericson et al. (2020) and Liu and Sydnor (2022). The density of total health spending is plotted on the right y-axis. Panels (C) and (D) plot the cumulative distribution functions (CDFs) of costs for each plan across all years using the empirical distribution.

vested for their own contributions and matching contributions from the employer. There is no default in the medical division, while employees in the academic division are defaulted into contributing $80 per month to receive the full employer match.

Employees may borrow against their 403(b) contributions, providing considerable liquidity. Loans can be taken for up to 5 years, with an interest rate that is closely tied to the prime rate. The principal and interest on loans are repaid periodically with after-tax dollars. In the case of default, the loan amount is considered a withdrawal and subject to income taxes and, if younger than $59\frac{1}{2}$, a penalty tax of 10%. These terms are similar to the features of retirement plan loans in other settings (Lu et al. 2017).

The main retirement outcome we examine is not receiving any employer matching

funds. We consider not contributing to the 403(b) as a puzzle from the perspective of maximizing expected lifetime consumption given the combination of tax-preferences, liquidity, and matching; a 50% risk-free return from the employer 403(b) match is high compared to other investment opportunities, and 403(b) contributions are not illiquid because employees are immediately vested and can take loans while working. The dependent variable in our empirical analysis is whether the employee did not contribute to either the 403(b) or 457. To be conservative, we do not consider the decision to contribute to the 457 but not the 403(b) as necessarily departing from expected utility maximization. 457 contributions are illiquid prior to separation, but then become completely liquid regardless of age. Only 1.2% of the sample contributes to the 457 but not the 403(b), and our results do not depend on how we consider 457 decisions. To clarify the exposition and because nearly all supplemental saving is in the 403(b), we refer to not contributing to either account as foregoing the employer match when describing our empirical analysis.

Nevertheless, we acknowledge that unlike the case with choosing a dominated health plan, it is less definitive that foregoing matching funds necessarily deviates from expected utility maximization. Data on insurance claims for the entire employee population helps pin down health spending expectations, whereas several factors like family structure, past financial circumstances, and expectations of life expectancy and future spending needs are both heterogeneous and unobservable in administrative data, but may change the marginal utility of saving versus consuming in a particular year.

2.3 Sample selection and descriptive statistics

The administrative data from the university report annual earnings, semiannual demographics, monthly retirement plan contributions as a percentage of earnings, annual health insurance choices, and annual health care spending data of each employee and dependent. Our earnings data are collapsed into bins (of \$10,000–\$20,000 intervals) to eliminate the possibility that an individual could be identified.[17] Demographic information consists of employee gender, age collapsed into bins (generally of 5-year intervals) and marital status (which is incompletely collected). We also observe the category of employment (faculty versus staff), the division of the university (academic or medical), and the hiring date for each employee. We observe annual health spending as reported on insurance claims, divided into dollars paid by insurance and dollars paid out-of-pocket by employees, and separately for in-network and out-of-network care. To protect confidentiality, the employer aggregated our claims data to the annual level for each employee and dependent, rather than providing

[17] Employee salaries are freely available online because the university is public.

granular line-item claims. We focus on choices over the years 2014–2018, following the introduction of the HDHP/HSA that stochastically dominated the two existing plans.

We select our sample to focus on employees with the opportunity to make choices in both domains. Starting with records for 25,569 employees during the 2014-2018 period, we restrict the sample to those who are: (i) staff or faculty; (ii) full-time employees; (iii) under age 65; (iv) annual salaries over $20,000; (v) enrolled in the employer's health insurance plan; (vi) not in their first year of tenure; (vii) have a dominated health plan in their choice set. The first two restrictions exclude those whose benefit choices differ from the standard options studied in this paper (dropping 16.9% of employees from the initial sample). In focusing on staff and faculty, we exclude students, post-doctoral scholars, house-staff, and a small number of employees with other non-standard employment designations. We drop employees over age 65 since Medicare coverage becomes available, and that itself represents a separate choice which excludes the HDHP/HSA (dropping 3.8% of the initial sample's employees). We exclude employees with very low salaries because they may face different choice sets through Medicaid or highly subsidized Affordable Care Act coverage, or they may be employed full-time but only for part of the year (dropping 6.7% of the initial sample's employees). We exclude employees who opt out of the health insurance plan (dropping 5.9% of the initial sample's employees). We drop the employee's initial year of employment because many face partial health insurance premiums since they arrive mid-year and because some do not make their voluntary contribution decisions immediately.[18] This restriction drops 2.1% of the initial sample's employees.[19] Finally, we drop employee-year observations in which the choice set did not include a dominated plan, as discussed above. This selection process yields an analytic sample of 18,494 employees spanning 60,517 employee-years.

Table 1 presents descriptive statistics for the sample. The mean salary is $73,929, with considerable heterogeneity (SD = $44,787). The average age is 45 years. Tenure with the employer—over 10 years, on average—is long in comparison to non-academic U.S. settings. 57% of employees work in the academic division and 43% in the medical division.

Most employees in our sample choose a stochastically dominated health plan. In the first five years, 55% of the sample choose H, 36% choose M, and 9% choose L. Enrollment in L grew during this time, rising from under 5% in 2014 to over 15% by 2018. Average total health spending per employee, including any dependents, is $6,737 (SD = $25,640). In terms of retirement saving, 63% of employees participate in either the 403(b) or 457, contributing 4.35% of salary, on average. Most of this saving occurs in the 403(b); among the set of

[18] Our prior study of retirement plan contributions in this setting found that most employees ramp up their voluntary contributions within the first year (Friedberg, Leive and Cai 2024).

[19] We do, however, use the first year's choices to study the importance of inertia in Section 4.

employees contributing to either account, 91% contribute only to the 403(b), 1% contribute only to the 457, and 8% contribute to both accounts.

Table 1: Summary Statistics

	Mean	SD
Annual salary ($)	73,929	44,787
Age (years)	45.04	11.48
Faculty (%)	0.19	0.39
Academic division (%)	0.57	0.50
Tenure with employer (years)	10.25	9.38
Female (%)	0.60	0.49
Household size	2.00	1.26
Plan L (%)	0.09	0.28
Plan M (%)	0.36	0.48
Plan H (%)	0.55	0.50
Total health spending ($)	6,737	25,640
Voluntary retirement contribution rate (% salary)	4.35	7.20
Voluntary retirement participation (%)	0.63	0.48
N	18,494	
NT	60,517	

Notes: Table presents means and standard deviations of demographic and outcome variables in the sample. Administrative data on employees at a large public university during 2014-2018. N denotes the number of unique employees and NT the number of employee-years. Salaries and total health spending are not adjusted for inflation.

2.4 External Validity

The structure of health insurance plans in our setting is common in many institutions. We collected information on plan offerings for the public and private universities that the university we study designates as its peer group. Most offer a HDHP with low premiums and contribute to the HSA (Appendix Table A.2). Outside of the education sector, many employers offer an HDHP/HSA alongside traditional plans (Claxton et al. 2023). Using the public use microdata from the 2014–2018 Kaiser Health Benefits surveys, Appendix Figure A.1 shows the University's HSA subsidy, premiums, and deductibles are near the center of the distribution among firms that offer HDHPs. Finally, similar to most universities and large employers, an individual employee's salary does not increase if they opt out of employer health insurance.

In terms of employee characteristics, the mean salary and age of our university's employees are fairly similar to the national average of employees with workplace health insurance. Based on calculations from 2014–2018 American Community Surveys (Ruggles et al. 2024), the average full-time employee with employer-sponsored health insurance earns $64,842 and is 42.9 years old. If we apply our sample's age and salary restrictions to the

ACS, the mean salary is $69,793 and the mean age is 43.5 years, which are slightly below those reported in Table 1. Employees are more likely to be women and have longer tenures than the average in the private sector, which is common among academic employers. Overall, our setting appears representative along several important dimensions of health insurance menus and individual characteristics.

3 Choices Across Domains

In this section, we first run linear probability models to quantify the relationship between choosing a dominated health plan and not receiving any matching contributions for retirement saving. We then describe the demographic composition of employees who make these puzzling choices. We discuss the consequence of these choices by quantifying how much money is "left on the table," in dollar terms and relative to annual salary. Finally, we discuss what we can learn from the administrative data about mechanisms explaining puzzling choices.

3.1 Descriptive regressions of puzzling choices

During the first five years of the HDHP, just over one-third of employees choose a dominated health plan while foregoing the retirement match. About 6% of employees avoid both puzzling choices, by choosing plan L and receiving employer matching funds. The most common behavior is choosing a dominated health plan while receiving matching funds (57.5%) and the least common behavior is not choosing a dominated plan while foregoing the match (2.5%).

As a way to summarize the relationship between puzzling choices, we run linear probability models in which the left-hand side variable is an indicator for employee i not receiving any matching funds (y_{2i}) and the right-hand side variable is an indicator for choosing a dominated health plan (y_{1i}):

$$y_{2i} = \beta_0 + \beta_1 y_{1i} + u_i \tag{1}$$

Table 2 shows that choosing a dominated plan is associated with an 8.0 percentage point higher probability of not receiving matching funds, which equates to a 27.5% increase from the baseline rate (column 1). Including controls does little to reduce the strength of this relationship; flexibly controlling for age, salary, gender, firm tenure, faculty status, payroll year, household size, and insurance coverage type reduces the coefficient estimate to 7.2 percentage points and it remains highly significant (column 2).

Table 2: Linear Probability Model: Choices Across Domains

	Dep var: Forego retirement match		
	(1)	(2)	(3)
Choose dominated health plan	0.080	0.072	0.102
	(0.010)	(0.009)	(0.016)
Constant	0.291	0.298	0.277
	(0.010)	(0.009)	(0.015)
Definition of dominance	SOSD	SOSD	FOSD
Controls	No	Yes	No
NT	60,148	60,148	13,879

Notes: Table presents regression results of linear probability models correlating choice of a dominated health plan with the choice to forego the retirement match. Standard errors clustered by employee in parentheses. The first column presents results using second-order stochastic dominance (SOSD) without controls. The second column adds indicators for age, income, tenure, gender, faculty, calendar year, household size, and insurance coverage type as controls. The third column presents results using first-order stochastic dominance (FOSD) without controls.

The positive correlation is also robust to considering alternative definitions of dominance in health plan choices. When we consider first-order stochastic dominance, choosing a dominated health plan is associated with a 10.2 percentage point increase in the probability of not obtaining matching funds (Table 2, column 3). Relative to the baseline rate of 27.7 percent, this estimate translates into an increase of 36.8%. We also obtain qualitatively similar results if we exclude employees with observed or predicted spending that falls in the range where costs are lower in H than in L (Appendix Table D.1). [20]

The results are also qualitatively similar across different sub-samples. We estimate a strong positive correlation whether or not we restrict to medical division employees with a zero default 403(b) contribution (Appendix Table D.1), suggesting that the correlation we document is not specific to one type of default regime. We also find a positive correlation when considering employees with employee-only coverage as well as those who do not report being married, suggesting that household unobservables are unlikely to drive the results (Appendix Table D.1).

Appendix E examines whether these results generalize to other contexts using survey data from 10 other universities merged to administrative records from the Teachers Insurance and Annuity Association of America (TIAA). The positive relationship between puzzling choices is also found in this broader set of employers and is larger in magnitude: employees who choose a dominated plan are 48% more likely to not save in supplemental retirement

[20] As further robustness, we consider a sub-sample of employees for whom foregoing the employer match is even more of a puzzle. Employees who are older than $59\frac{1}{2}$ and younger than 65 do not face an early withdrawal penalty from the 403(b). For that sub-sample, we find an even stronger positive relationship between puzzling choices in both domains (Appendix Table D.1).

accounts. This analysis assuages concerns that some idiosyncratic factor in our setting leads to the positive correlation in Table 2.

As another, largely equivalent, way to measure the correlation between choices, we run bivariate regressions that jointly estimate equations for each outcome and allow for correlation between the errors:

$$y_{1i} = x_i\theta_1 + e_{1i} \tag{2}$$

$$y_{2i} = x_i\theta_2 + e_{2i} \tag{3}$$

$$Cov(e_1, e_2) = \rho \tag{4}$$

This specification directly delivers the unit-free correlation of the choices through ρ, which is now the parameter of interest. We estimate versions of these models with a constant alone included in x (as in column 1 of Table 2), or with demographic controls and job characteristics included in x (as in column 2 of Table 2). We estimate a positive correlation and reject the null of zero, whether we specify the equations as a linear model via seemingly unrelated regression ($\rho = 0.043$) or as a bivariate probit ($\rho = 0.100$).

3.2 Demographics of choice patterns

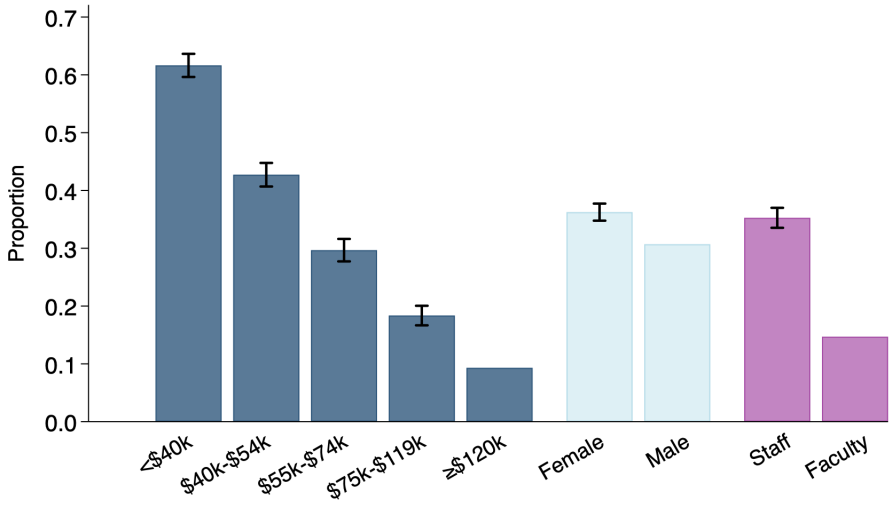
Employees who make puzzling choices in both domains are more likely to be women, more likely to be staff (as opposed to faculty), and have lower average salaries. Figure 2 shows that these differences are large in magnitude and statistically significant. Comparing the top and bottom quintiles of salary, just 9% of employees earning over $120,000 make this pair of choices versus more than 61% of employees earning below $40,000.[21] Less than 15% of faculty make this set of choices compared to more than 35% staff. The disadvantage of socioeconomic groups who make puzzling choices in both domains raises concerns that they miss opportunities to improve their financial security. Appendix Table D.2 summarizes the characteristics of employees who make other sets of choices across domains.

3.3 Quantifying financial losses

In order to quantify the impact of puzzling choices, we calculate the amount of money left on the table by choosing a dominated health plan, and how much would be gained by using some of that money to get employer matching funds. We define financial losses as the sum of premiums and expected out-of-pocket payments net of employer HSA contributions in

[21] This income gradient persists when splitting by faculty vs. staff and by gender (Appendix Figure D.3)

Figure 2: Proportion who choose a dominated health plan and forego the retirement match



Notes: Figure plots the proportion of employees who simultaneously choose a dominated health plan and forego the retirement match by salary, gender, and faculty/staff status. Whiskers denote 95% confidence interval on the difference relative to the omitted group, which is shown without a confidence interval, calculated from a linear probability model. The linear probability model controls for fixed effects for calendar year and coverage type. The comparison between staff and faculty is restricted to the academic division, where this distinction is observed in the data.

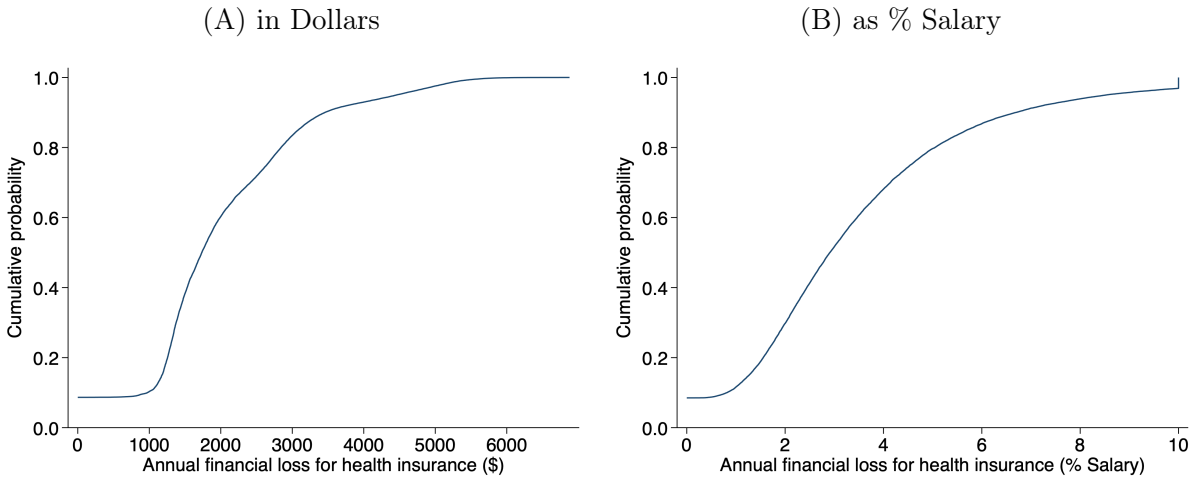
the chosen plan relative to L.[22] Figure 3 shows the distribution of financial losses, which are large in magnitude. Half of employees could save at least $1,700 a year and one-quarter could save at least $2,600 by avoiding dominated plans (Figure 3A). Put differently, financial losses exceed 2.9% of (pre-tax) salary for more than half of the sample, 3.8% for a third, and 5% for a fifth (Figure 3B), with losses reaching such a high share of salary because they predominate for lower-salary employees (Appendix Figure D.4).

By switching out of a dominated plan, this money could be consumed, saved, or used to pay down debt. If it were saved in the 403(b), many employees would receive employer matching contributions. For example, the financial losses from dominated health plans for employees who do not make voluntary retirement contributions are nearly 4.5% of their salary, on average.[23] These choices have long-term implications for retirement wealth. A person who chooses a dominated health plan year after year and simultaneously foregoes employer matching for retirement saving will have substantially lower wealth over a long time horizon. The negative spillovers across domains add up due to employer matching, tax

[22]We note two factors that are not modeled in these calculations. Moral hazard would reduce the cost differences between L and either M or H. On the other hand, the HSA's tax preferences would increase the differences for employees using the account to accumulate funds over time. Incorporating these opposing forces would require making additional assumptions that we believe would complicate the comparisons without changing the conclusions.

[23]More generally, Appendix Figure D.4 presents binned scatterplots of financial losses for health insurance against voluntary retirement contributions.

Figure 3: CDF of financial losses for health insurance



Notes: Panel A plots the distribution of financial losses for health insurance (in expectation) across all employees over all years in the sample in dollar terms. Panel B plots financial losses as a fraction of employee pretax salary. Financial losses are defined as the expected cost in the chosen plan relative to plan L, which stochastically dominated the other plans.

preferences for retirement saving, and compounding of investment returns.

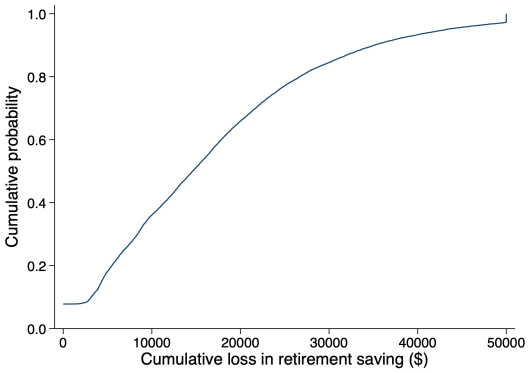
We calculate foregone retirement assets generated by observed choices in health insurance and retirement saving during our sample period, using each person's salary, estimated financial losses from health insurance choices, observed level of 403(b) contributions, and their matching schedule for 403(b) contributions. We assume a real interest rate of 2% and a future marginal tax rate of 25% (when assets are withdrawn). Figure 4 shows that the losses in retirement wealth are large for many employees. Panel A presents the distribution of foregone retirement assets from choosing a dominated health plan across the sample. Among those who make this choice at least once (over 92% of the sample), the mean of foregone retirement assets exceeds $18,500 and the median exceeds $15,900. Twenty-five percent of the sample incur losses over $23,900. The present value of the average loss exceeds $10,000.

One way to benchmark these magnitudes is relative to net worth at retirement. Based on estimates of net worth by age reported in Bhutta et al. (2020), the median loss in retirement wealth after 30 years equates to about 7% of net worth at retirement.[24] As a percentage of salary, the losses are sizable for all employees but are extremely large for employees with lower earnings: Panel B shows the retirement losses amount to 40% of annual salary for those earning less than $50,000. Not only are these magnitudes large, but they understate the lifetime costs because many people continued to choose dominated plans in subsequent years.

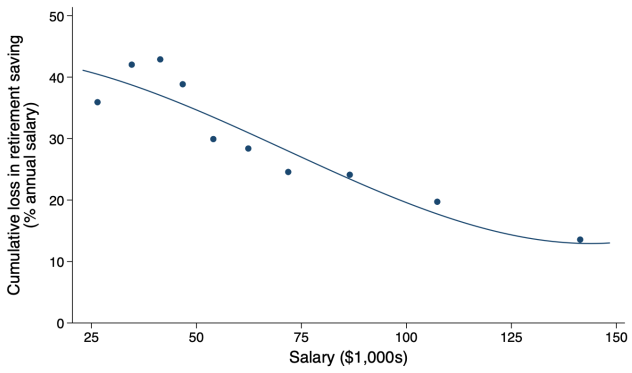
[24]Using the Survey of Consumer Finances, Bhutta et al. (2020) report the median net worth of families with a reference person aged 55–64 was $199,200 and for those aged 65–74 was $237,600 in 2016.

Figure 4: Losses in Retirement Wealth from Choosing Dominated Health Insurance Plans

(A) CDF of Savings Losses



(B) Savings Losses (% Salary) versus Salary



Notes: Panel A plots the cumulative distribution function (CDF) of the loss in retirement saving from the dominated health insurance choices observed during the study period. Panel B presents a binned scatterplot of the loss in retirement saving as a percentage of annual employee (pre-tax) salary versus salary in thousands of dollars. Calculations assume a 2% interest rate and 25% marginal tax rate in retirement.

3.4 Evidence about mechanisms from the administrative data

We conclude this section by noting that these choice patterns provide evidence against some candidate mechanisms as a single explanation for both choices. We can rule out present-focused time preferences, some forms of liquidity constraints, and inertia as explanations for both choices.

Present focus would predict not making supplemental retirement contributions and choosing the lowest premium health plan. This set of choices would minimize payroll deductions and maximize current consumption. Concerns about liquidity to finance non-health expenses would predict the same set of choices. Yet, only 2% of employees choose to minimize payroll deductions. Within this small group, those who do are younger, earn lower salaries, and have low health spending, consistent with liquidity constraints.

We consider inertia by comparing choices of new and existing employees. New employees must actively choose a health plan upon starting employment, while existing employees are defaulted into their previous choice every year.[25] After conditioning on other employee characteristics, differences in outcomes between these groups may reflect inertia. The probability of choosing a dominated plan is 5.6 percentage points lower among new employees compared to existing employees, which is a 6.1% decline from the mean of 92% for incumbent employees (Appendix Table G.8). With more than 86% of new employees still choosing a dominated plan, inertia plays a statistically significant but minor role in accounting for health insurance choices, unlike in some other contexts (Handel 2013). On

[25]For this analysis, we include choices from the employee's first year of tenure, including those that correspond to a partial-year of health insurance coverage.

the retirement side, new employees are *less* likely to make voluntary contributions than existing employees. There is instead a gradual increase in voluntary contributions, as has been observed in this context (Friedberg, Leive and Cai 2024) and in other settings dating back at least to Madrian and Shea (2001). Inertia may partly explain the largest group of employees who choose a dominated health plan while making supplemental retirement contributions, but not why people leave money on the table in both domains.

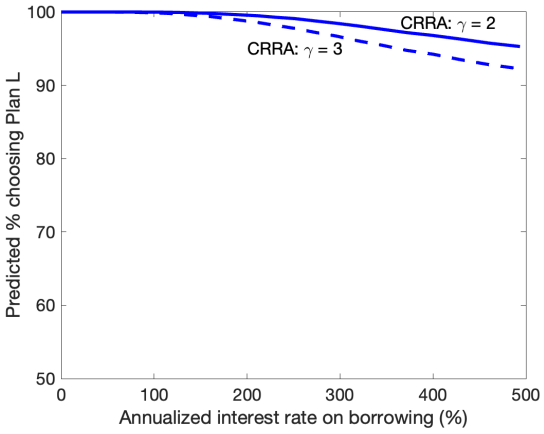
Finally, we consider liquidity constraints related to financing out-of-pocket health expenses. Ericson and Sydnor (2022) show how borrowing costs and the timing of payments might lead people to choose a dominated health plan. Premium savings from the HDHP accrue gradually over the course of the year, but large out-of-pocket expenses can occur all at once. If such a shock occurs early in the year, then a person who is cash-constrained may be unable to finance the out-of-pocket expense by borrowing against their future premium savings. The prevalence of "wealthy hand-to-mouth" consumers suggests that liquidity may be important even at higher income levels (Kaplan, Violante and Wiedner 2014).

We simulate choices under a consumption-utility framework with borrowing constraints, as in Ericson and Sydnor (2022), to assess whether dominated plan choices in our setting are consistent with an economic model in which risk-averse households face shocks throughout the year, live hand-to-mouth, and cannot borrow against premium savings. We consider two scenarios about the nature of liquidity constraints. In the first scenario, employees must borrow to finance out-of-pocket payments, and we simulate choices under monthly interest rates ranging from 0% to 16%. In the second scenario, employees are unable to borrow at all and forego other consumption that month to finance health care. To capture the greatest possible impact of liquidity constraints, we assume that all out-of-pocket spending occurs in a single month, with an equal probability of each month. Appendix G details the specifications for both scenarios.

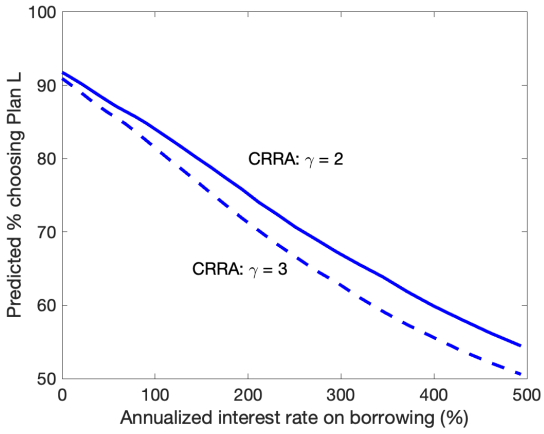
Nearly all employees in our data are still predicted to choose the HDHP if they can borrow at annualized interest rates of 25%, which mimics credit card debt. Even at annualized interest rates of 200%, over 95% of the sample would choose the HDHP, as shown in Figure 5 (Panel A). Risk aversion becomes more important as borrowing costs rise, but even at annualized interest rates of 500% and a CRRA coefficient of 3, a large majority of the sample would still choose the HDHP. The reason is that the difference in out-of-pocket payments between plans is generally small and high borrowing costs for low-probability events are not enough to outweigh the large difference in premiums and HSA funds from the employer. However, fewer people are predicted to choose Plan L if they are unable to borrow at all. At higher levels of risk aversion, less than half of the sample would choose Plan L. In reality, people can borrow from 403(b), although they may be unaware of it.

Figure 5: Simulated Choices of Plan L (2014–2018) vs. Borrowing Rates

(A) With employer HSA funding



(B) Without employer HSA funding



Notes: Figure plots predicted choices of plan L assuming that employees must borrow to finance out-of-pocket expenses. The calculations use each respondent's distribution of costs and salary, and predict choices as a function of annualized interest rate on borrowing. Appendix G provides details of the specification.

In both scenarios, the employer's HSA contribution is central to valuing plans under borrowing constraints. The share predicted to choose Plan L at annual borrowing costs of 100% declines to 80% (which is still high) without the employer contribution (Panel B) and to less than 13% if they cannot borrow at all. As we show next in Section 4, many people do not know the amount of the employer's HSA contribution and therefore may not realize that it partly offsets the deductible. Perhaps, then, perceived liquidity constraints induce some employees to avoid the HDHP, even though they actually have more resources at their disposal. To measure employee knowledge and other mechanisms directly and to test whether they can explain puzzling choices, we now turn to our survey.

4 Survey Evidence about Mechanisms

In seeking to understand puzzling choices across domains, a key question is whether one mechanism explains choices in both domains. If so, then a single approach directed at everyone might be effective at influencing multiple choices. Alternatively, different explanations might arise in each domain, but they be correlated within individuals, potentially enabling effective targeting of particular individuals.[26] In this section, we use a survey of employees at the university studied in Section 3 to help determine why many people both choose a dominated health plan and forego the retirement saving match. We show evidence of multiple mechanisms, and in Section 5 we weigh their relative importance.

[26]Recent laboratory and survey research finds that several forms of nonstandard behavior are positively correlated, for example (Dean and Ortoleva 2019, Chapman et al. 2023, Stango and Zinman 2023).

4.1 Survey overview and recent health plan enrollment

In August 2023, we implemented an incentivized survey to distinguish among four broad mechanisms. The first two mechanisms relate to individual capacities, and the second two to budget constraints and preferences. The first mechanism involves frictions in acquiring and processing information about benefits. We asked questions eliciting what knowledge individuals have about benefits; how they respond to complexity in their benefit choices; and how they choose to devote attention when faced with complexity.[27] In two cases, one following the literature and one novel, we tested their importance experimentally. The second mechanism is financial literacy, which, as a reflection of general financial knowledge, may help reduce information frictions that are specific to benefits. The other two mechanisms focus on budget constraints and preferences. The third mechanism involves concerns about liquidity, which we measure through questions about financing a large emergency expense and about preferring low insurance deductibles in order to help plan a budget. The fourth mechanism is an aversion to deductibles, which we interpret as a form of non-standard preferences, resulting from psychological costs of thinking about paying out-of-pocket for health care.[28]

Beyond questions about mechanisms, we asked about the individual's demographics, household income, and financial assets. Appendix F presents the survey questionnaire and other details, including balance tables for experimental treatments.[29] Survey respondents have similar demographics, income, and job types as non-respondents based on publicly available information, and similar predicted insurance and saving choices based on observables (Appendix Table F.1).[30]

Before presenting the survey results, we note how choices changed between 2018 (the last year of our administrative data) and 2023 (the survey year).[31] Enrollment in the HDHP/HSA (plan L) grew to just over half of employees in 2023, according to discussions with the university's Human Resources department.[32] Yet, when we re-estimate linear

[27] Some factors we label as frictions represent "mental gaps" in the terminology of Handel and Schwartzstein (2018).

[28] We also simply asked respondents who did not choose plan L why they did not. We listed several possible explanations, which we expressed in lay terms to facilitate responses, and we allowed respondents to select up to three reasons. The range of those responses, reported in Appendix Table G.1, provide support for all the mechanisms described here.

[29] The pre-registration for the survey can be found on AsPredicted: https://aspredicted.org/TSQ_CH8.

[30] All of our results are robust to weighting by the inverse probability of survey response, computed using demographic controls, or restricting to those who pass the survey's attention check (Appendix G).

[31] We do not have access to administrative data from recent years. A change in the software used to manage HR records would also make merging such data at the individual level infeasible. In addition, we were unable to link the survey data to administrative data due to concerns about confidentiality.

[32] This increase follows the same rate of growth as in the initial 5 years, when enrollment grew from 5% to 15%. By contrast, enrollment in plan H fell substantially and is now the least popular choice. Since 2018, premiums in all plans increased but did so the most in H. The university also invested resources in

probability models shown in Table 2 using the survey data, we continue to find a strong positive correlation between choosing a dominated plan and foregoing the retirement savings match. The magnitude of this correlation is *larger* than in the earlier period, as there is now more variation in who chooses a dominated plan. The correlation again only slightly declines when controlling for job characteristics and demographics (Appendix Table F.2). All of this suggests that puzzling choices remain important.

4.2 Descriptive Survey Responses

We begin by simply tabulating the percentage of employees making puzzling choices based on their responses to the survey's key questions. Table 3 organizes questions according to the four mechanisms described above (the order in which they appear in the survey is shown in Appendix F). We focus on summarizing the main patterns here, with Appendix G showing supplementary regressions. After that, we will describe our two experimental treatments, which causally test particular mechanisms. We then formally quantify the importance of each mechanism in Section 5.

Frictions in acquiring and processing information: The first three questions in Panel A consider what information people have acquired about their health insurance and retirement saving plans. Research in other settings finds that many employees are poorly informed about several features of HDHP/HSAs (Handel and Kolstad 2015, Brot-Goldberg et al. 2017) and more general aspects of health insurance (Loewenstein et al. 2013, Bhargava, Loewenstein and Sydnor 2017). Separately, many people are not well informed about retirement benefits, which results in lower savings (Bernheim and Garrett 2003, Duflo and Saez 2003, Chan and Stevens 2008, Bhargava and Conell-Price 2022).

We find that people who correctly answer these questions are far less likely to make puzzling choices in both domains. 24% of those who recognize that the HSA rolls over each year choose a dominated plan, compared to over 83% who incorrectly believe that funds are lost and 86% who are not sure. We observe similar patterns for the questions about the amount of the university's HSA contribution to plan L and whether any 403(b) contributions are matched. Correct answers are positively correlated across domains: employees who know that the employer matches 403(b) contributions are 32% more likely to know the employer's HSA contribution and 42% more likely to know that HSA funds roll over. Acquiring each piece of information is critical to understanding financial outcomes of benefits choices. While

helping employees consider different options, including adding a second decision support tool and providing illustrations of premiums and out-of-pocket payments in each plan if the out-of-pocket maximum was reached (Appendix Figure A.5).

each is readily available on the university's website and in other employer-provided materials, we cannot determine whether respondents knew this information before making their choices or only learned it afterwards. Our formal quantification of mechanisms in Section 5 therefore considers models with and without these three questions to bound their importance.[33]

The next two questions in Panel A ask employees about their attention to benefits decisions.[34] Given their complexity, attention is likely required both to acquire information about benefit options and to make high-quality choices. Various behavioral models of inattention (Gabaix 2019) may underlie dominated plan choices and limit retirement saving. In addition, psychological models indicate that limited "bandwidth" (Mullainathan and Shafir 2013, Schilbach, Schofield and Mullainathan 2016) may reduce decision-making quality: concerns about a scarcity of money, time, or other resources may shift people's focus to their pressing problems at the expense of longer-term ones.

We ask employees their beliefs about the role of attention in making high-quality decisions. One of these questions follows Stango and Zinman (2023) by asking: "Do you believe your household's long-run finances (dealing with kids' college, retirement planning, allocation of savings/investments, etc.) would improve if you paid more attention to them?" Another question was slightly modified to address health insurance. The responses are designed to distinguish different forms of inattention. For example, the response "*Yes, but paying more attention would require too much time/effort*" is interpreted as rational inattention (Mackowiak, Matějka and Wiederholt 2023), while the response "*Yes, and I often regret not paying greater attention*" is interpreted as a preference reversal.

The respondents least likely to make puzzling choices are those who are either already very attentive, or, in the case of retirement saving, who say their finances are set up not to require attention. Those who say that choices are "too difficult" no matter how much attention they devote are the most likely to make puzzling choices in the relevant domain. Those who exhibit preference reversals also make puzzling choices more often than those who pay attention. Notably, we find limited evidence for rational inattention. Although respondents who say paying more attention would require too much time/effort are more likely to make puzzling choices compared to those who report being attentive, the differences are not statistically significant (Appendix Figure G.1). The lack of strong support for rational inattention may not be surprising, given that the stakes of these decisions are often high, as shown in Section 3.

[33] Handel and Kolstad (2015) encounter the same issue when linking similar survey questions to insurance choices.

[34] We also asked how long people spent choosing their health plan and retirement saving, as well as what sources of information they used (see Appendix F). We omit tabulations here for brevity, but these questions are included in our models that quantify the importance of the four mechanisms in Section 5.

Responses to these attention questions are highly correlated across domains, with people who select a specific description for their attention or inattention in one domain likely to make the same selection in the other (Appendix Table G.9). Attention is also highly correlated with benefits knowledge (Appendix Figure G.5).[35]

Financial literacy: To understand how generalized knowledge relates to the benefit-specific knowledge on which we focused above, our survey included the "Big Three" financial literacy questions about compound interest, inflation, and diversification (Lusardi and Mitchell 2014).[36] Prior research shows that financial literacy impacts retirement planning and a range of other financial behaviors and that financial education improves financial literacy (Kaiser et al. 2022). To our knowledge, no evidence indicates whether financial literacy predicts avoiding dominated health plans.

In our survey, 58% of respondents correctly answered each of the three financial literacy questions, which is higher than the average of the U.S. population (Lusardi and Mitchell 2023, Lusardi and Streeter 2023). Those who answer correctly are more likely to avoid dominated plans and obtain retirement matching funds than those who do not (Table 3, Panel B).

Liquidity: Our survey included two questions to assess the role of liquidity. First, we ask about people's confidence in financing a $2,000 emergency expense within 30 days, following the question developed by Lusardi, Schneider and Tufano (2011). This amount is roughly the difference between health insurance deductibles in our setting. 81% of our sample say they could certainly or probably come up with the money, which is similar to the U.S. average in recent years (Clark, Lusardi and Mitchell 2021). The less confident someone is, the more likely they are to choose a dominated plan and to not save in supplemental retirement accounts (Table 3, Panel C).

Second, we asked a question about the trade-off between premiums and deductibles for planning purposes, which may matter to individuals who face liquidity constraints. The question asks to what extent the respondents agree with the statement, "*I would rather pay more in premiums upfront, and pay less out of pocket each time I use health care services, because it helps me plan a budget.*" We find a strong monotonic relationship between

[35]The survey included an attention check to assess whether people were reading carefully, and to test whether paying attention in the survey correlated with actual choices. Respondents who failed the attention check were 19% more likely to choose a dominated health plan in real life (Appendix Figure G.2).

[36]We follow Stango and Zinman (2023) in interpreting financial literacy as a summary measure of crystallized intelligence that is conceptually distinct from the domain-specific knowledge and cognitive processes that we collectively label as information frictions.

agreement with this statement and choosing a dominated health plan, with 78.6% of those who strongly agree choosing a dominated plan compared to 27.5% of those who strongly disagree.

Payment Aversion: In choosing their health insurance plan, people may experience a "pain of paying" the deductible, as in Prelec and Loewenstein (1998): they may avoid the HDHP because they experience a psychological cost in paying out-of-pocket for each visit or service before reaching their deductible, rather than paying upfront as a premium. In addition, people may not like to trade off money and health at the margin, deciding whether each trip to the doctor is worth its cost. By contrast, the expense of a visit has been largely pre-paid in a low-deductible, high-premium plan. Premiums are also automatically subtracted from each paycheck and so may be less salient than deductibles. Some people may therefore prefer to shield themselves from the psychological costs of paying at the point of service, even if they recognize that the HDHP delivers lower financial costs overall.

To measure payment aversion, we asked respondents the extent to which they agree with the following statement: "*I would rather have a lower deductible than a lower premium, so that in case I get sick, I do not have to think about whether I should pay out of pocket to use health care services.*" Panel D of Table 3 provides empirical support for this mechanism, showing a monotonic relationship between the strength of agreement with the statement and the choice of a dominated health plan: 68.1% of those who strongly agree choose a dominated plan compared to 27.1% of those who strongly disagree.

We now discuss our two experimental components of the survey, which causally test two mechanisms related to information frictions. Then, we will quantify the relative importance of the full range of mechanisms in Section 5.

Table 3: Summary of Main Survey Questions and Benefit Choices

Survey Question	Dominated Health Plan (%)	Forego Retirement Match (%)
Panel A. Frictions in acquiring and processing information		
Domain-Specific Knowledge		
Which statement is true about the Health Savings Account (HSA)?		
HSA funds roll over from year to year (61.1%) [correct]	24.4	12.2
If I don't use funds in a given year, they will be lost (22.4%)	83.5	18.7
Not sure (16.5%)	86.5	22.5
What is the University's contribution to your HSA if you choose PLAN L?		
Less than $500 (4.9%)	48.7	16.7
$500 to $999 (5.9%)	29.0	12.0
$1,000 to $1,499 (26.4%) [correct for employee-only coverage]	15.8	12.2
$1,500 to $1,999 (14.7%) [correct for all types of family coverage]	13.2	12.8
$2,000 or more (5.3%)	36.5	1.2
Not sure (42.8%)	81.3	20.6
Does the University match 403(b) contributions?		
The University matches some of my contributions (81.6%) [correct]	46.3	9.0
The University does not match any of my contributions (4.9%)	44.3	16.5
Not sure (13.5%)	58.7	52.7
Self-Assessed Attention		
Would your long-run finances (retirement planning, allocation of savings/investments, etc.) improve if you paid more attention to them?		
Yes, and I often regret not paying greater attention (45.1%)	54.5	17.9
Yes, but paying more attention would require too much time/effort (12.9%)	36.5	16.9
No, my finances are set up so that they don't require much attention (17.7%)	38.8	5.9
No, my household is always very attentive to these matters (17.4%)	46.8	12.4
No, these choices are too difficult no matter how much attention I devote (6.4%)	53.4	17.9
Would your health insurance choices improve if you paid more attention to them?		
Yes, and I often regret not paying greater attention (16.5%)	52.6	15.6
Yes, but paying more attention would require too much time/effort (11.1%)	51.4	15.6
No, my household is already very attentive to these matters (62.2%)	44.8	13.5
No, these choices are too difficult no matter how much attention I devote (10.2%)	56.1	17.8
Panel B. Financial Literacy		
If $100 earns 2% interest yearly, what is the balance after 5 years?		
More than $102 (89.4%) [correct]	46.0	14.2
Exactly $102 (3.0%)	61.2	30.6
Less than $102 (2.8%)	71.7	10.9
Not sure (4.8%)	63.6	29.9

(Continued on next page)

Table 3 – Summary of Main Survey Questions and Benefit Choices (continued)

Survey Question	Dominated Health Plan (%)	Forego Saving Retirement Match (%)
If savings grow at 1% and inflation is 2%, how much can you buy next year?		
More than today (4.7%)	48.7	18.7
Exactly the same (3.9%)	49.2	31.7
Less than today (81.2%) [correct]	45.6	12.7
Not sure (10.2%)	66.1	29.1
Buying a single company's stock usually offers a safer return than a stock mutual fund		
True (28.0%)	58.5	19.5
False (69.0%) [correct]	42.4	11.3
Not sure (2.5%)	60.7	24.8
Panel C. Liquidity		
Could you come up with $2,000 for an emergency expense within 30 days?		
I am certain I could come up with the full $2,000 (63.9%)	43.0	10.9
I could probably come up with $2,000 (16.9%)	50.9	14.2
I could probably not come up with $2,000 (6.5%)	57.1	29.5
I am certain I could not come up with $2,000 (9.7%)	65.2	29.1
Not sure (3.0%)	64.6	41.7
I prefer higher premiums and lower out-of-pocket costs to a lower premium because it helps me plan a budget		
Strongly Agree (15.1%)	78.6	19.3
Agree (26.7%)	58.5	14.7
Neither Agree nor Disagree (19.2%)	48.4	17.5
Disagree (25.1%)	29.0	12.7
Strongly Disagree (13.8%)	27.5	14.4
Panel D. Non-Standard Preferences:Payment Aversion		
I prefer a lower deductible to a lower premium to avoid thinking about paying out-of-pocket costs in case I'm sick		
Strongly Agree (16.6%)	68.1	19.0
Agree (31.0%)	55.7	17.9
Neither Agree nor Disagree (20.5%)	43.9	16.0
Disagree (22.4%)	34.0	10.7
Strongly Disagree (9.5%)	27.1	8.7

Notes: Table tabulates insurance and saving choices by survey responses, organized according to the four mechanisms. See Appendix F for the exact wording of each question, which have been condensed here for space. The percentage of respondents with each response is listed in parentheses after the response.

4.3 Experimental Results: Simplifying Health Insurance Menus

We showed above that people report a lack of knowledge of key health insurance parameters. Choosing a health insurance plan that includes an HSA requires information on *five* critical

parameters (premiums, deductibles, coinsurance and copays, out-of-pocket maximum, and HSA funds) that vary across plans and determine costs in each. Some respondents also report a lack of attention, and processing information about insurance plans is further complicated by uncertain spending, which requires that people calculate a distribution of costs. Prior research shows that clarifying these financial consequences helps many consumers avoid dominated plans (Bhargava, Loewenstein and Sydnor 2017, Samek and Sydnor forthcoming).[37]

Given the potential importance of complexity in processing health insurance information, the survey included an experimental treatment that varied how information was presented. All participants were asked to make a hypothetical choice among the three plans. The three plans resembled their actual offerings, with Plan 1 as plan H (high premium and low deductible), Plan 2 as plan M, and Plan 3 as plan L (low premium, high deductible, and HSA). Plan 3 stochastically dominated the other plans, but did not strictly dominate. Participants were told that they could expect to spend one of three possible amounts on health care, with a probability attached to each.

We presented two decision frames in random order to participants. All respondents saw both frames, which differed in their organization and content, and were asked their preferred plan after seeing each. The complex frame (Figure 6, Panel A) resembled how information is provided in real-world settings: a table listed the features of each contract (premium, deductible, coinsurance rate, out-of-pocket maximum and employer HSA contribution). The simple frame visualized the financial consequences of each plan choice without including the plan parameters, with two cross-randomized versions of this simplified information. Both simplified versions showed the financial consequences (premiums plus out-of-pocket payments, converted to after-tax dollars) of each spending scenario (Figure 6, Panel B). The second version added additional information reflecting the amount of extra retirement savings possible after 20 years from avoiding the dominated plan, if the reduction in health care costs relative to Plan 1 were contributed to the retirement account (Figure 6, Panel C).

We first use between-subjects variation to test the effect of simplifying information on hypothetical choices, by comparing the initial choice of those who first see the complex frame to the initial choice of those who first see one of the two simplified frames. We then use within-subject variation to test whether people who respond to the simplified frame by switching out of dominated plans are more likely to choose dominated plans in real life. We can interpret "choice reversals" as evidence consistent with the impact of simplification of plan information.

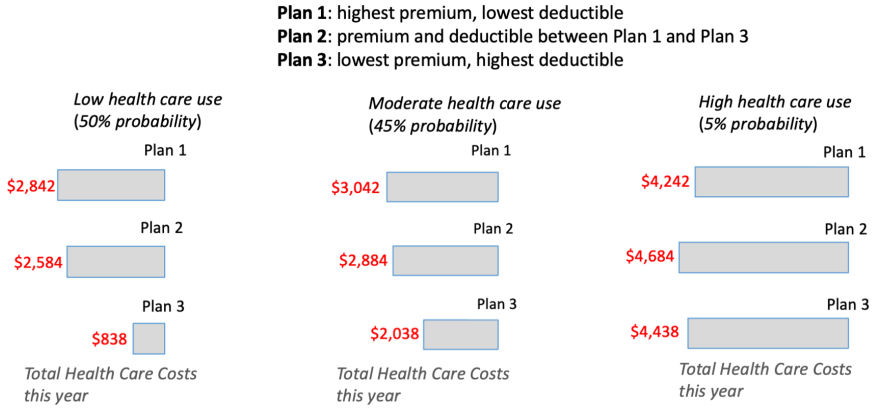
[37] As an alternative approach, Gruber et al. (2020) and Bundorf, Polyakova and Tai-Seale (2024) find that decision aids using artificial intelligence also reduce expected spending of seniors choosing Medicare plans.

Figure 6: Experimental Treatment: Insurance Menu Simplification

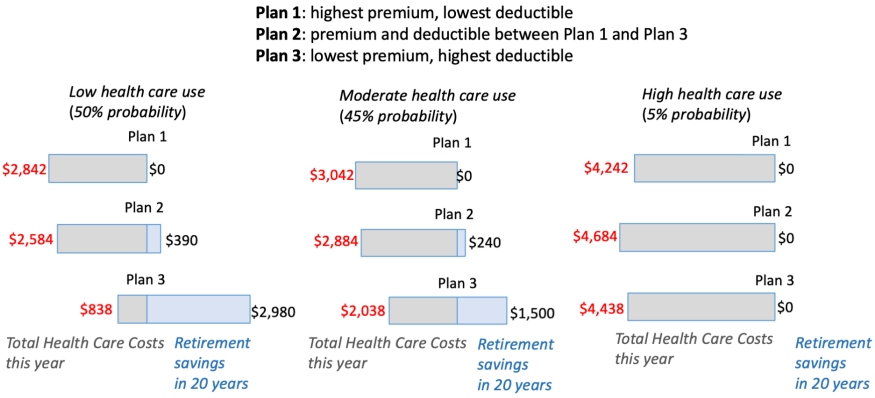
(A) Complex Frame: Table with Plan Features

	Plan 1	Plan 2	Plan 3
Monthly premium	$191	$132	$49
Annual Deductible	$500	$1,000	$2,000
Coinsurance Rate	10%	15%	20%
Annual out-of-pocket maximum	$5,000	$5,000	$5,000
Employer HSA contribution	$0	$0	$750

(B) Simplified Frame: Figure 1



(C) Simplified Frame: Figure 2



Notes: Figure presents images shown in the complex and simplified menu. See Appendix F for a complete description of each decision frame and for images displayed for those with family coverage. Respondents were randomly assigned to see either Figure 1 (Panel B) or Figure 2 (Panel C) in the simplified menu, in addition to the Complex Menu (Panel A). The order of which menu came first in the survey was randomized.

Menu simplification: between-subjects design. We test the effect of simplification by running the following specification:

$$d_i = \gamma_0 + \gamma_1 \cdot FIGURE1_i + \gamma_2 \cdot FIGURE2_i + u_i \tag{5}$$

where $FIGURE1_i$ and $FIGURE2_i$ indicate that respondent i was randomly assigned to first see either the figure with health care costs only or the figure that combined health care costs and future retirement savings. The omitted group are those who first saw the table with plan features. We define d_i as an indicator for choosing a dominated plan from the menu or being unsure of which plan to choose.[38]

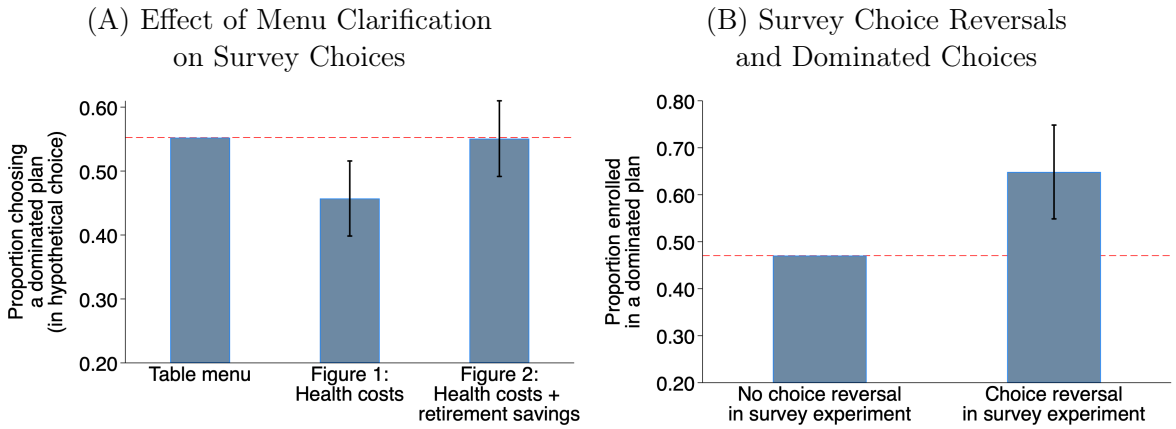
Figure 7 illustrates that being shown $FIGURE1$, with information on that year's expected health costs, reduced the probability of making a hypothetical dominated choice by 17% relative to the 55.2% of respondents who were first shown the table menu. The effect of menu simplification is larger for those who pass the attention check, which is expected since answering this particular question required a high level of focus (Appendix Table G.3). It is also stronger for those with below-median household income. These reductions in the choices of the dominated plans from clarifying health care costs are meaningful, though much smaller than the 62% decline from menu clarification in Bhargava, Loewenstein and Sydnor (2017), which involved a high deductible plan that strictly, rather than stochastically, dominated the others. In testing more comprehensive visualizations of the distribution of costs, Samek and Sydnor (forthcoming) find that the effects of simplification are about half as large when plans are stochastically dominated rather than strictly dominated. As we discuss below, some of these dominated choices can be explained by payment aversion and liquidity concerns.

Contrary to our expectations, the $FIGURE2$ frame that included the additional retirement savings made possible by avoiding the dominated choice plan had little effect on the insurance choice, undoing the gain from the simplest frame. We had hypothesized that visualizing the benefits and costs in multiple domains would lead to larger effects by helping people frame decisions more broadly.

Choice reversals and dominated plan enrollment: within-subjects design. We next use the respondent's sequential choices to study the frequency of choice reversals, occurring when people who choose a dominated plan when initially seeing the complex decision frame then avoid a dominated plan when seeing the simplified frame. We test whether those who

[38] As robustness, Appendix Table G.3 presents results for specifications that include controls, weight by survey response rates, and pass the attention check. Appendix Table G.4 replicates these specifications using both choices of each respondent.

Figure 7: Experimental Results: Menu Clarification and Choice Reversals



Notes: Panel A presents proportion of survey respondents who choose a dominated plan according to the menu they are randomly assigned to see first, based on between-subject comparisons. Panel B presents results from a linear regression of choosing a dominated plan in the employee's actual choice and choice reversal in the survey experiment, which is an indicator variable corresponding to whether the employee initially chose a dominated plan under the complex menu and then did not choose a dominated plan under the simplified menu (within-subjects comparison).

exhibit choice reversals are also more likely to choose a dominated plan in real life. Analyzing choice reversals serves two goals. First, we interpret the initial choice under the complex frame as a likely mistake, and the reversal as recognition of a mistake. Second, we consider whether people who choose dominated plans are responsive to simplification of complex information. About 22% of respondents chose a dominated plan when seeing the table first and then chose the high deductible plan when subsequently seeing the figure. This group that exhibits a choice reversal is much more likely to choose a dominated plan in real life, as shown in Panel B of Figure 7. While 47.0% of people who do not exhibit choice reversals choose a dominated plan in real life, 64.9% of those who exhibit choice reversals do so.

Non-standard preferences and liquidity constraints may explain why some people do not change their choice after information is simplified. Among those whose choice remains the same across decision frames, we test how dominated choices relate to stated preferences for low premiums either to plan a budget or due to "payment aversion" from Table 3. We find a strong monotonic relationship between the degree of agreement with those statements and the rate of dominated choices from the hypothetical menus (Appendix Figure G.3 and Appendix Figure G.4). These patterns suggest that people who experience psychological costs from deductibles or who prefer to smooth expenses may choose dominated plans even if they recognize the financial costs.

4.4 Experimental Results: Opting Out of Benefit Choices

We examined the role of attention and complexity aversion through an experimental treatment with varying incentives that mimics the decision of whether to attend to choices about benefits. We offered participants a chance to win extra money if they decided to attempt some additional complicated questions on benefits choices and correctly answered them. This section was motivated by lab studies finding that people are willing to pay to avoid complex tasks (Oprea 2020). The five questions, which appeared at the end of the survey (when they were perhaps tired), were designed as vignettes asking the participant to advise a friend on health plan choices and as calculations of the compounding in savings. The health insurance vignette specified that the friend's objective is to minimize their expected health care costs, to abstract from preferences and yield a single correct answer. This setup purposely contrasts with the prior questions about plan choices in Figure 6 that elicited choices based on the respondent's subjective preferences.

Participants were randomly assigned to earn either \$10 per correct question (up to \$50 total) or \$40 per correct question (up to \$200 total), if randomly selected for payment. Importantly, the expected payout was uncertain; while we announced we would select 100 winners, the number of respondents from which the 100 would be drawn was unknown. This setup captures the consequences of real-life benefit decisions, which involve financial ambiguity about how much might be gained from devoting attention, better than a deterministic or probabilitistic payout.

Participants had to choose whether to attempt the questions or skip to the end of the survey without seeing them. We refer to this final section of the survey as the "opt-out task." We hypothesized that those who opted out would be more likely to choose a dominated health plan in real life because of a choice to be inattentive or averse to complex tasks. Denoting the variable $OPTOUT$ as an indicator equal to 1 if the participant opted out of the incentivized task, we run the following regression:

$$y_i = \pi_0 + \pi_1 \cdot OPTOUT_i + e_i \tag{6}$$

where y_i is an indicator for making one of the puzzling choices in real life. As predicted, Table 4 shows that those who skipped the additional questions were over 20% more likely to choose a dominated plan (60% vs. 47.5%). We did not detect a statistically significant relationship between engaging in the opt-out task and making supplemental retirement contributions (column 2) or choosing a dominated plan while not making supplemental contributions (column 3). Therefore, attention and complexity aversion may be particularly relevant for health insurance, even though this is a recurring choice.

We also test whether the size of the financial stakes affects the opt-out decision by regressing $OPTOUT$ against the treatment arms:

$$OPTOUT_i = \delta_0 + \delta_1 \cdot ARM_i^{\$40} + \epsilon_i \tag{7}$$

where $ARM_i^{\$40}$ is an indicator for being randomly assigned to the arm paying \$40 per correct question instead of the one paying \$10 per correct question. We find attention responds to the size of the financial stakes, although the opt-out rate was low overall. 12.3% of participants offered \$10 per correct question opted out, compared to 7.3% of participants offered \$40 per correct question (Table 4, column 4).

Table 4: Experimental Results: Opt-Out Task

	Dominated health plan	Forego retirement match	Dominated plan & forego match	Opted out		# questions correct	Payment (\$)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Opted out of incentivized task	0.125	0.012	0.010				
	(0.041)	(0.033)	(0.026)				
Higher incentive payment				-0.049			
				(0.015)			
Household inc. $<$ \$125k					-0.035	-0.438	-7.651
					(0.014)	(0.081)	(2.811)
Constant	0.475	0.153	0.090	0.122	0.103	2.307	52.933
	(0.013)	(0.009)	(0.007)	(0.011)	(0.010)	(0.059)	(2.078)
Observations	1643	1621	1621	1643	1622	1482	1622
R^2	0.006	0.000	0.000	0.007	0.004	0.019	0.005

Notes: Columns (1)-(3) present linear regressions of insurance and saving choices against the indicator for whether the participant opted out of the incentivized task at the end of the survey. Column (4) presents a linear probability model (LPM) of the decision to opt-out against an indicator for being randomly assigned to receive \$40 payment per correct question instead of \$10 per correct question. Column (5) presents LPM of the opt-out decision by being above the median of household income. Columns (6)-(7) present results of the number of questions answered correctly (including zeros for those who opted out) and payments against household income. Robust standard errors in parentheses.

Finally, the decision to opt out also varies by income. Households with lower income were less likely to skip the questions: 10.3% of households earning above \$125,000 opted out versus 6.8% of those earning less (column 5). However, conditional on attempting the questions, higher income households correctly answered more questions (column 6). The fewer correct answers among lower-income employees offset their higher likelihood of attempting the questions, with lower-income households earning 14% less (\$52.93 vs. \$45.28, column 7). These results extend other research that considers attention-based explanations of insurance choices (Brot-Goldberg et al. 2023, Brown and Jeon 2023) and documents

differences in choice quality by socioeconomic status (Handel et al. 2024). In explaining deductible choices in the Netherlands, Handel et al. (2024) hypothesize that people with higher income either pay more attention or are more skilled at making choices when they do pay attention, compared to those with lower income. Our results suggest the latter force is strong enough to outweigh a lower propensity by those with higher income to devote attention in the first place.

5 Quantification of Mechanisms

Since we have found support for several mechanisms explaining puzzling benefits choices, we now assess their relative importance. We do so with a series of bivariate regressions that jointly estimate one equation for choosing a dominated health plan and another for foregoing the retirement plan match, while allowing for correlated errors between the two equations. By including multiple mechanisms as regressors, we can assess the importance of each one based on how they influence the model's fit to the data and the correlation between the errors. To fully capture each an mechanism elicited in our survey, we include a full set of indicators for the responses to the relevant survey questions. For example, we include indicators for each possible response (including being unsure) to each of the three financial literacy questions.[39] Appendix G provides details on the implementation of these models. Our main specification is a bivariate probit, so we measure model fit using the log likelihood ratio as well as the Akaike information criterion (AIC), which penalizes adding variables that offer little explanatory power.[40] A mechanism that meaningfully improves model fit is important in explaining choices for a substantial share of the sample, suggesting what might be targeted. If a mechanism reduces the residual correlation in choices, then targeting it might affect choices in both domains.

Our baseline regression includes controls for demographics, household income, job characteristics, expected health spending, and experimental arm. Compared to choices predicted by chance alone (i.e., no model), these baseline variables increase the log likelihood by 7.5%, as shown by the likelihood ratio index displayed for the top row of Panel A of Figure 8. Moreover, adding the baseline variable leaves a correlation of 0.152 between the residuals of the regression equations, as shown in the top row of Panel B. We can strongly reject the null of no correlation ($p = 0.003$).

Subsequent rows of Figure 8 show the impact of adding mechanisms to the baseline

[39] Bucher-Koenen et al. (forthcoming) show that some people who select "Don't Know" to financial literacy questions actually know the answer but are not confident.

[40] The AIC is calculated as $2k - LL(\theta)$, where k is the number of parameters and $LL(\theta)$ is the log-likelihood of the model.

model. Only slight improvements in model fit occur from controlling separately for liquidity, non-standard preferences in the form of payment aversion, or financial literacy, though we can statistically reject that any of these models are equivalent to the baseline based on likelihood ratio tests. Adding them reduces the AIC, indicating improved model fit. The correlation between the residuals falls in each case, but the 95% confidence intervals still reject the null of zero correlation. Thus, these three mechanisms modestly help explain choices.

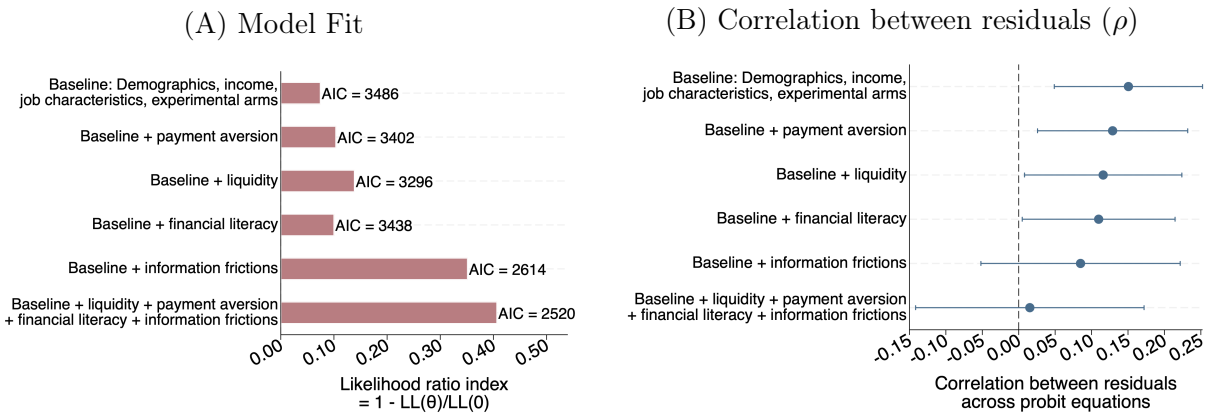
In contrast, controlling for frictions that reflect the difficulty of acquiring and processing information leads to substantial improvements in model fit. The increase in the likelihood ratio index from adding information frictions to the baseline model is four times larger than the increase when adding liquidity, and over 10 times larger than when adding financial literacy or payment aversion.[41] The same is true when considering reductions in the AIC. Information frictions also explain much of the positive correlation in choices; controlling for frictions reduces the correlation coefficient between residuals to 0.08 and eliminates its statistical significance.

Finally, the bottom row shows that including all mechanisms measured in the survey further improves model fit. It is also the only specification that effectively eliminates the positive correlation between residuals, reducing its magnitude to just 0.01. We obtain qualitatively similar results here and elsewhere in our analysis when restricting to medical division employees whose default 403(b) contribution is zero (Appendix Figure G.6), which suggests our conclusions about mechanisms do not depend on the default regime (Goda et al. 2020).

We use this final model with all mechanisms to assess each one's importance in explaining choices. Recall that the regressors for each mechanism in this analysis are a full set of indicator variables corresponding to the relevant survey response. For each mechanism, we predict the reduction in puzzling choices if that mechanism were to be "turned off" by recoding the corresponding variables. We choose the strongest coding for each response to be able to differentiate as sharply as possible between mechanisms. For example, to remove the influence of liquidity, we predict choices if each person responded that they could "certainly finance a $2,000 emergency expense" and that they "strongly disagree" with the statement that they prefer higher premiums to higher deductibles because it helps them plan a budget. To remove the influence of financial illiteracy, we predict choices if each person answered each of the three questions correctly. We undertake these predictions for each mechanism one at a time, holding regressors for the other mechanisms at their observed values. We first consider

[41] The influence of information frictions on the log likelihood does not occur because it is represented by more variables than the other mechanisms. A model with information frictions alone improves log likelihood by almost twice as much as baseline characteristics and the other three mechanisms combined, even though the frictions-only model includes less than half as many parameters (Appendix Table G.11).

Figure 8: Bivariate Probit Regressions: Model Fit and Estimates of ρ



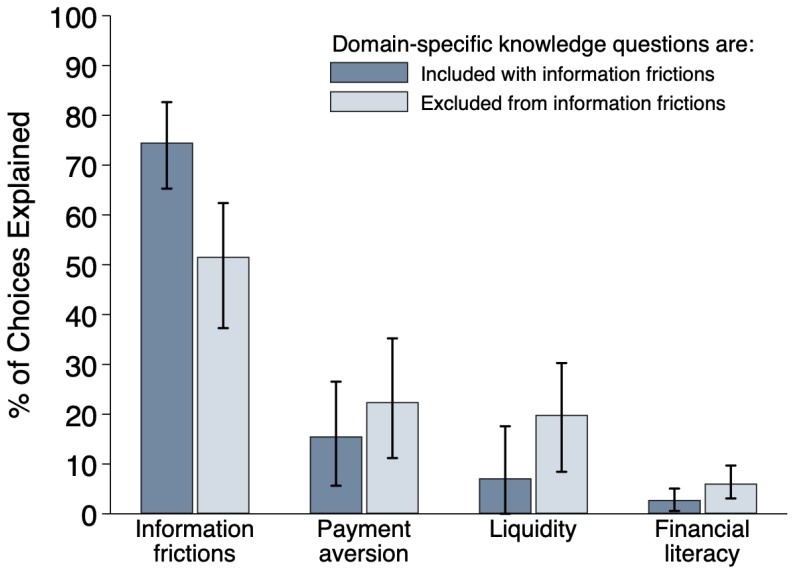
Notes: Figure presents results of bivariate probit regressions of choosing a dominated health plan and foregoing the retirement match, which allow correlation between the errors in each equation. The baseline model includes indicators for age, gender, marital status, household income, academic or medical division, faculty, tenure, and expected health spending as measured in the survey. Each row adds different sets of mechanisms to the baseline model (see Appendix G for details), while keeping the same set of respondents across models ($N = 1,607$). As a measure of the goodness of fit, Panel A plots the likelihood ratio index, defined as 1 minus the ratio of the log likelihood of that model, $LL(\theta)$, to the log likelihood from the null model that restricts all coefficients to zero, LL(0). Panel B plots the correlation coefficient (ρ) of the residuals from each outcome equation, and its associated 95% confidence interval.

a model that includes the three domain-specific knowledge questions as part of information frictions and then consider a model that omits the three questions. The latter case assumes that people have learned about these features after making their choices, reflecting a lower bound on the importance of information frictions. We interpret the results of this exercise descriptively.

We start by describing results that consider domain-specific knowledge as part of information frictions (dark blue bars). Removing information frictions alone is predicted to reduce the share of puzzling choices by more than 46 percentage points (from 55.5 to 8 percent). The predicted declines are much smaller for the other three mechanisms: removing payment aversion, liquidity constraints, or financial illiteracy would reduce the shares by 9.7, 4.5, and 1.8 percentage points, respectively. Figure 9 standardizes these predicted reductions to sum to 100% across the four mechanisms for ease of interpretation. Frictions in acquiring and processing information explain about three-quarters of the predicted declines. Payment aversion accounts for about 15%, followed by liquidity (7%) and financial literacy (3%).[42] As a lower bound, we find frictions explain over 50% of choices if we exclude the three domain-specific knowledge questions (light blue bars). This exercise reinforces the conclusions from Figure 8 that information frictions are of primary importance, although

[42]As an additional technique to measure the importance of each mechanism and account for their correlation, Appendix G performs a Shapley-Owen decomposition (Shapley 1953, Owen 1977) based on improvements in AIC and likelihood ratio index. That decomposition yields a similar quantitative conclusion that information frictions explain three-quarters of choices.

Figure 9: Quantification of Mechanisms: Predicted Choices from Bivariate Probit



Notes: Figure plots predicted changes in puzzling choices from each mechanism, standardized to sum to 100 across the four mechanisms, where information frictions exclude the three knowledge questions. Changes are calculated using the final model that includes all mechanisms, turning off each mechanism one at a time while holding other regressors at their observed values. Results are split by whether information frictions include the three questions about knowledge of employer HSA contributions, whether HSAs roll over, and whether employer matches 403(b) contributions (dark bars) or excluded (light bars). Whiskers denote 95% confidence intervals calculated by bootstrapping 200 samples.

the others still help to explain puzzling choices and their correlation. When removing the influence of all mechanisms simultaneously, the model predicts that over 98% would choose the HDHP and save in supplemental accounts.

6 Discussion

It is well-established that many people depart from standard economic models of behavior when it comes to choices about health insurance or retirement saving (Beshears et al. 2019, Chandra, Handel and Schwartzstein 2019). However, whether such behavior is correlated across domains has remained largely unexplored. We provide novel evidence about this correlation in the context of employee benefit decisions, which are made each year and carry sizable financial consequences. Using administrative data from a large university, we document that people who choose a dominated health plan are less likely to contribute to supplemental retirement accounts, which sacrifices employer matching funds. One-third of employees simultaneously choose a dominated health insurance plan and forego the match. For those employees, financial losses from their health insurance choice average over 4% salary per year, which could be reallocated to retirement saving, current consumption, or debt reduction. The positive correlation between puzzling choices is not restricted to our

particular setting. Using survey data linked to TIAA's administrative records on retirement accounts, we observe the same pattern in ten other universities.

Using a comprehensive survey of the employees at the university that we study, we find that frictions in acquiring and processing information explain 50–75% of puzzling choices across domains. In particular, our results point to the importance of knowledge about benefits, responses to complexity in benefit options, and the choice to devote attention when faced with complexity. Information frictions in each domain are positively correlated within individuals, consistent with Stango and Zinman (2023). Other choices can be explained by liquidity constraints, consistent with Ericson and Sydnor (2022), or by an aversion to deductibles, reflecting psychic costs of thinking about paying to access health care.

Our results inform policy in two main ways. First, we show that it is often the same people who could benefit from assistance across multiple financial decisions. Targeting a subset of people may be more efficient for employers and policymakers compared to a situation where different people leave money on the table in different domains. Moreover, the relative socioeconomic disadvantage of employees who simultaneously choose a dominated plan and forego the retirement match underscores the importance of accurate targeting. Second, our results point to the importance of policies that reduce frictions in acquiring and processing information. Efforts that steer consumers away from dominated plans (or simply eliminate them entirely) would necessarily increase the equilibrium prices of dominant plans as consumers re-sort. Even if the financial losses of choosing dominated plans decrease over time, our results show that repeatedly making puzzling choices leaves substantial money on the table.

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A Institutional Details of Health Insurance and Retirement Plans

This Appendix presents more information on the rules and options for health insurance and retirement saving offered by the employer.

Health insurance: Table A1 presents key features of the health insurance plans—premiums, deductibles, out-of-pocket maxima, HSA availability and employer contributions—by type of coverage in 2015 and 2017. Copayments and coinsurance rates differed by plan. Coinsurance rates were lower in the high coverage plan compared to the other two options (10% vs 20%), and these rates applied to most service categories. Copayments applied to office or outpatient visits for the middle coverage and high coverage plans. Copayments were $25 for primary care in the high coverage plan and $30 in the medium coverage plan and not subject to the deductible. Copayments for specialty care visits were twice these amounts and also not subject to the deductible for these two plans. Physical therapy, occupational therapy, chiropractic care, and acupuncture each had $40 copayments for both the medium and high coverage plans. Inpatient care had a $500 deductible for the high coverage plan. For the low and medium coverage plans, inpatient care had 20% coinsurance after the deductible. Emergency room visits had a $200 copayment in the high coverage plan and a 25% coinsurance rate after the deductible in the low and medium coverage plans. All plans covered preventive care (including physical examinations with a primary care provider, well care child visits, non-urgent diagnostic tests, lab services, and x-rays, common communicable diseases like flu shots) without out-of-pocket payments. Maternity visits were also paid in full by each plan. Plans had slightly different prescription drug coverage. Nonetheless, we compared prices on the 30 most common prescriptions (nationwide) as classified in Fuentes, Pineda and Nagulapalli Venkata (2018) and found little difference across plans.

The university provided information to help employees make decisions between the three plans. Figure A.1 presents a summary comparison of the three health plans and Figure A.2 presents the first page of a four-page glossary of health insurance terms that describe plan features and other insurance terms in plain language. The university also offered examples of how cost sharing works for particular expenses, as shown in Figure A.3. During our sample period, employees also had access to Alex, an online decision support tool to aid in choosing between the three plans.

Retirement saving: The large public university that we study offers faculty a complicated set of retirement plan choices. Several distinctions are important, between the academic and medical divisions, between faculty and other employees in the academic division; and by hire date.
Academic division. Non-faculty academic-division employees are enrolled into the state DB plan, with 5% of their pay contributed to the help finance the system. This has become less generous over time, following two changes in the state system. The DB formula was changed to reduce generosity a little and delay retirement for employees hired after July 1, 2010. It was changed again, with a much more substantial reduction in generosity for employees hired after December 31, 2013; another change at that time was that 4% of pay continued to go to the state DB system, but 1% began to go to a DC plan with an employer match of 1%. Faculty face a one-time irrevocable choice at the outset of employment between the DB plan run by the state and the 401(a) DC plan with mandatory contributions. For faculty hired before July 1, 2010, the mandatory contribution rate to the 401(a) is 10.4% from the employer. For faculty hired after, it is 8.9% from the employer and 5% from the employee. A large majority of faculty chooses the DC plan instead of the DB plan.

For both faculty and staff in the academic division, the employer provides a match to the university 403(b) plan. This consists of a 50% match on employee contributions up to $80 per

month ($960 per year). There is a choice between two vendors for the 401(a) and each vendor also offers the 403(b). There is also a state 457 plan that is run by a different vendor. Both the 403(b) and 457 allow for tax-deferred and Roth contributions.

Medical division. Medical division employees do not have a choice of mandatory plan and are enrolled in a medical system DC plan. For employees hired before October 1, 2002, the employer contributes 8% of pay, and for employees hired after, the employer contributes 4%. The match ceiling for contributions to the 403(b) plan changed at the same time. For employees hired before October 1, 2002, the match parameters were the same as for academic-division employees, with a 50% match for contributions up to $960 per year. For employees hired after, it is a 50% match for employee contributions up to 4% of salary. Medical division employees also have access to the same state 457 plan.

Table A.1: Summary of Main Features of Health Insurance Plans, 2015 and 2017

	2015			2017		
	Coverage level			Coverage level		
	High	Medium	Low	High	Medium	Low
Panel A. Employee-only						
Annual premium	1,080	612	228	1,275	687	228
Deductible	250	500	2,000	400	500	2,000
Out-of-pocket max	5,000	5,500	6,000	5,000	5,500	6,550
HSA available	No	No	Yes	No	No	Yes
Employer HSA contribution	No	No	1,000	No	No	1,000
Panel B. Employee + child						
Annual premium	2,580	1,020	288	3,039	1,164	288
Deductible	500	1,000	4,000	800	1,000	4,000
Out-of-pocket max	10,000	11,000	12,000	10,000	11,000	13,100
HSA available	No	No	Yes	No	No	Yes
Employer HSA contribution	No	No	1,500	No	No	1,500
Panel C. Employee + spouse						
Annual premium	2,904	1,092	360	3,471	1,284	381
Deductible	500	1,000	4,000	800	1,000	4,000
Out-of-pocket max	10,000	11,000	12,000	10,000	11,000	13,100
HSA available	No	No	Yes	No	No	Yes
Employer HSA contribution	No	No	1,500	No	No	1,500
Panel D. Family						
Annual premium	5,136	1,800	696	6,066	2,064	720
Deductible	500	1,000	4,000	800	1,000	4,000
Out-of-pocket max	10,000	11,000	12,000	10,000	11,000	13,100
HSA available	No	No	Yes	No	No	Yes
Employer HSA contribution	No	No	2,000	No	No	2,000

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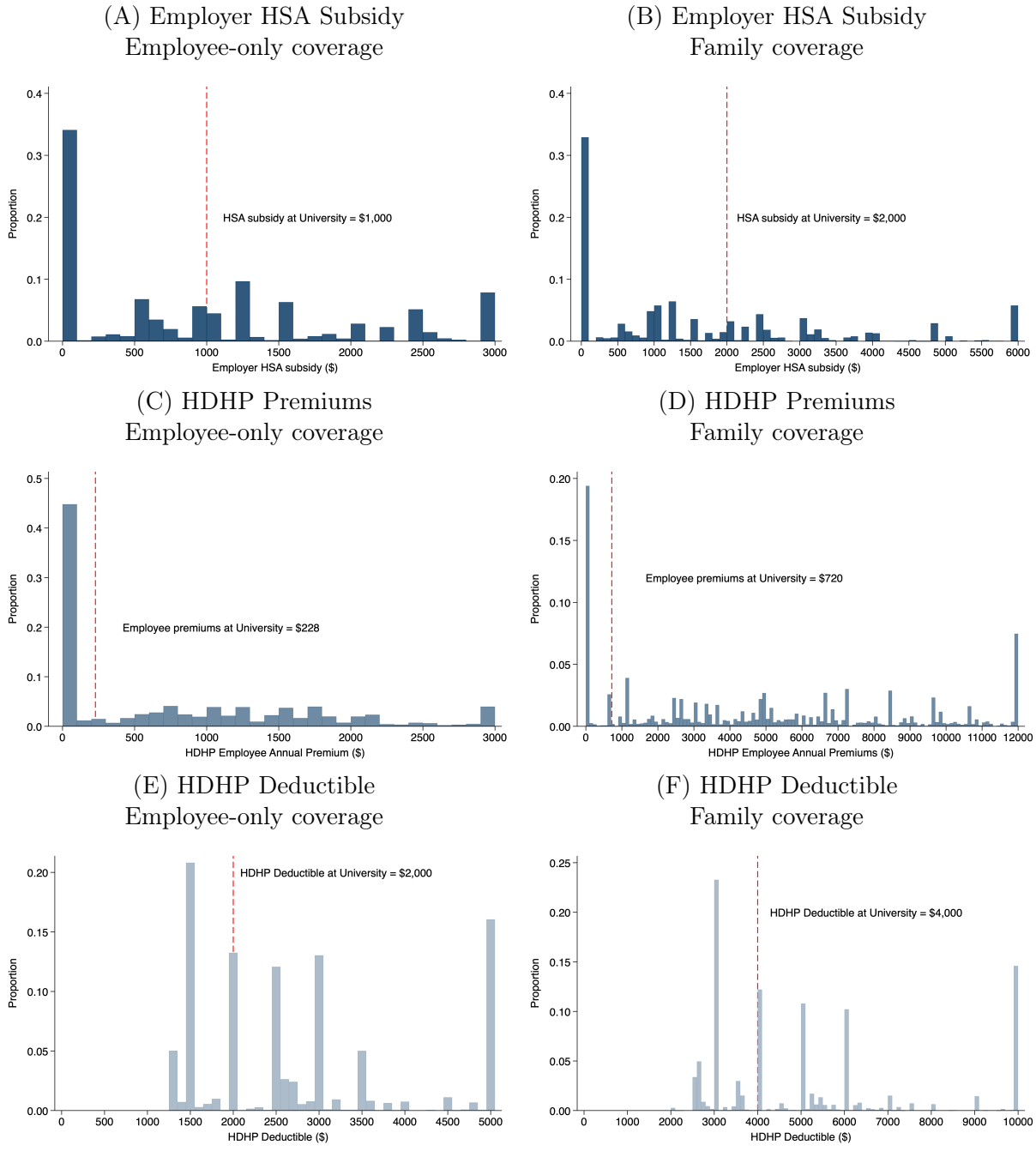
Fuentes, Andrea, Moises Pineda, and Kaylan Nagulapalli Venkata. 2018. "Comprehension of Top 200 Prescribed Drugs in the US as a Resource for Pharmacy Teaching, Training, and Practice." *Pharmacy*, 6(2): 43.

Table A.2: Summary of Main Plan Features at Peer Universities

		Low coverage plan				High coverage plan		
		Premium	Deductible	HSA Available	Employer HSA Contribution	Premium	Deductible	# plans
Panel A. Private Universities								
1	Individual	$324	$1,500	Yes	$1,000	$1,380	$300	3
	Family	$3,480	$3,000	Yes	$1,000	$7,620	$600	
2	Individual	$408	$600	No	N/A	$2,016	$0	4
	Family	$3,768	$1,800	No	N/A	$9,036	$0	
3	Individual	$348	$1,450	Yes	$300	$804	$850	2
	Family	$3,084	$2,900	Yes	$600	$6,024	$2,550	
4	Individual	$643	$2,500	Yes	$500	$1,452	$500	3
	Family	$4,209	$5,000	Yes	$1,000	$3,402	$1,000	
5	Individual	$1,092	$1,500	Yes	$1,000	$2,448	$150	4
	Family	$3,576	$3,000	Yes	$2,000	$7,596	$450	
6	Individual	$1,512	$0	N/A	N/A	$3,168	$100	4
	Family	$5,556	$0	N/A	N/A	$8,904	$300	
7	Individual	$355	$1,500	Yes	$400	$1,288	$500	5
	Family	$1,320	$3,000	Yes	$800	$6,869	$1,500	
Panel B. Public Universities								
1	Individual	$264	$1,400	Yes	$60	$1,387	$200	4
	Family	$1,465	$2,800	Yes	$120	$3,413	$400	
2	Individual	$276	$1,400	Yes	$500	$1,701	$500	5
	Family	$802	$2,800	Yes	$1,000	$5,660	$1,500	
3	Individual	$276	$1,400	Yes	$500	$1,701	$500	5
	Family	$802	$2,800	Yes	$1,000	$5,660	$1,500	
4	Individual	$0	$1,500	Yes	$0	$1,308	$0	4
	Family	$228	$3,000	Yes	$0	$4,542	$0	
5	Individual	$180	$1,350	Yes	$500	$1,680	$400	4
	Family	$772	$2,700	Yes	$1,000	$2,160	$800	
6	Individual	$0	$400	No	N/A	$408	$0	2
	Family	$3,492	$800	No	N/A	$4,188	$0	
7	Individual	$812	$0	No	N/A	$1,224	$0	5
	Family	$2,112	$0	No	N/A	$3,060	$0	
8	Individual	$0	$500	No	N/A	$1,788	$0	3
	Family	$2,820	$1,000	No	N/A	$7,896	$0	
9	Individual	$2,256	$2,800	Yes	$0	$3,948	$300	4
	Family	$5,469	$5,400	Yes	$0	$10,437	$600	
10	Individual	$0	$1,500	Yes	$0	$936	$0	4
	Family	$600	$3,000	Yes	$0	$4,548	$0	
11	Individual	$300	$1,400	Yes	$0	$2,112	$175	10
	Family	$948	$2,800	Yes	$0	$5,928	$525	
12	Individual	$372	$1,500	Yes	$750	$3,228	$250	4
	Family	$936	$3,000	Yes	$1,500	$8,040	$500	

Note: Table presents parameters of insurance plans for the set of peer institutions (as classified by the university). When there are more than two plans offered, we report only the most generous and least generous plans to show the range.

Figure A.1: Distribution of HDHP Characteristics, Kaiser Employee Health Benefits Survey



Notes: Figure plots distributions of annual the employer HSA subsidies, employee premiums, and deductibles in high-deductible health plans (HDHPs) reported in the Kaiser Employee Benefits Survey data. The sample is restricted to years 2014–2018 to match our empirical setting and the University's values of these variables are listed for comparison and denoted by vertical dashed lines.

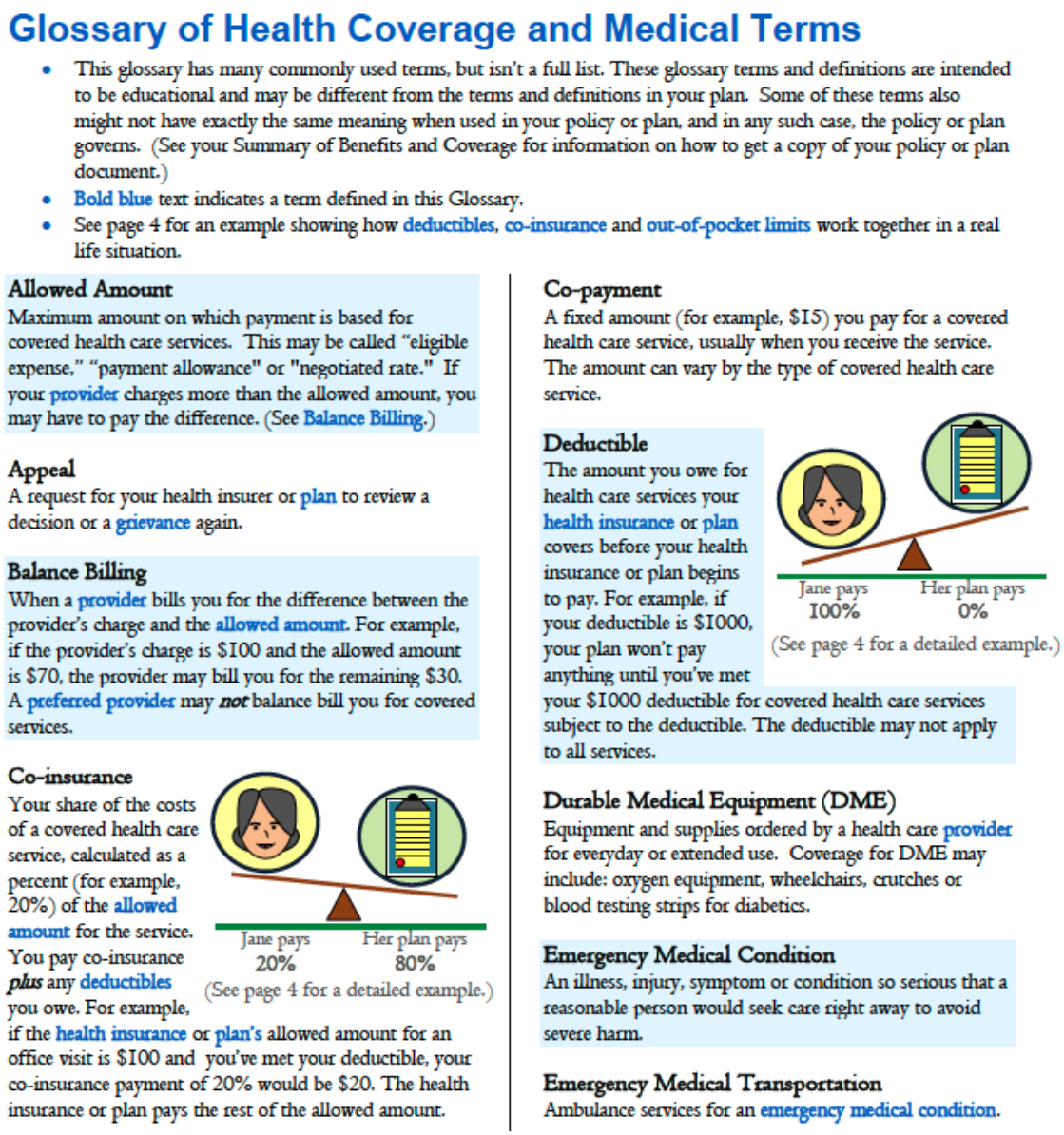
Figure A.2: Health Plan Comparison provided by University, 2015

SERVICES PROVIDED	PLAN "L"	PLAN "M"*	PLAN "H"
1. PLAN COINSURANCE Applies to all expenses unless otherwise stated.			
	Deductible & 20% Coinsurance	Deductible & 20% Coinsurance	Deductible & 10% Coinsurance
2. PROFESSIONAL SERVICES IN OFFICE OR OUTPATIENT			
A. Primary Care Physician Visit	Deductible & 20% Coinsurance	$30 Copayment	$25 Copayment
B. Specialty Care Visit	Deductible & 20% Coinsurance	$60 Copayment	$50 Copayment
C. Maternity Visit	Paid in Full[1]	Paid in Full[1]	Paid in Full[1]
3. PREVENTIVE CARE AND IMMUNIZATIONS			
A. Preventive General Physical Examination (PCP Only)	Paid in Full	Paid in Full	Paid in Full
B. Preventive Well Child Care (Under Age 7) (PCP Only)	Paid in Full	Paid in Full	Paid in Full
C. Preventive Diagnostic Tests, Laboratory Services and XRay Procedures (Non-Urgent Only)	Paid in Full[1]	Paid in Full[1]	Paid in Full[1]
D. For Common Communicable Diseases as per CDC Guidelines excluding those used for Foreign Travel	Paid in Full	Paid in Full	Paid in Full
4. URGENT CARE CENTER *(Must be an unexpected illness or injury where services are needed sooner than a routine doctor's visit)*			
	Deductible & 20% Coinsurance	Deductible & 20% Coinsurance	Deductible & 10% Coinsurance

SERVICES PROVIDED	PLAN "L"	PLAN "M"*	PLAN "H"
5. EMERGENCY ROOM SERVICES Emergency Room Services will be processed under the Hospital Care Benefits if patient is admitted. *(Must be an emergency to receive benefits.)*			
Emergency Room Visit	Deductible & 25% Coinsurance	Deductible & 25% Coinsurance	$200 Copayment
Other Associated Charges	Deductible & 25% Coinsurance	Deductible & 25% Coinsurance	Deductible & 10% Coinsurance
6. INPATIENT HOSPITAL			
A. Inpatient Care (Semi-Private Accommodations Unless Private Accommodations are Approved for Medical Reasons)	Deductible & 20% Coinsurance	Deductible & 20% Coinsurance	$500 Copayment per confinement
B. Limitation on Inpatient Days	Unlimited	Unlimited	Unlimited
7. TRANSPLANT SERVICES Using Institutes of Excellence Network			
Inpatient Services	Deductible & 20% Coinsurance	Deductible & 20% Coinsurance	$500 Copayment per confinement
8. OUTPATIENT HOSPITAL			
Outpatient Procedures	Deductible & 20% Coinsurance	Deductible & 20% Coinsurance	$200 Copayment per visit
Other Associated Charges	Deductible & 20% Coinsurance	Deductible & 20% Coinsurance	Deductible & 10% Coinsurance
9. SKILLED NURSING FACILITY			
Skilled Nursing / Rehabilitation Facility (180 Days Per Year Combined Maximum)	Deductible & 20% Coinsurance	Deductible & 20% Coinsurance	$300 Copayment per confinement
10. HOME HEALTH SERVICES			
Medically Necessary Services Approved By Claims Administrator (90 Visits Per Year Maximum)	Deductible & 20% Coinsurance	Deductible & 20% Coinsurance	Deductible & 10% Coinsurance
11. AMBULANCE TRANSPORTATION			
Local Ground or Air Transportation When Medically Necessary To and/or From a Hospital	Deductible & 20% Coinsurance	Deductible & 20% Coinsurance	Paid in Full

Notes: Screenshot of the first two pages of the plan benefit comparison chart provided by University for 2015 health plans. Names of plans have been replaced with "L", "M", and "H" to preserve anonymity.

Figure A.3: Glossary of Health Insurance Terms Provided by Employer



Glossary of Health Coverage and Medical Terms

- This glossary has many commonly used terms, but isn't a full list. These glossary terms and definitions are intended to be educational and may be different from the terms and definitions in your plan. Some of these terms also might not have exactly the same meaning when used in your policy or plan, and in any such case, the policy or plan governs. (See your Summary of Benefits and Coverage for information on how to get a copy of your policy or plan document.)
- Bold blue text indicates a term defined in this Glossary.
- See page 4 for an example showing how deductibles, co-insurance and out-of-pocket limits work together in a real life situation.

Allowed Amount
Maximum amount on which payment is based for covered health care services. This may be called "eligible expense," "payment allowance" or "negotiated rate." If your provider charges more than the allowed amount, you may have to pay the difference. (See Balance Billing.)

Appeal
A request for your health insurer or plan to review a decision or a grievance again.

Balance Billing
When a provider bills you for the difference between the provider's charge and the allowed amount. For example, if the provider's charge is $100 and the allowed amount is $70, the provider may bill you for the remaining $30. A preferred provider may ***not*** balance bill you for covered services.

Co-insurance
Your share of the costs of a covered health care service, calculated as a percent (for example, 20%) of the allowed amount for the service. You pay co-insurance ***plus*** any deductibles you owe. For example, if the health insurance or plan's allowed amount for an office visit is $100 and you've met your deductible, your co-insurance payment of 20% would be $20. The health insurance or plan pays the rest of the allowed amount.

(See page 4 for a detailed example.)

Co-payment
A fixed amount (for example, $15) you pay for a covered health care service, usually when you receive the service. The amount can vary by the type of covered health care service.

Deductible
The amount you owe for health care services your health insurance or plan covers before your health insurance or plan begins to pay. For example, if your deductible is $1000, your plan won't pay anything until you've met your $1000 deductible for covered health care services subject to the deductible. The deductible may not apply to all services.

(See page 4 for a detailed example.)

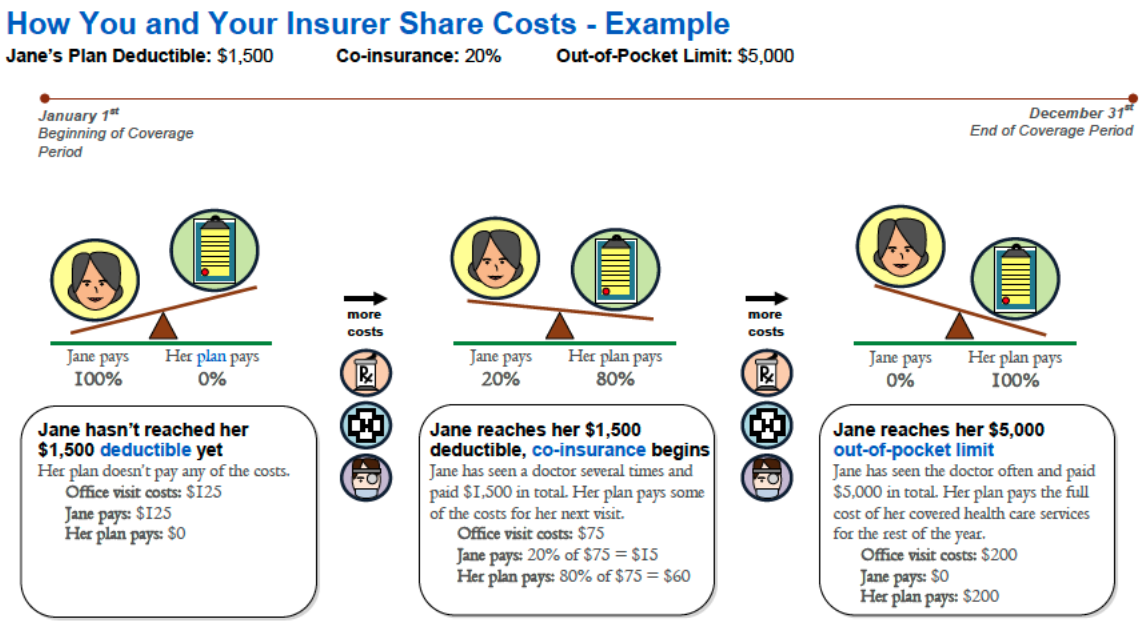
Durable Medical Equipment (DME)
Equipment and supplies ordered by a health care provider for everyday or extended use. Coverage for DME may include: oxygen equipment, wheelchairs, crutches or blood testing strips for diabetics.

Emergency Medical Condition
An illness, injury, symptom or condition so serious that a reasonable person would seek care right away to avoid severe harm.

Emergency Medical Transportation
Ambulance services for an emergency medical condition.

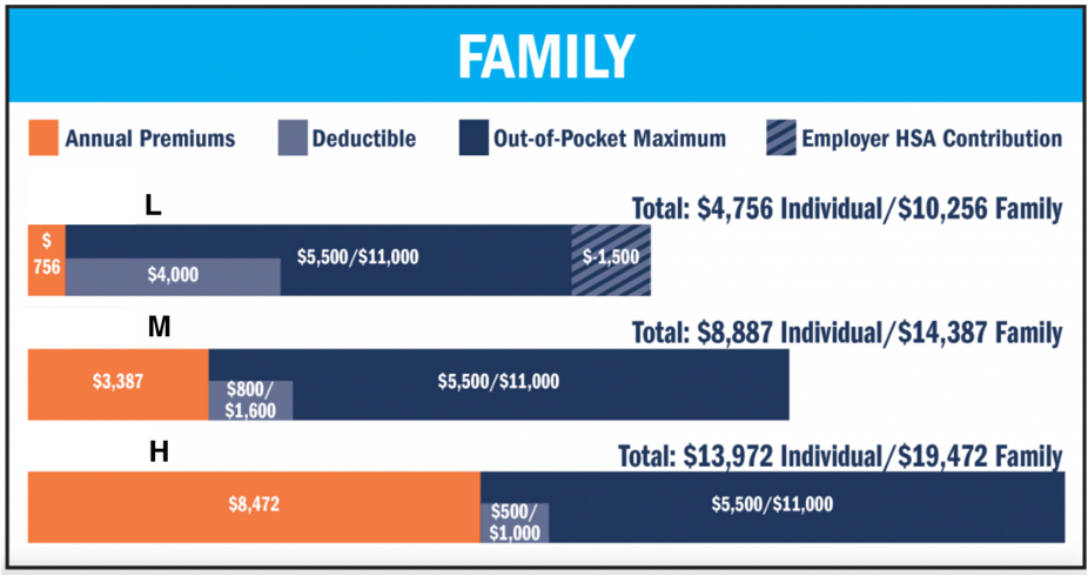
Notes: Screenshot of first page of glossary of health insurance terms provided to employees.

Figure A.4: Example of Cost Sharing Provided by Employer



Notes: Screenshot of an example of deductibles, coinsurance, and out-of-pocket limit provided to employees.

Figure A.5: Graphic of Costs if Spending Exceeds Out-of-Pocket Max, Family Coverage 2022



Notes: Graphic presented during 2022 Open Enrollment in written materials and online. Graphs corresponding to each coverage type were provided to employees.

B Construction of Health Expenditure Distributions

We construct distributions of out-of-pocket costs for each employee and dependents by grouping people into "risk groups" according to demographics and previous health spending, and then using 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, 59.5–65, 65 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.

It is important to note several assumptions made in this approach to constructing OOP distributions. First, we assume draws are independent within families. Draws might be positively correlated if family members have similar tastes for health care consumption that we do not model. On the other hand, OOP draws (not necessarily spending draws) might be negatively correlated due to the non-linear nature of the insurance contract. We believe modeling these correlations would introduce unnecessary complexity into this calculation without providing meaningfully different results. We assume people have rational expectations regarding future spending risk based on their demographics and lagged spending, which is a standard assumption in modeling choices between health plans.

C Imputation of Marginal Tax Rates

This Appendix describes the procedure to impute marginal tax rates for each employee in our data. Our administrative records lack several pieces of information required for a direct calculation of the employee's marginal tax rate, including information about spousal earnings, children, other sources of income, home ownership, and relevant deductions. In addition, marital status is reported incompletely and salary is recorded in bands to protect data confidentiality. Our approach is therefore to calculate marginal tax rates for respondents of the American Community Survey (ACS) using the National Bureau of Economic Research's TAXSIM, and then to use hot-deck imputation to assign a marginal tax rate for the employees in our sample by matching on income, age, and gender.

Step 1: ACS data We use ACS surveys between 2011 and 2017, which record relatively comprehensive information that helps us calculate marginal tax rates. In particular, we use the following information from the survey: wage and salary income of respondent and spouse, interest received, retirement income and social security benefits, supplemental security income and public assistance income, state, marital status, age, number of dependents, and number of children under 13.

Step 2: Marginal tax rate calculation For each ACS observation, we use NBER TAXSIM to estimate the federal and state marginal tax rates based on the variables in the list above.

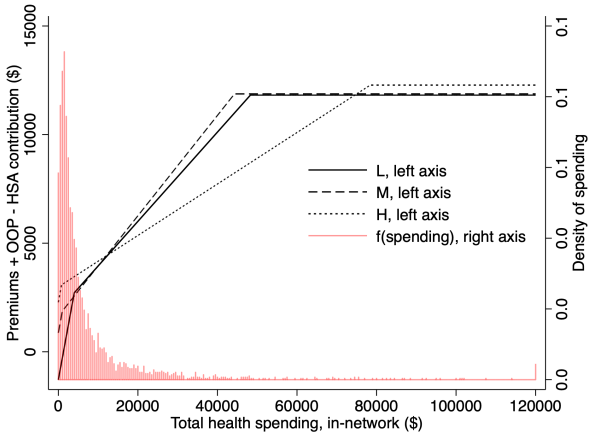
Step 3: Hot-deck imputation We match individuals between our administrative data and the ACS by year, age band, income band, and gender. We then use hot-deck imputation to assign a marginal tax rate to the matched employees in our sample. The imputation is repeated five times and we take the average to construct our estimate of the employee's marginal tax rate.

D Additional Descriptive Analyses of Choice Patterns

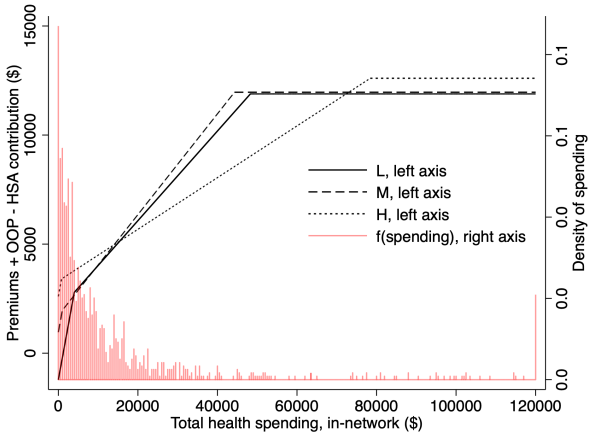
Health Care Cost Distributions. We provide additional examples of distributions of health care costs to illustrate the prevalence of dominated choices in health insurance. Figure D.1 replicates Figure 1 for employee-plus-spouse and employee-plus-children coverage, showing similar patterns. In Panels (A) and (B), we manually calculate the single coinsurance rate for all spending that would produce the same actuarial value for the plan as the set of its actual copayments and coinsurance rates using the Actuarial Value calculator by the Center for Medicare and Medicaid Services (CMS), following the procedure used in Ericson et al. (2020) and Liu and Sydnor (2022). This calculation uses the same deductible and out-of-pocket maximum as the plan, and does not incorporate employer HSA contributions in calculating the actuarial value. Panels (C) and (D) plot the cumulative distribution functions (CDFs) using the empirical distribution of costs to assess stochastic dominance. These costs are inclusive of premiums and HSA contributions from the employer in the low coverage plan. Figure D.2 plots the CDFs of health care costs for 40-year olds in the middle cost tercile in 2017 who face a 25% marginal tax rate under each of the three plans, using the empirical distribution of costs as described in Appendix B.

Figure D.1: Stochastic Dominance of Health Insurance Plans, Other Coverage Types

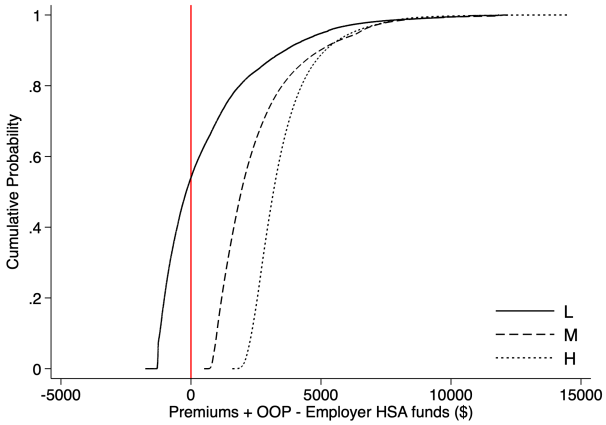
(A) Costs vs. Health Spending: Employee + Children



(B) Costs vs. Health Spending: Employee + Spouse



(C) CDFs of Costs: Employee + Children



(D) CDFs of Costs: Employee + Spouse

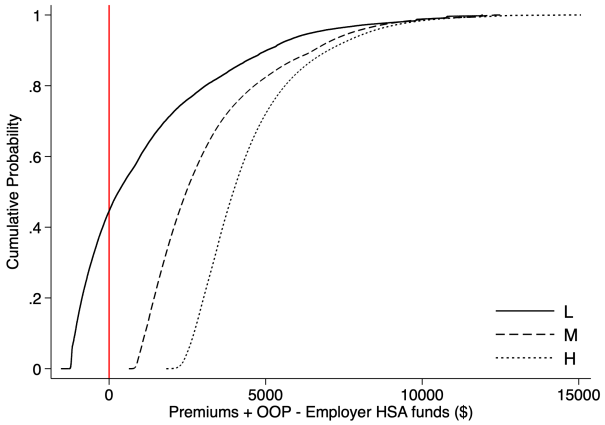
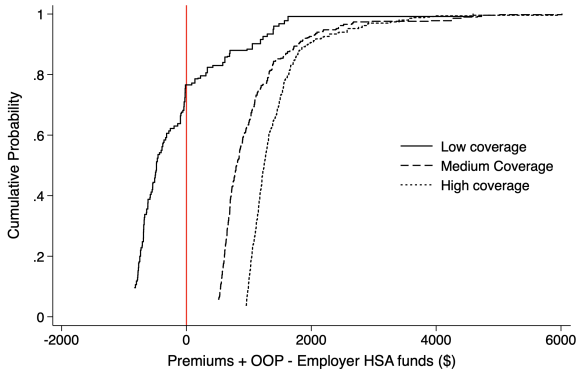
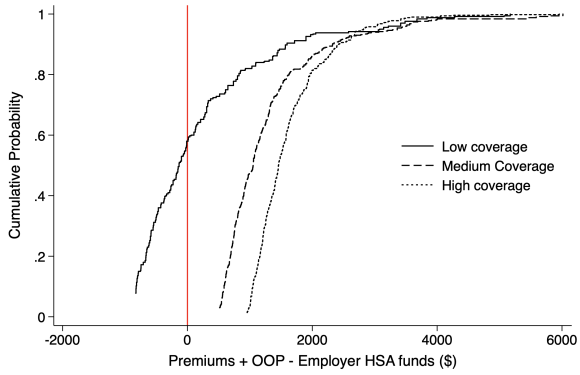


Figure D.2: CDFs of health care costs for 40-year-old in 2017

(A) Male, middle cost tercile



(B) Female, middle cost tercile



Robustness to Definition of Dominance and Sub-samples. Table D.1 shows the distribution of the four types under different criteria for classifying dominance, and restricted to different sub-samples. The patterns are similar if we exclude employees who have either observed spending or predicted spending (via LASSO) that falls in the range where costs in H are lower than in L. The general patterns are also similar when examining sub-samples, including by type of health insurance coverage and to employees who face a higher limit for matched retirement savings (Panel C).

Table D.1: Distribution of Choice Patterns, Robustness

	Dominated plan and forego match	Dominated plan and obtain match	Plan L and forego match	Plan L and obtain match	LPM coefficent (SE)
Panel A. Choices based on empirical OOP distribution					
SOSD (Main analysis)	33.9	57.5	2.5	6.1	0.080 (0.010)
FOSD	34.3	56.3	2.6	6.8	0.102 (0.016)
Panel B. Excluding employees in range where H has lowest costs					
using observed spending	32.5	56.8	3.5	7.2	0.034 (0.015)
using LASSO-predicted spending	29.7	59.9	2.6	7.7	0.079 (0.018)
Panel C. By coverage type, division, and age					
Family coverage	28.5	61.6	2.2	7.7	0.093 (0.022)
Employee-only coverage	35.6	54.4	3.5	6.5	0.047 (0.014)
Not Married	36.5	54.4	3.0	6.0	0.069 (0.011)
Medical division with 4% 403(b) match	41.9	49.8	3.2	5.1	0.074 (0.018)
Age $> 59\frac{1}{2}$	32.0	63.9	0.7	3.4	0.159 (0.032)

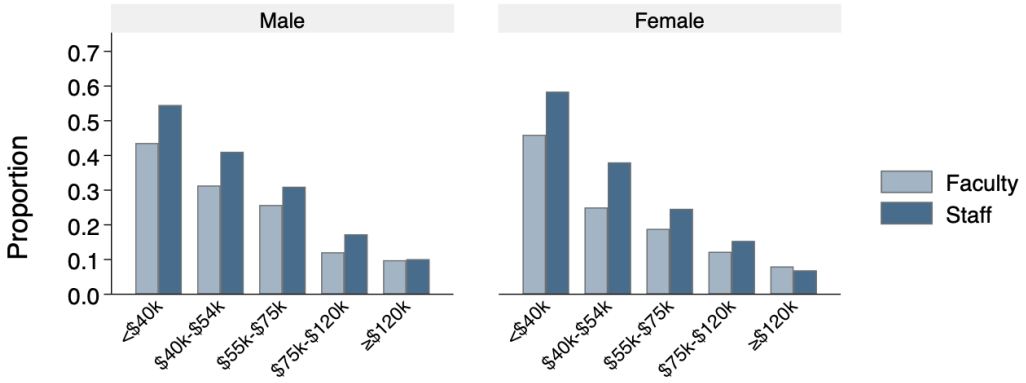
Characteristics Associated with Choice Patterns. Table D.2 tabulates sample means of income, demographics, job characteristics, and health spending split by the four pairs of choices. Those who obtain matching funds earn higher incomes than those who do not. Those who avoid choosing the dominated health plan but but do not make supplemental retirement contributions have the lowest incomes, on average. Those who choose the dominated health plan have longer tenures and higher health spending.

Table D.2: Characteristics by Choice Patterns

	Dominated plan and forego match	Dominated plan and obtain match	Plan L and forego match	Plan L and obtain match
Income ($)	54,805	84,976	50,377	85,743
Age (years)	43.8	46.4	36.3	42.5
Female (%)	64.6	58.1	62.3	54.4
Tenure (years)	10.0	10.9	4.4	7.9
Household size	1.9	2.1	1.7	2.0
Faculty (%)	8.2	25.2	11.0	28.0
Academic division (%)	47.0	61.2	54.7	66.1
Total health spending ($)	7,170	7,183	2,589	1,873

Figure D.3 plots the proportion of employees who simultaneously choose a dominated health plan and forego the match for different demographics. The comparison is restricted to the academic division because the staff/faculty designation is only observed for that division.

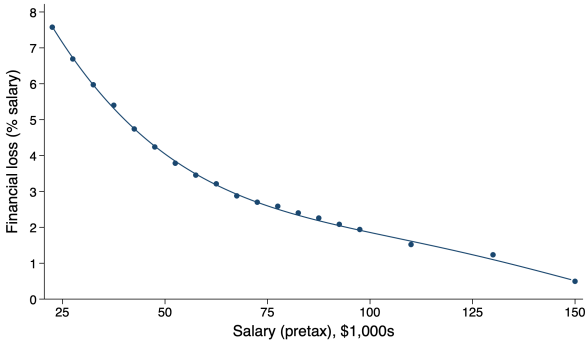
Figure D.3: Proportion who choose a dominated plan and forego the retirement match by salary, gender, and faculty status



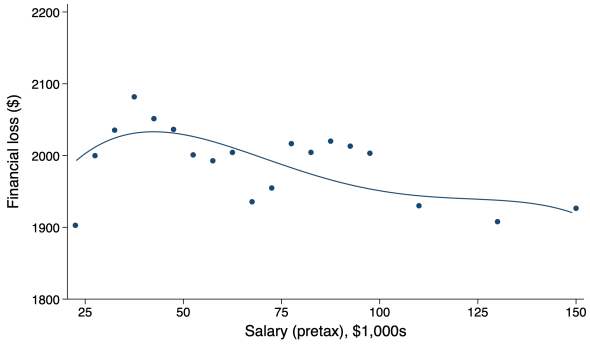
Financial Losses from Health Insurance, Salary, and Retirement Saving. Figure D.4 presents binned scatterplots using the methods of Cattaneo et al. (2024) of financial losses from health insurance against salary, with financial losses measured as a percent of salary in Panel A and in dollars in Panel B. Panel C plots financial losses against supplemental retirement contributions, both measured as a percent of salary. The line plots a 4th-order global polynomial.

Figure D.4: Financial Losses vs. Salary and Retirement Saving

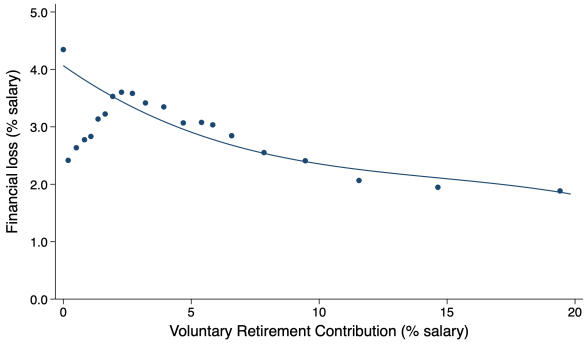
(A) Financial Losses (% Salary) vs. Salary



(B) Financial Losses ($) vs. Salary



(C) Financial Losses vs. Retirement Saving



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Cattaneo, Mattias, Richard Crump, Max Farrell, and Yingjie Feng. 2024. "On Binscatter." *American Economic Review*, 114(5): 1488–1514.

Ericson, Keith, Philipp Kircher, Johannes Spinnewijn, and Amanda Starc. 2020. "Inferring Risk Perceptions and Preferences Using Choice from Insurance Menus: Theory and Evidence." *Economic Journal*, 131(634): 713–744.

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

E External Validity: Analysis from Other Universities

We assess how the results in Section 3 generalize to other settings by using survey data linked to administrative retirement accounts managed by the Teachers Insurance and Annuity Association of America (TIAA). The survey was designed to study fungibility of HSA assets, financial literacy, and liquidity as analyzed in Davis, Leive and Gellert (2023). The set of 15 universities differed by geography, university type, and level of employer HSA funding, and included the university in the main text of the paper. Universities were not selected based on whether they offered dominated health plans. We take advantage of the fact that the HDHP/HSA stochastically dominated the other health plans in 10 of the 15 universities to re-estimate the models from Table 2 in these other universities. We refer to this as the "TIAA sample." The survey was not incentivized and had a response rate of 3%. Table E.1 presents summary statistics of the TIAA sample. Compared to both our main sample and TIAA participants at these universities, survey respondents were older and earn higher salaries. Compared to the US average, they have higher levels of financial literacy and are less likely to be liquidity constrained, which we define as either having an outstanding 403(b) loan or reporting they are not confident they could finance an unexpected $2,000 emergency expense (Lusardi, Schneider and Tufano 2011).

Table E.1: Summary Statistics, TIAA Sample

	Mean
Salary ($)	94,345
Age (years)	53.63
Female (%)	60.5
Married (%)	14.6
White (%)	84.2
Faculty (%)	30.5
Defined benefit plan (%)	19.2
Total TIAA employee retirement saving ($)	8,279
Employee supplemental retirement saving ($)	5,154
Current retirement plan loan (%)	4.9
Chose HDHP/HSA (%)	44.3
Correctly answered 3 financial literacy questions (%)	62.8
Liquidity constraint (%)	11.9
N	1,105

Characterizing dominated health plans in TIAA sample: While we observe administrative data on retirement accounts, we lack administrative data on health spending or insurance choices. Nonetheless, we can still assess whether a person chose a dominated health plan using their self-reported responses and by classifying dominated plans using the methods of Liu and Sydnor (2022). We use the claims distribution from the Center for Consumer Information and Insurance Oversight's actuarial value calculator combined with each plan's cost sharing, premiums, and any employer HSA funding at each university. This information is publicly available online. We continue to use second-order stochastic dominance (SOSD) as our definition of dominated plans. For each plan at each university, we record the deductibles, co-pays, coinsurance rates, and other plan rules that are used to determine the plan's actuarial value according to the Center for Consumer Information and Insurance Oversight (CCIIO). The actuarial value is defined as the percentage of total spending for a population that is covered by the insurance plan. The remainder are paid in out-of-pocket payments by the insured. We input these parameters into the actuarial value

calculator available from CCIIO's website.[43] The calculations use the Gold metal tier assumption for each plan. After recording the actuarial value for each plan's actual cost sharing rules, we then calculate what single coinsurance rate for the same deductible and out-of-pocket maximum would yield the same actuarial value. This step is performed manually. For each plan, out-of-pocket payments can then be calculated as a function of total health spending, by applying the plan's actual deductible, this calculated coinsurance rate, and the plan's actual out-of-pocket maximum (just as we did in Figure 1). Finally, we account for premiums and any employer HSA contributions to assess whether the HDHP/HSA plan stochastically dominated each of the other plans.

Our analysis includes the universities where the HDHP/HSA stochastically dominated all other plans offered. We do this because our survey did not ask the name of the chosen plan, only whether it was the HDHP/HSA. Among the 15 universities, we determine that the HDHP/HSA stochastically dominated the other plans in 11 cases. In three of the four remaining cases, the HDHP/HSA did not stochastically dominate. In the last case, we did not attempt to assess dominance due to substantial differences in provider networks across plans that indicated plans were not solely vertically differentiated based on costs. Two universities offered tiered coverage for each plan, and we assessed dominance within each tier of coverage in those cases.

The universities where the HDHP/HSA stochastically dominated the other plans are presented in Figure E.1. Figures plot employee costs, defined as premiums plus out-of-pocket payments less employer HSA contributions, as a function of total health spending for each plan. In Universities 7-10, the HDHP/HSA also strictly dominates all other plans as shown by costs being lower for each possible level of spending. For universities that adjust premiums by salary (panels D, H, I, J), we have presented examples for particular salary levels. The differences in costs are sometimes very large. For example, University 10 has differences exceeding $10,000 between the highest premium plan and the HDHP/HSA for employees earning over $182,000. The cost differences are still high but lower for employees at lower salary levels because premiums are a progressive function of income in that setting.

Linear Probability Models of Choices in TIAA sample: As shown in Table E.2, the positive correlation between choosing a dominated plan and not saving in supplemental retirement accounts is also observed among this wider set of universities. Choosing a dominated plan is associated with a 16.2 percentage point increase in not saving in supplemental accounts. This represents a 48.6% increase from the baseline mean, larger than the corresponding magnitude in Table 2. The magnitude declines only slightly we control flexibly for age, gender, and salary. In summary, the choice patterns in Table 2 extend to other contexts.

References

Davis, Brent, Adam Leive, and Andrew Gellert. 2023. "Fungibility in Workplace Benefits Choices: Evidence from Health Savings Accounts." *Working Paper*.

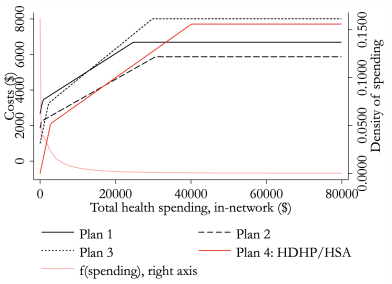
Liu, Chenyuan, and Justin Sydnor. 2022. "Dominated Options in Health Insurance Plans." *American Economic Journal: Economic Policy*, 14(1): 277–300.

Lusardi, Annamaria, Daniel Schneider, and Peter Tufano. 2011. "Financially Fragile Households: Evidence and Implications." *Brookings Papers on Economic Activity*, Spring: 83–134.

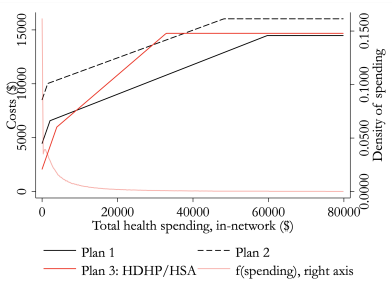
[43] The link is available here: https://www.cms.gov/CCIIO/Resources/Regulations-and-Guidance/Downloads/av-calculator-final.xlsm.(Accessed June 16, 2021)

Figure E.1: Costs vs. Total Health Spending, TIAA Sample

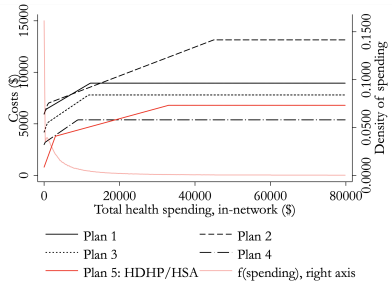
(A) University 1: All



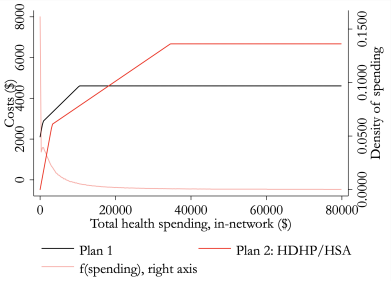
(B) University 2: All



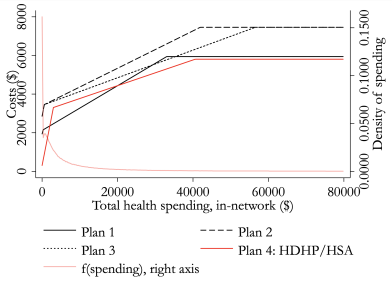
(C) University 3: All



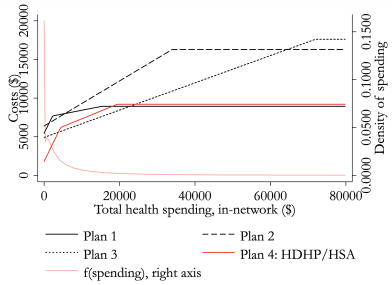
(D) University 4: $60k-$100k



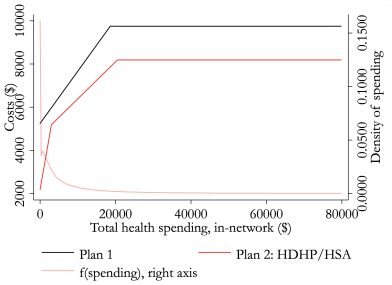
(E) University 5: All



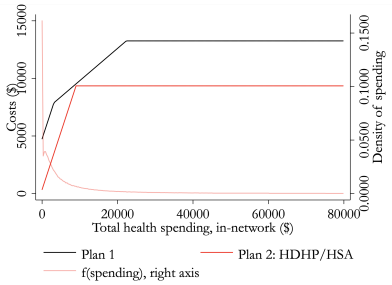
(F) University 6: All



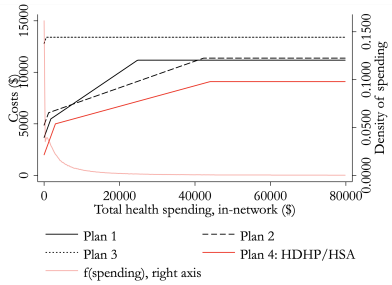
(G) University 7: All



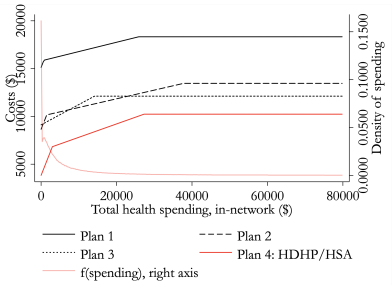
(H) University 8: $62k-$132k



(I) University 9: $80k-$135k



(J) University 10: $182k+



(K) University 11: All

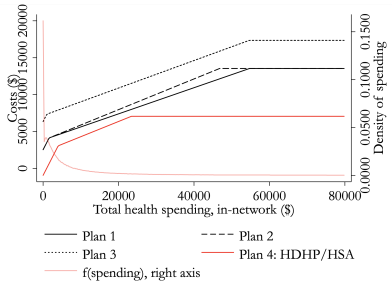


Table E.2: Choices Across Domains, TIAA Sample

	Dep var: Zero supplemental saving	
Choose dominated health plan	0.162	0.156
	(0.030)	(0.030)
Constant	0.333	0.336
	(0.022)	(0.021)
Controls	No	Yes
N	1,105	1,101

Table E.3: Sample Characteristics by Choices, TIAA sample

	Dominated plan & zero supplemental saving	Dominated plan & pos. supplemental saving	HDHP/HSA & zero supplemental saving	HDHP/HSA & pos. supplemental saving
Percent of sample	27.6	28.1	14.8	29.5
Household salary ($)	80,705	89,379	94,366	109,384
Age (years)	54.5	54.9	52.3	52.3
Female (%)	58.5	62.7	53.7	63.6
Married (%)	17.8	13.8	14.1	12.7
White (%)	85.4	80.3	87.1	85.4
Faculty (%)	31.3	27.6	38.0	28.8
Defined benefit plan (%)	18.8	20.6	13.5	21.2
Total employee retirement saving ($)	4,280	2,446	4,800	12,534
Employee supplemental retirement saving ($)	0	7,118	0	10,678
Current retirement plan loan (%)	9.8	1.6	74	2.1
Correctly answer 3 financial literacy Qs (%)	60.8	59.9	73.6	62.0
Cannot pay $2,000 emergency expense (%)	15.1	11.6	12.3	9.2

F Survey Instrument and Additional Details of Survey Design

On August 9th 2023, we fielded a Qualtrics survey among employees of the university described in Section 2 and analyzed in Section 3. The survey was created with input from the University's Human Resources Department and was approved by the University of Virginia's IRB. The survey was open between August 9th and August 23rd 2023. The survey involved 40 questions and two experimental treatments. We describe the experimental design and present balance tests after showing the survey instrument below.

We collected email addresses, income, job type, and demographics from publicly available websites. 1,890 people completed the survey out of 18,364 invitations sent, for a response rate of 10.3%. Our approved IRB proposal specified that we planned to send two reminders after the initial email. However, after sending the initial survey invitation, we were contacted by the Provost's office requesting that we not send any reminders and so no reminders were sent.

The following text was included in the body of an email with a link to the survey. The subject line of the email was "Survey on health insurance and retirement decisions" and it was sent by Leora Friedberg.

Hello, we are conducting research (IRB-SBS #5331) that examines how people make choices about health insurance and retirement saving. As part of our research, we are conducting this survey among approximately half of UNIVERSITY NAME employees.

We request your participation in the survey. The survey is completely voluntary, as is answering each question. Your answers and identity as a participant will be kept confidential and will not be shared with anyone outside of this research project.

As a reward for participating in the survey, we are providing 50 randomly selected people the chance to receive up to $350[$200] each. Each of these winning participants will receive a payment of $150 for completing the survey and have the chance to earn up to $200[$50] more based on their answers to additional questions involving financial decisions.

Please click on the link below to complete our brief online survey. The estimated time to take this survey is 15 minutes and will be available to you for up to 14 days from today. Participants must be aged 18 or older. The survey is designed to work on either a computer or a mobile device.

If you would like to contact the research team, you may do so based on the information below.

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2607 Hearst Avenue, Berkeley, CA 94720
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Email: leive@berkeley.edu

Follow this link to the Survey:
Take the Survey

Participants clicking the link are taken to the study consent page and the following survey:

Study Title: Understanding Health Insurance and Retirement Saving Choices
Protocol #: UVA IRB-SBS 5331
Please read this study information sheet carefully before you decide to participate in the study.

Purpose of the research study: The purpose of the study is to better understand the reasons behind employee decision-making in health insurance and retirement saving.

What you will do in the study: The survey asks about 30 questions regarding workplace benefits, household finances, and approaches to financial decision-making. You may skip any question that makes you uncomfortable and stop the survey at any time.

Time required: The study is estimated to take about 15 minutes of your time.

Risks: There are no anticipated risks in this study.

Benefits: There are no direct benefits to you for participating in this research study. The study may help you consider different aspects of health insurance and saving benefits you receive through UNIVERSITY NAME. The study may help researchers understand the factors related to choices in health insurance and retirement saving.

Payment: As a reward for participating in the survey, we are providing 50 randomly selected people the chance to receive up to $[350/200] each. Each of these winning 50 participants will receive a payment of $150 for completing the survey and have the chance to earn up to $[200/50] more based on their answers to additional questions involving financial decisions. A computer will be used to randomly select the 50 participants. The survey will be emailed to approximately 9,500 people, so, for example: if 2,500 people complete the survey, your chance of winning will be 1 in 50. The odds will be no worse than 1 in 190. If you are selected for payment, you will be contacted (separately from the survey) to provide your Social Security Number (SSN) for tax purposes.

Confidentiality: The information that you give in the study will be kept confidential. Your name will not be collected. Your email address is only collected in case you opt in to be randomly selected for payment. You must provide a valid UNIVERSITY NAME email address to be eligible for payment; that email address will be assigned a code number, and the list connecting your email address to this code will be kept in a locked file. When the study is completed and the data have been analyzed, this list will be destroyed. Your name and email address will not be used in any report. No identifying information will be included in the final dataset used by the research team to conduct analysis.

Voluntary participation: Your participation in the study is completely voluntary. Your decision to

participate will have no effect on your employment.
Right to withdraw from the study: You have the right to withdraw from the study at any time without penalty. Withdrawing will not affect your experience as an employee.

How to withdraw from the study: If you want to withdraw from the study, you can exit the survey at any time. There is no penalty for withdrawing. Withdrawing will not affect your experience as an employee. If you choose to withdraw after completing the survey, you can email Leora Friedberg and Adam Leive at the email addresses provided below with the subject line "Request to withdraw from study."

Using data beyond this study: The data will not be used beyond the original study and will only be reported in the aggregate. The data you provide in this study will be retained in a secure manner by the researcher for 5 years and then destroyed.

If you have questions about the study, contact:
Leora Friedberg, PhD
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To obtain more information about the study, ask questions about the research procedures, express concerns about your participation, or report illness, injury or other problems, please contact:

Tonya R. Moon, Ph.D. Chair, Institutional Review Board for the Social and Behavioral Sciences
One Morton Dr Suite 400
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Email: irbsbshelp@virginia.edu
Website: https://research.virginia.edu/irb-sbs
Website for Research Participants: https://research.virginia.edu/research-participants
UVA IRB-SBS # 5331

You may print a copy of this consent for your records.
Please check this box to indicate that you are 18 or older, that you have read the above information, and that you are willing to take part in the study:

□

Q1: Which best describes your employment type?

- Faculty
- Staff or Administration

Q2a: [if Q1=Faculty] Which best describes your faculty employment?

- Full-time, tenured
- Full-time, tenure-track
- Full-time, non-tenure track
- Part-time with benefits
- Part-time without benefits [Go to Q38]

Q2b: [if Q1=Staff] Which best describes your staff or administration employment?

- Full-time with benefits
- Full-time without benefits [Go to Q38]
- Part-time with benefits
- Part-time without benefits [Go to Q38]

Q3: Which division best describes where you work?

- Academic division
- Medical division
- Both Academic and Medical division

Q4: What year did you first begin working at UNIVERSITY NAME?

- Prior to 2002
- 2002–2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- 2021
- 2022
- 2023

Q5: What is your age?

- Younger than 30
- 30–34
- 35–39
- 40–44
- 45–49
- 50–54
- 55–59
- 60–64
- 65–69
- 70–74
- 75 or older

In this section we would like to ask you some questions about your income, retirement saving, and personal finances, since financial factors can play a critical role in benefits choices.

Q6: What is your approximate annual household income?

- Less than $25,000
- $25,000 to $49,999
- $50,000 to $74,999
- $75,000 to $99,999
- $100,000 to $124,999
- $125,000 to $149,999
- $150,000 to $199,999
- $200,000 to $299,999
- $300,000 and higher
- Not sure
- Prefer not to answer

Q7: UNIVERSITY NAME offers additional retirement saving options that you can make contributions to via payroll deductions. UNIVERSITY NAME offers a 403(b) plan administered by either TIAA or Fidelity. There is also a 457 account, which is a state-run plan, that is administered by Mission Square. Have you previously contributed to any of the following supplemental retirement plans through UNIVERSITY NAME?

- Yes, 403(b) savings plan only
- Yes, 457 savings plan only
- Yes, both 457 and 403(b) savings plans
- Yes, but not sure in which plan
- Not sure
- No

Q8 [If Q7 $\neq$ No]: Approximately, how much money are you contributing to these supplemental accounts in total in 2023? Please consider combined contributions to the 403(b) and 457 plans over the entire year. Enter your contributions as either dollars or as a percentage of your salary (whichever you can report most accurately):

- _____ Enter dollar amount
- _____ Enter % amount
- Not sure

Q9: Which of the following do you believe is true about the supplemental 403(b) plan offered through UNIVERSITY NAME? [Random order until "Not sure"]

- UNIVERSITY NAME matches some of my contributions up to a limit
- UNIVERSITY NAME does not match any of my contributions
- Not sure

Q10: What is the approximate amount of your total household retirement assets? Include assets in all of your household's Individual Retirement Accounts (IRAs), 401(a)s, 401(k)s, 403(b)s, 457s from past and current jobs.

- Less than $25,000
- $25,000 to $99,999
- $100,000 to $249,999
- $250,000 to $749,999
- $750,000 or greater
- Not sure

Q11: How much time did you spend last year deciding how much to save for retirement?

- Less than 5 minutes
- 5–9 minutes
- 10–29 minutes
- 30–59 minutes
- 1 hour or longer

Q12: Do you believe your household's long-run finances (dealing with kids' college, retirement planning, allocation of savings/investments, etc.) would improve if your household paid more attention to them?

- Yes, and I often regret not paying greater attention
- Yes, but paying more attention would require too much time/effort
- No, my household long-run finances are set up so that they don't require much attention
- No, my household is already very attentive to these matters
- No, these choices are too difficult no matter how much attention I devote

Q13: How confident are you that you could come up with $2,000 if an unexpected need arose within the next month?

- I am certain I could come up with the full $2,000
- I could probably come up with $2,000
- I could probably not come up with $2,000

- I am certain I could not come up with $2,000
- Don't know

Health insurance is one of the most important benefits employees have access to through their employer. In this section we would like to ask you about your health insurance plan this year (in 2023).

Q14: Are you currently covered by UNIVERSITY NAME health insurance in 2023?

- Yes [go to Q15]
- No [go to end of survey]
- Not sure [go to Q15]

Q15: Who is covered through the UNIVERSITY NAME health insurance plan?

- Only myself
- Myself and my spouse/partner only
- Myself and my children only
- My whole family (i.e. myself, my spouse/partner, and children)

Q16 What is the name of the health insurance plan you chose?

(**Note:** IN THE DESCRIPTION AND RESPONSES BELOW, THE ORDER OF PLAN L AND PLAN H WAS RANDOMIZED. RESPONDENTS EITHER SAW (1) L, M, H OR (2) H, M, L FOR BOTH THE DESCRIPTION AND THE RESPONSES. THE SURVEY INCLUDED THE ACTUAL PLAN NAMES INSTEAD OF PLAN L, PLAN M, OR PLAN H.)

As a reminder:

- PLAN H has the lowest deductible and highest premium
- PLAN M has an intermediate deductible and intermediate premium
- PLAN L has the highest deductible and lowest premium, and provides access to a Health Savings Account (HSA)

Premiums are the amount the employee contributes from each paycheck to pay for health plan enrollment. The deductible is the amount you pay before your plan begins to pay for health care costs.

- PLAN H
- PLAN M
- PLAN L
- Not sure

Q17 How much would UNIVERSITY NAME contribute to your HSA if you chose PLAN L?

- Less than $500
- $500 to $999

- $1,000 to $1,499
- $1,500 to $1,999
- $2,000 or more
- Not sure

Q18 Please rank the extent to which you agree or disagree with the following statements [5 categories from Strongly Disagree to Strongly Agree]

- I would rather pay more in premiums up front, and pay less out of pocket, each time I use health care services, because it helps me plan a budget
- I would rather have a lower deductible than a lower premium, so that in case I get sick, I do not have to think about whether I should pay out of pocket to use health care services

Q19 Which of the following statements do you believe is true about the Health Savings Account (HSA)? [Random order until "Not sure"]

- Funds in the Health Savings Account roll over from year to year
- If I don't use funds in a given year, they will be lost
- Not sure

Q20a [If Q16 $\neq$ PLAN L]: PLAN L, with its higher deductible and Health Savings Account, is quite different than the other two plans. Why did you decide not to choose PLAN L in 2023? Choose all that apply. [Random order until "Not sure"]

- Deductible was too high
- Expected to have high medical spending in 2023
- Expected to have low medical spending in 2023
- Thought managing payments from the HSA would be a hassle or confusing
- Thought the funds in the HSA could not be carried over
- I do not have any experience with a high deductible plan or HSA
- I worried about paying large out-of-pocket expenses all at once
- I was recommended not to choose it
- Not sure
- Other [Please elaborate in the space provided] [free response]

Q20b [If Q16 $=$ PLAN L]: PLAN L, with its higher deductible and Health Savings Account, is quite different than the other two plans. Why did you decide to choose PLAN L in 2023? Choose all that apply. [Random order until "Not sure"]

- Premiums were low
- Expected to incur high medical spending in 2023
- Expected to incur low medical spending in 2023
- For the tax benefits of the Health Savings Account
- Unused HSA balances roll over each year
- It was recommended to me

- Not sure
- Other [Please elaborate in the space provided] [free response]

Q21 Approximately how much money did you and your family collectively incur on out-of-pocket payments for health care services in 2022? *Exclude* any money spent on health insurance premiums.

- $0 - $499
- $500 - $1,999
- $2,000 - $4,999
- $5,000 or higher

Q22 How much time did you spend last year choosing a health insurance plan?

- Less than 5 minutes
- 5–9 minutes
- 10–29 minutes
- 30–59 minutes
- 1 hour or longer

Q23 What sources of information did you use last year (in 2022) to make decisions about your health insurance plan? Select up to 3 that you used.

- Research I did myself
- Information distributed from Human Resources
- Recommendation from decision tool from Human Resources
- Recommendation from a coworker, friend, or family member
- Other source
- I just chose what I did the previous year

Q24 Do you believe your household's health insurance choices would improve if you paid more attention to them?

- Yes, and I often regret not paying greater attention
- Yes, but paying more attention would require too much time/effort
- No, my household is already very attentive to these matters
- No, these choices are too difficult no matter how much attention I devote

Q25 People are busy these days and do not always have time to research benefit options. While some have time to pay attention to their options, others may not even have time to read survey questions carefully. To show that you have read carefully, please select "December" as your choice option. That's right, there is no question here – just select " December" to show you were reading carefully.

During which month, if any, did you attend an information session by Human Resources about your 2023 benefits?

- September
- October
- November
- December
- Cannot remember
- Did not attend any session

Next, we would like to ask you a few questions on financial literacy. You may use whatever approaches you would like to answer these questions.

Q26: Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

- More than $102
- Exactly $102
- Less than $102
- Not sure

Q27: Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

- More than today
- Exactly the same
- Less than today
- Not sure

Q28: Buying a single company's stock usually provides a safer return than a stock mutual fund.

- True
- False
- Not sure

Note: ALL RESPONDENTS SEE THE FOLLOWING PROMPT FIRST

In this section, we ask you to consider hypothetical choices of health insurance plans. Suppose there are three health plans that differ in their premiums and deductibles, but are otherwise equivalent. For example, plans provide access to the same doctors and hospitals.

- Plan 1 has the highest premium and lowest deductible.
- Plan 2 has a lower premium than Plan 1 but a higher deductible.
- Plan 3 has the lowest premium and the highest deductible.

Note: RESPONDENTS THEN SEE TWO QUESTIONS. THE ORDER OF WHICH QUESTION COMES FIRST IS RANDOMIZED ACCORDING TO THE FOLLOWING GROUPS:

MENU TREATMENT 1: Q29 THEN Q30
MENU TREATMENT 2: G30 THEN Q29
MENU TREATMENT 3: Q29 THEN Q31
MENU TREATMENT 4: Q31 THEN Q29

Q29: *The table below lists the premiums, deductibles, coinsurance, and out-of-pocket maximum for each plan. Assume that any taxes have already been paid on each of these amounts. Plans provide access to the same doctors and hospitals.*

As a reminder, premiums are the amount the employee contributes from each paycheck to pay for health plan enrollment. Premiums are not included as contributions toward the deductible or out-of-pocket maximum. Premiums are money the employee spends on health coverage, regardless of whether the employee uses health care. The deductible is the amount you pay before your plan begins to pay for health care costs; then, the employee and the health plan share the cost of services (coinsurance), up to the out-of-pocket maximum. A coinsurance rate of 20% means that the employee pays 20% of the costs and the plan pays 80%. Once the employee reaches their out-of-pocket maximum, the health plan pays for covered services at 100% for the rest of the year.

[**Note:** If Q15 $\neq$ "Only myself", the following table and spending distribution is shown. Otherwise, the graphic and distribution presented in the main text is shown.]:

	Plan 1	Plan 2	Plan 3
Monthly premium	\$379	\$243	\$93
Annual Deductible	\$1,000	\$2,000	\$4,000
Coinsurance Rate	10%	15%	20%
Annual out-of-pocket maximum	\$10,000	\$10,000	\$10,000
Employer HSA contribution	\$0	\$0	\$1,500

For the purpose of choosing a plan, suppose there are three possible scenarios of how much health care you use. Which scenario occurs is uncertain.

1. You are healthy next year and use \$1,000 of health care (50% probability)
2. You use \$3,000 of health care (45% probability)

3. You end up using $15,000 of health care (5% probability)

Which health plan would you choose?

- Plan 1
- Plan 2
- Plan 3
- Not sure

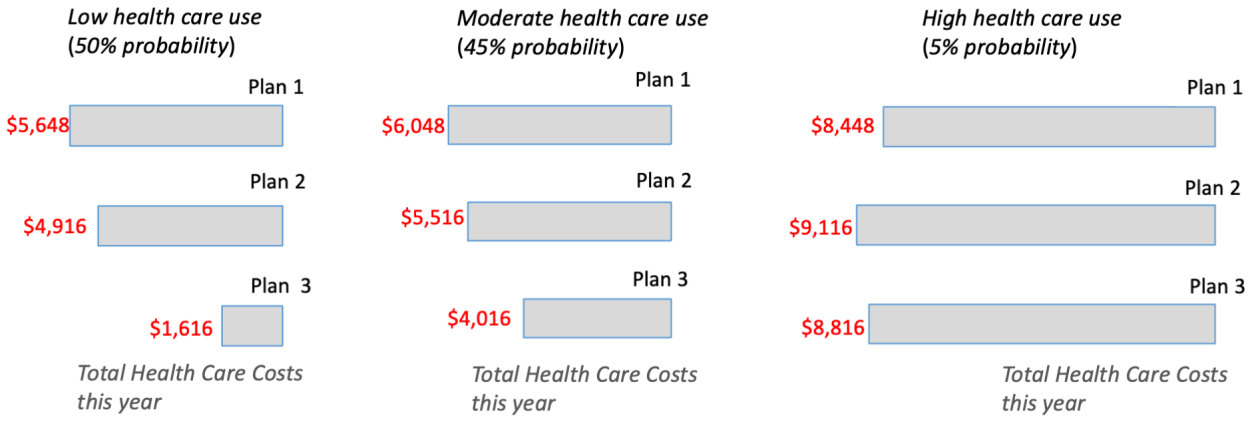
Q30: *The graphic below shows your health care costs (premiums and out-of-pocket payments) for each plan under three possible scenarios, which are uncertain:*

1. You are healthy next year and have low use of health care (50% probability)
2. or you use a moderate amount of health care (45% probability)
3. or you end up using a large amount of health care (5% probability)

Assume that any taxes have already been paid on each of these amounts. Plans provide access to the same doctors and hospitals.

[**Note:** If Q15 $\neq$ "Only myself", the following table and spending distribution is shown. Otherwise, the graphic and distribution presented in the main text is shown.]:

Plan 1: highest premium, lowest deductible
Plan 2: premium and deductible between Plan 1 and Plan 3
Plan 3: lowest premium, highest deductible



Which health plan would you choose?

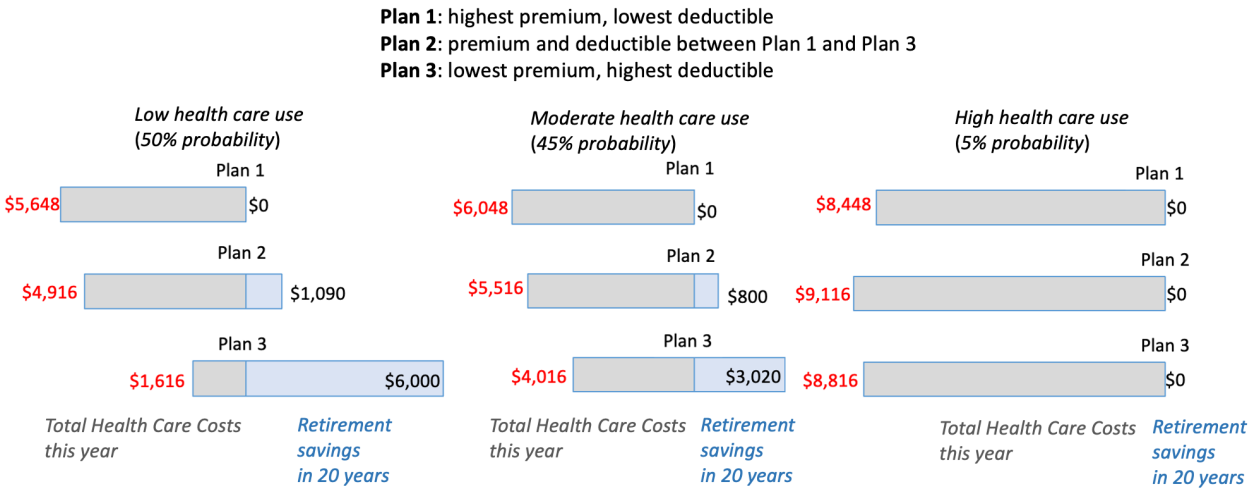
- Plan 1
- Plan 2
- Plan 3
- Not sure

Q31: *The graphic below shows your health care costs (premiums and out-of-pocket payments) for each plan under three possible scenarios, which are uncertain:*

1. You are healthy next year and have low use of health care (50% probability)
2. or you use a moderate amount of health care (45% probability)
3. or you end up using a large amount of health care (5% probability)

The figure also displays the amount of additional retirement savings after 20 years when choosing plan 2 or plan 3 compared to plan 1 if the difference in health care costs were contributed to the retirement account. Assume that any taxes have already been paid on each of these amounts. Plans provide access to the same doctors and hospitals.

[**Note:** If Q15 $\neq$ "Only myself", the following table and spending distribution is shown. Otherwise, the graphic and distribution presented in the main text is shown.]:



Which health plan would you choose?

- ○ Plan 1
- ○ Plan 2
- ○ Plan 3
- ○ Not sure

Note: IN THE NEXT QUESTION, THE PAYMENTS ARE RANDOMIZED ACCORDING TO THE FOLLOWING GROUPS, WHERE "X", "Y", and "Z" CORRESPOND TO DOLLAR AMOUNTS IN THE QUESTION PROMPT:

OPT-OUT TREATMENT 1: X = $200, Y = $350, Z = $40
OPT-OUT TREATMENT 2: X = $50, Y = $200, Z = $10

This is the final set of questions on financial choices in the survey. It is an optional task that has 5 questions. If you are randomly selected to be one of the 50 participants to receive $150, you can earn up to an additional $X bonus (for a total of $Y) based on correctly answering the 5 questions in this task, with each question worth $Z. If you are randomly selected and choose to skip this set of questions, you will still receive $150 for completing the survey.

First, there are three questions that ask you to choose a health insurance plan for a hypothetical person who wants to minimize their spending on premiums and out-of-pocket payments. Next, there are two questions asking you about how much money will accumulate over time from monthly saving.

For all the questions, you can use a calculator, online tools, or any other approach you would like to answer the question.
Q32: Do you want to attempt the questions to have a chance to earn the bonus money, or skip to the final survey questions?

- ◦ Yes, attempt questions [Go to Q33]
- ◦ No, skip to end [Go to Q38]

Recommending a health plan

Q33: This question asks you to recommend a health plan to a friend.

- Your friend's employer offers three health plans, which differ based on the table below. All other features of the plans (e.g. which physicians are covered) are the same.
- Your friend tells you they want to minimize how much they spend on insurance premiums and out-of-pocket costs.
- Your friend has very predictable expenses – in fact, they know exactly how much care they will use. They will be billed for health care services amounting to $1,500.
- Insurance will cover some of this amount, and they will have to pay some of it out-of-pocket. The amount they pay out-of-pocket and the amount the insurance plan pays will depend on which plan they choose. Your friend is in the 25% tax bracket.

You may use whatever tools, calculators, or approaches you would like to answer the following questions. Here are some reminders:

- **Premiums** are the amount the employer deducts from each paycheck to pay for health plan enrollment. Premiums are not included as contributions toward the deductible or out-of-pocket maximum. Premiums are money the employee spends on health coverage,

regardless of whether the employee uses health care. The **deductible** is the amount you pay before your plan begins to pay for health care costs.; then the employee and the health plan share the cost of services (coinsurance), up to the out-of-pocket maximum. A **coinsurance rate** of 20% means that the employee pays 20% of the costs and the plan pays 80%. Once the employee reaches their **out-of-pocket maximum**, the health plan pays for covered services at 100% for the rest of the year.

	Plan 1	Plan 2	Plan 3
Monthly premium	$284	$168	$42
Annual Deductible	$500	$900	$2,000
Coinsurance Rate	10%	20%	20%
Annual out-of-pocket maximum	$5,000	$5,000	$5,000
Employer HSA contribution	$0	$0	$1,500

Which plan would you advise your friend to choose to minimize how much they will spend on insurance premiums and out-of-pocket costs?

- Plan 1
- Plan 2
- Plan 3

Q34: Now suppose that your friend instead knows they will consume more health care than in the previous scenario. Suppose they know they will be billed for health care services amounting to $8,000.

Everything else about the insurance choices remain the same. The amount they pay out-of-pocket and the amount the plan pays will again depend on which plan they choose. Your friend is in the 25% tax bracket. The plan options and definitions are presented below for convenience.

Note: THE TABLE AND DEFINITIONS IN Q33 ARE OMITTED HERE FOR BREVITY BUT INCLUDED PRIOR TO THE FOLLOWING QUESTION

Which plan would you advise your friend to choose to minimize how much they will spend on insurance premiums and out-of-pocket costs?

- Plan 1
- Plan 2
- Plan 3

Q35: Now suppose that your friend instead knows they will consume more health care than in the previous scenario. Suppose they know they will be billed for health care services amounting to $30,000.

Everything else about the insurance choices remain the same. The amount they pay out-of-pocket and the amount the plan pays will again depend on which plan they choose. Your friend is in the

25% tax bracket. The plan options and definitions are presented below for convenience.

Note: THE TABLE AND DEFINITIONS IN Q33 ARE OMITTED HERE FOR BREVITY BUT INCLUDED PRIOR TO THE FOLLOWING QUESTION

Which plan would you advise your friend to choose to minimize how much they will spend on insurance premiums and out-of-pocket costs?

- ◦ Plan 1
- ◦ Plan 2
- ◦ Plan 3

Choosing how much to save

The final two questions in this section ask you to calculate the growth from monthly saving. You may again use whatever tools, calculators, or approaches you would like.

Q36: Suppose your friend's employer offers them a 401(k). Contributions are tax-deductible and interest earned on account assets are not taxable. Withdrawals are fully taxable. Your friend tells you they can save $100 per month for 20 years. If the account earns 3 percent interest per year and interest is compounded monthly, how much will they have at the end of 20 years before paying taxes? Enter the amount below, rounded to the nearest $1,000:

_____ Enter dollar amount

Q37: Now suppose your friend decides to save an extra $50 each month (for a total of $150 per month). Their account still earns 3 percent interest per year and interest is compounded monthly, and interest earned on account assets are not taxable. How much will they have at the end of 20 years before paying taxes? Enter the amount below, rounded to the nearest $1,000:

_____ Enter dollar amount

This final section asks you a few brief questions about your demographics.

Q38: What is your gender identity?

- ◦ Woman
- ◦ Man
- ◦ Nonbinary or different identity
- ◦ Prefer not to answer

Q39: What is your marital status?

- ◦ Married
- ◦ Not married
- ◦ Prefer not to answer

Q40: What race/ethnicity do you identify with? Please select all that apply

- American Indian or Alaska Native
- Asian
- Black or African American
- Hispanic or Latino/a/x
- Middle Eastern or North African
- Native Hawaiian or Pacific Islander
- White
- Prefer not to answer

THANK YOU FOR COMPLETING THE SURVEY

Characteristics of Survey Respondents: Table F.1 reports salary, demographics, and job characteristics of survey respondents and non-respondents. We collected data on salary, job titles, and departments matched to each employee's email address. We impute race and gender using validated algorithms based on first and last names. The first three rows present the predicted probabilities of benefits choices from a linear regression of the choice against the characteristics in the table. These predictions are nearly equal across survey respondents and non-respondents, indicating that the influence of observable characteristics on choices is similar across groups. The differences in salary are small and not statistically significant. The differences in other characteristics are statistically significant, but are small in magnitude. Survey respondents are more likely to be women, White, staff, and work in the medical division. While we interpret respondents to be fairly similar to non-respondents in terms of characteristics that influence choices, we also perform analysis that weights respondents by their inverse probability of responding based on a logit regression of responses against these characteristics. Results are very similar whether or not we use these weights.

Table F.1: Characteristics of Survey Respondents

	Respondents	Non-Respondents
Predicted probability of dominated health plan (%)	56.4	56.4
Predicted probability of foregoing match (%)	15.8	16.0
Predicted probability of dominated plan & forego match (%)	10.1	10.3
Salary ($)	84,465	82,750
Faculty (%)	14.1%	18.8%
Staff (%)	88.8%	86.0%
Professor (%)	10.5%	13.5%
Medical division (%)	58.7%	54.3%
Asian (%)	4.5%	7.0%
Black (%)	13.1%	14.3%
Hispanic (%)	4.4%	5.0%
White (%)	75.5%	71.0%
2+ race/ethnicity (%)	1.7%	1.9%
Female (%)	68.6%	60.8%

Choice Patterns in 2023: Table F.2 presents regression results of linear probability models that correlate the choice of a dominated health plan with the choice of not contributing to supplemental retirement accounts using the 2023 survey. Standard errors are in parentheses. The first two columns include all survey respondents. The final two columns are restricted to those who pass the attention check. Columns 2 and 4 include indicators for age, income, tenure, gender, race, faculty, marital status, academic division, and insurance coverage type as controls. The positive correlation during 2014–2018 documented in the main text is also observed in 2023.

Table F.2: Linear Probability Model: Choices Across Domains, 2023 survey

	Dep var: Forego retirement match			
Choose dominated health plan	0.067	0.055	0.061	0.060
	(0.018)	(0.018)	(0.022)	(0.022)
Constant	0.121	0.127	0.121	0.120
	(0.011)	(0.012)	(0.013)	(0.013)
Controls	No	Yes	No	Yes
Restricted to passing attention check	No	No	Yes	Yes
N	1621	1601	1086	1077

Randomization and Balance: Participants were cross-randomized across the two treatments into eight possible conditions. At this university, employees are automatically assigned email addresses that include their initials followed by a portion with digits and letters that are randomly assigned. To assign each email address to one of the eight treatment groups, we made a crosswalk that randomly assigned each combination of these digits and letters to one of the eight groups. We tested for balance before running the survey by verifying that each group was similar in terms of demographics and job characteristics. Table F.3 shows that among the employees invited to participate in the survey, these characteristics are balanced across experimental conditions. Table F.4 shows the corresponding balance table among survey respondents. These characteristics are also balanced.

Table F.3: Balance Table: Survey Invitations

	Experimental groups								
Menu Treatment	1	2	3	4	1	2	3	4	p-value
Opt-Out Treatment	1	1	1	1	2	2	2	2	from F-test
Faculty (%)	0.192	0.176	0.191	0.176	0.183	0.177	0.181	0.175	0.625
Staff (%)	0.857	0.867	0.853	0.869	0.868	0.868	0.859	0.867	0.609
Professor (%)	0.129	0.129	0.142	0.130	0.135	0.130	0.130	0.123	0.717
Medical division (%)	0.549	0.545	0.541	0.547	0.560	0.563	0.539	0.544	0.692
Asian (%)	0.061	0.067	0.070	0.072	0.068	0.063	0.069	0.066	0.714
Black (%)	0.139	0.145	0.138	0.150	0.139	0.139	0.141	0.141	0.222
Hispanic (%)	0.050	0.051	0.045	0.048	0.051	0.047	0.045	0.056	0.404
White (%)	0.723	0.708	0.720	0.703	0.716	0.724	0.719	0.711	0.132
2+ race/ethnicity (%)	0.019	0.018	0.018	0.018	0.019	0.018	0.018	0.018	0.810
Female (%)	0.609	0.620	0.603	0.614	0.626	0.621	0.640	0.619	0.295
Salary ($)	84,064	82,248	84,561	83,973	82,828	82,928	80,830	81,691	0.393

Table F.4: Balance Table: Survey Responses

	Experimental groups								
Menu Treatment	1	2	3	4	1	2	3	4	p-value
Opt-Out Treatment	1	1	1	1	2	2	2	2	from F-test
Faculty (%)	0.152	0.136	0.167	0.124	0.170	0.121	0.130	0.124	0.455
Staff (%)	0.871	0.889	0.872	0.901	0.868	0.906	0.901	0.903	0.588
Professor (%)	0.121	0.104	0.139	0.099	0.115	0.075	0.092	0.094	0.269
Medical division (%)	0.583	0.599	0.563	0.558	0.604	0.632	0.573	0.584	0.665
Asian (%)	0.037	0.033	0.069	0.049	0.051	0.035	0.043	0.047	0.340
Black (%)	0.122	0.139	0.118	0.142	0.121	0.150	0.130	0.127	0.127
Hispanic (%)	0.055	0.042	0.036	0.060	0.038	0.042	0.034	0.042	0.303
White (%)	0.760	0.760	0.752	0.723	0.765	0.747	0.768	0.760	0.526
2+ race/ethnicity (%)	0.017	0.017	0.016	0.016	0.016	0.017	0.017	0.016	0.443
Female (%)	0.667	0.713	0.684	0.666	0.678	0.687	0.721	0.676	0.756
Salary ($)	88,753	85,856	86,711	83,188	84,510	82,190	76,506	86,820	0.124

G Additional Analyses of Mechanisms

This appendix presents additional analyses of mechanisms that are referenced in Section 4 and Section 5.

Reasons for Plan Choices: Table G.1 reports the reasons people report for not choosing the HDHP in the 2023 survey. The percentages sum to over 100% because respondents could select up to three reasons.

Table G.1: Reasons for Not Choosing HDHP/HSA

	All (%)	If pass attention check (%)
Worried about paying large out-of-pocket expenses all at once	43.0	47.3
Deductible was too high	26.6	30.0
Expected to have high medical spending	22.8	22.5
Thought managing the HSA would be a hassle or confusing	17.4	21.7
No experience with HDHP or HSA	17.5	19.9
Expected to have low medical spending	9.9	11.5
Not sure	6.5	5.2
Was recommended not to choose it	6.3	5.8
Thought HSA couldn't roll over	5.6	6.8
Other reason	14.4	17.9
	N= 800	N= 497

Benefits Knowledge and Financial Literacy: We estimate the association between benefits choices and our measures of benefits knowledge and financial literacy by running the following regressions (and repeat similar regressions below, as we test other mechanisms):

$$y_i = \alpha_0 + \sum_{j=1}^{3} \beta_j \cdot Know_i^j + \sum_{j=4}^{6} \beta_j \cdot FinLit_i^j + e_i \tag{G.8}$$

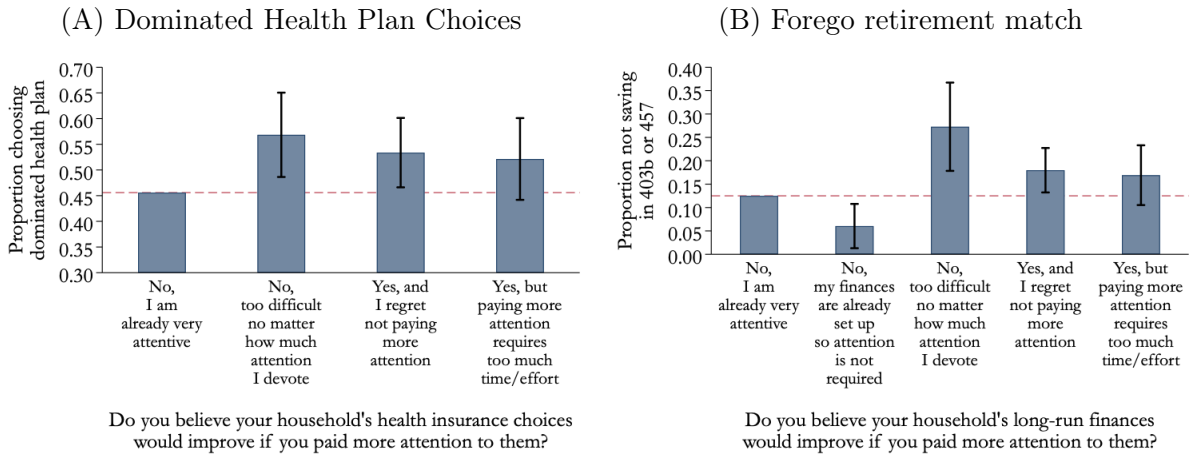
where y_i is an indicator for whether employee i makes a puzzling choice (choosing a dominated health plan, not making supplemental retirement contributions, or both), $Know_i^j$ is an indicator for whether employee i correctly answers the survey question about rule j, and $FinLit_i^j$ is an indicator for correctly financial literacy question j. Table G.2 presents the regression results. Columns 1–3 include benefits knowledge only and columns 4–7 add financial literacy as in Equation G.8. Domain-specific knowledge about benefits is an extremely strong predictor of choices in that domain. Those who know the HSA rolls over are 46.8 percentage points less likely to choose a dominated plan, and those who know the amount of the employer's HSA contribution are 31.1 percentage points less likely (column 1). Knowing the retirement match does little to predict choosing a dominated health plan after conditioning on knowledge about the HSA. Meanwhile, those who know the employer matches some 403(b) contributions are 33.3 percentage points less likely to have zero supplemental contributions (column 2). When considering both puzzling choices simultaneously, the coefficient on each type of benefits knowledge is negative and highly significant (column 3). Lastly, employees who correctly answer financial literacy questions are less likely to make both puzzling choices, and adding financial literacy only slightly reduces the coefficient estimates on benefits knowledge (column 4). The results are robust to adding controls (column 5), weighting by the inverse probability of survey responses (column 6), or restricting to those who pass the attention check (column 7).

Table G.2: Benefits Knowledge and Financial Literacy

	Dominated health plan (1)	Forego retirement match (2)	Dominated health plan AND forego retirement match (3)	(4)	(5)	(6)	(7)
Domain-specific knowledge							
Retirement match Q correct	0.006	-0.333	-0.194	-0.187	-0.178	-0.194	-0.167
	(0.024)	(0.030)	(0.025)	(0.025)	(0.025)	(0.030)	(0.029)
HSA rollover Q correct	-0.468	-0.056	-0.095	-0.087	-0.076	-0.071	-0.080
	(0.024)	(0.020)	(0.016)	(0.017)	(0.017)	(0.021)	(0.021)
Employer HSA funding Q correct	-0.311	0.011	-0.054	-0.048	-0.047	-0.053	-0.036
	(0.025)	(0.019)	(0.012)	(0.012)	(0.012)	(0.015)	(0.015)
Financial literacy							
Diversification Q correct				-0.034	-0.034	-0.017	-0.053
				(0.018)	(0.018)	(0.023)	(0.023)
Inflation Q correct				-0.035	-0.041	-0.049	-0.006
				(0.022)	(0.023)	(0.029)	(0.027)
Interest Q correct				-0.015	0.003	0.033	0.039
				(0.029)	(0.029)	(0.034)	(0.032)
Constant	0.861	0.454	0.324	0.376	0.350	0.332	0.290
	(0.023)	(0.030)	(0.027)	(0.037)	(0.038)	(0.043)	(0.046)
Controls	No	No	No	No	Yes	No	No
Survey response weights	No	No	No	No	Yes	Yes	No
Restrict to pass attention check	No	No	No	No	Yes	No	Yes
N	1643	1621	1621	1621	1607	1232	1080
R^2	0.436	0.141	0.129	0.136	0.180	0.206	0.182

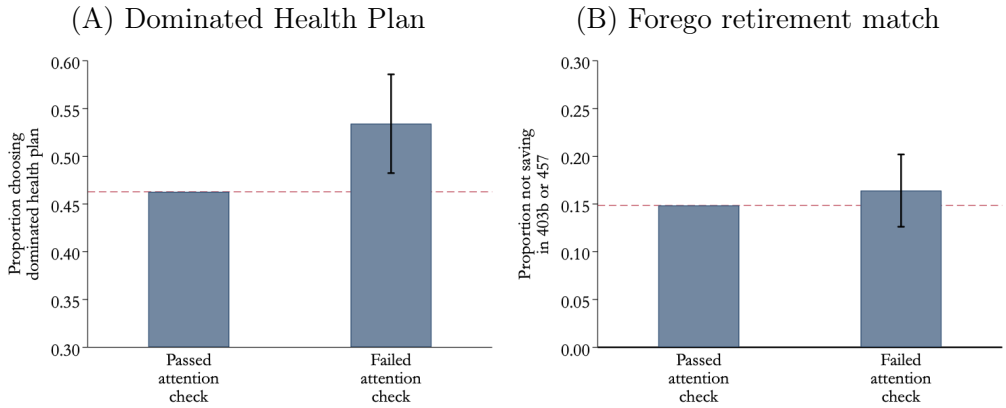
Self-Assessed Attention and Choices: Figure G.2 correlates choices with responses to the questions about self-assessed attention and decision quality. Panel A presents the proportion of survey respondents who choose a dominated plan according to their response to the question: "*Do you believe your household's health insurance choices would improve if you paid more attention to them?*" Panel B presents the proportion who forego the retirement match according to their response to the question: "*Do you believe your household's long-run finances (dealing with kids' college, retirement planning, allocation of savings/investments, etc.) would improve if your household paid more attention to them?*" Whiskers denote 95% confidence intervals relative to the mean among respondents who say they are already very attentive to these matters.

Figure G.1: Insurance and Saving Choices by Attention



Attention Check and Choices: Figure G.2 correlates benefits choices with whether the respondent passed the survey's attention check. Panel A presents the proportion of survey respondents who choose a dominated plan and Panel B presents the proportion who do not save in the 403b or 457. Whiskers denote 95% confidence intervals relative to the mean among respondents who pass the attention check. Respondents who fail the attention check are more likely to enroll in a dominated health plan. There is little change in retirement saving behavior according to whether the respondent failed the survey's attention check.

Figure G.2: Insurance and Saving Choices by Pass/Fail Attention Check



Complexity of Choices: Before estimating Equation 5 in the main text, we run a specification that includes indicators for each treatment arm to test whether the effect of menu simplification depends on the incentive in the opt-out task. We fail to reject the null that the coefficients on arms with the same menus but different opt-out incentives are equal, and so run Equation 5 that pools treatment arms with different opt-out incentives.

Table G.3 presents the results of estimating Equation 5 using the respondent's first choice of hypothetical health plan. Column 1 replicates Figure 7, Column 2 includes controls, Column 3 weights by the inverse probability of survey responses, and Column 4 restricts to respondents passing the attention check. The final two columns split the sample by household income and show that the reduction in dominated choices from menu simplification is larger for respondents with household incomes below $125,000. Table G.4 mirrors the same set of specifications using both choices of the respondent, clustering standard errors by respondent.

Table G.3: Effect of Menu Simplification, 1st choices

	Dependent variable: Choose dominated plan					
	(1)	(2)	(3)	(4)	(5)	(6)
Simplified frame: Figure 1	-0.096	-0.090	-0.103	-0.109	-0.045	-0.155
	(0.030)	(0.030)	(0.036)	(0.037)	(0.042)	(0.043)
Simplified frame: Figure 2	-0.002	0.014	0.032	0.009	0.050	-0.062
	(0.031)	(0.031)	(0.036)	(0.037)	(0.043)	(0.044)
Constant	0.545	0.539	0.546	0.507	0.489	0.609
	(0.017)	(0.017)	(0.020)	(0.022)	(0.024)	(0.025)
Controls	No	Yes	No	No	No	No
Survey response weights	No	No	Yes	No	No	No
Restricted to passing attention check	No	No	No	Yes	No	No
Household Income	All	All	All	All	≥$125k	<$125k
Observations	1618	1604	1240	1085	838	779

Table G.4: Effect of Menu Simplification, both choices

	Dependent variable: Choose dominated plan					
	(1)	(2)	(3)	(4)	(5)	(6)
Simplified frame: Figure 1	-0.064	-0.066	-0.066	-0.072	-0.063	-0.062
	(0.017)	(0.017)	(0.021)	(0.021)	(0.023)	(0.025)
Simplified frame: Figure 2	0.008	0.009	0.003	0.011	0.012	-0.001
	(0.018)	(0.018)	(0.021)	(0.022)	(0.026)	(0.026)
Constant	0.552	0.551	0.558	0.507	0.514	0.591
	(0.012)	(0.012)	(0.015)	(0.015)	(0.017)	(0.018)
Controls	No	Yes	No	No	No	No
Survey response weights	No	No	Yes	No	No	No
Restricted to passing attention check	No	No	No	Yes	No	No
Household Income	All	All	All	All	≥$125k	<$125k
Observations	3233	3205	2477	2168	1676	1555

Liquidity: Simulation of Consumption-Utility Model. We simulate choices under a model with liquidity constraints to assess the possibility that high borrowing costs might explain the choice of dominated health plans. Assume consumers have utility over consumption that satisfies constant relative risk aversion: $u(c) = \frac{c^{1-\gamma}}{1-\gamma}$ with γ denoting the coefficient of relative risk aversion. If they incur health spending m while enrolled in plan j, their out-of-pocket costs are $OOP^j(m)$. We assume spending occurs in only one month of the year, with an equal probability of occurring in any month. We consider two alternative scenarios regarding borrowing constraints.

Scenario 1: Borrowing at monthly rate r^b: First, we assume people are able to borrow up to the out-of-pocket maximum, but they may have to pay a high interest rate. In particular, we assume that the person is unable to finance any out-of-pocket payments (less any employer HSA contributions) without borrowing at the monthly interest rate r^b. If they borrow to finance out-of-pocket costs, they must repay the loan by the last month of the year. If the shock occurs in month k, the person borrows an amount $OOP^j(m)$ and repays $OOP^j(m)(1+r^b)^{12-k}$ at the end of the year. If they choose plan L, employer HSA contributions Z offset the amount that must be borrowed: they repay $(OOP^j(m)-H)(1+r^b)^{12-k}$ if $OOP^j(m) > Z$ and can pocket $Z - OOP^j(m)$ if $OOP^j(m) \leq Z$. Annual premiums π_j are excluded from taxable income y, so that a dollar of health insurance premiums reduces their consumption by $\$(1-\tau)$, where τ is the marginal tax rate. Their utility if they enroll in plan j is defined as:

$$u(c^j) = \frac{1}{12}\sum_{k=1}^{12}\int_0^\infty u((y-\pi_j)(1-\tau) - B^k(OOP^j(m)))dF(OOP^j(m))$$

where $dF(OOP^j(m))$ is the density of out-of-pocket payments from enrolling in plan j and

$$B^k(OOP^j(m)) = \begin{cases} (OOP^j(m))(1+r^b)^{12-k} & \text{if } j = H, M \\ (OOP^j(m)-Z)(1+r^b)^{12-k} & \text{if } j = L \text{ and } OOP^j(m) > Z \\ OOP^j(m) - Z & \text{if } j = L \text{ and } OOP^j(m) \leq Z \end{cases}$$

This formulation treats any HSA funds in excess of out-of-pocket costs as equivalent to a premium reduction. We use the empirical distribution of spending from the administrative data to predict plan choices for L, M, or H corresponding to the period analyzed in Section 3. We calculate choices for each employee in the sample over a range of monthly borrowing constraints r^b from 0 to 16% (resulting in annualized interest rates up to 500%), using each employee's observed salary and assuming $\gamma = 2$ or $\gamma = 3$.

Scenario 2: No borrowing: The second scenario instead assumes that credit constraints prevent people from borrowing any money, no matter how high the interest rate. The out-of-pocket cost reduces consumption in that particular month and cannot be spread throughout the course of the year. To capture the effect of such uneven consumption throughout the year, utility over the course of the year is modeled as the sum of monthly utility, in which one month's utility is lower due to the out-of-pocket cost:

$$u(c^j) = 11 \cdot u((y-\pi_j)(1-\tau)) + \int_0^\infty u((y-\pi_j)(1-\tau) - OOP^j(m) + \mathbf{1}(j=L)Z)dF(OOP^j(m))$$

where $\mathbf{1}(j = L)$ is an indicator for choosing plan L. This specification ignores discounting within the year. We set a consumption floor of $100 per month in case out-of-pocket payments and premiums exceed income.

Table G.5 shows that far fewer people are predicted to choose Plan L when they are unable to borrow at all if risk aversion is high. The employer's HSA contribution is again central to offsetting the costs of high out-of-pocket payments, with 12% or less predicted to choose L if there were no HSA funding. This scenario suggests those who are unaware of the employer's HSA funding are unlikely to choose the HDHP if they face severe borrowing constraints.

Table G.5: Predicted % Choosing Plan L if Unable to Borrow

	CRRA Coefficient	
	$\gamma = 2$	$\gamma = 3$
With employer HSA funding	96.5	45.3
Without employer HSA funding	12.4	6.1

Liquidity: Survey Results. Table G.6 present regressions that show higher rates of puzzling choices among people who are liquidity constrained. We define an indicator equal to 1 if the person says they could probably not come up with $2,000 for an emergency expense within 30 days, could certainly not come up with the money, or are unsure. Those who are unable to finance a $2,000 emergency expense are 17.7 percentage points more likely to choose a dominated health plan, which is a 39% increase relative to the mean of 45.3% among those who are not constrained (column 1). They are also over 2.5 times less likely to save in the supplemental plan compared to those who are not constrained (31.2% vs. 11.6%, column 2), and they are more than 3 times as likely to make both puzzling choices (column 3). The relationship between liquidity and choices declines by almost half but remains strong and statistically significant after controlling for knowledge about benefits and financial literacy (column 4), as well as demographic controls (column 5), which include indicators for household income, age, gender, marital status, non-white, academic division, faculty, and tenure with the employer. These results suggest that plan knowledge reduces, but does not eliminate, concerns among individuals who are liquidity constrained. The results are similar to weighting by the inverse probability of survey response rates (column 6) or restricting to those who pass the attention check (column 7).

Table G.7 splits the sample by whether household income is below or above $125,000. For both income levels, liquidity is associated with dominated plan choices, foregoing retirement saving, and both behaviors simultaneously. The coefficient estimates are larger in relative terms for those with higher household income, indicating the importance of liquidity constraints in explaining choices are not only among those with lower incomes.

We asked a direct question about the trade-off between premiums and deductibles for planning purposes, which may matter to individuals who face liquidity constraints. The question asked to what extent the respondents agree with the statement, "*I would rather pay more in premiums upfront, and pay less out of pocket each time I use health care services, because it helps me plan a budget.*" There is a strong monotonic relationship between the extent to which people agree with this statement and their propensity to choose a dominated health plan: 27.5% among those who strongly disagreed with this statement chose a dominated plan versus 78.6% who strongly agreed (Figure G.3, Panel A). This gradient is large and statistically significant. We find a similar pattern when considering hypothetical choices from our experiment comparing decision frames. In Panel B of Figure G.3, we restrict the sample to those who do not change their choice even after complex

Table G.6: Liquidity

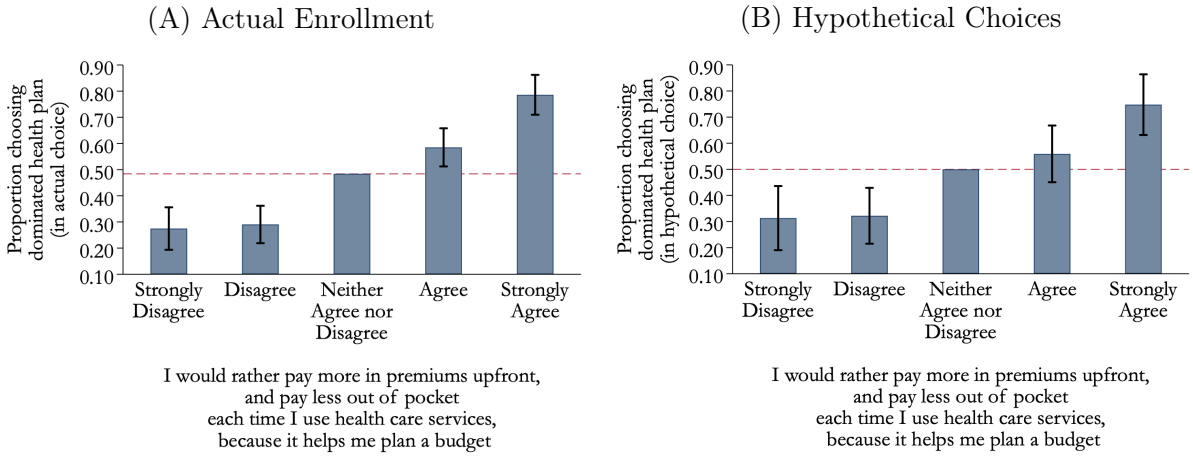
	Dominated health plan	Forego retirement match	Dominated health plan AND forego retirement match				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Liquidity constrained	0.177	0.196	0.142	0.078	0.071	0.076	0.093
	(0.031)	(0.028)	(0.024)	(0.024)	(0.025)	(0.029)	(0.031)
Retirement match Q correct				-0.181	-0.175	-0.201	-0.168
				(0.024)	(0.024)	(0.029)	(0.029)
HSA rollover Q correct				-0.080	-0.072	-0.079	-0.085
				(0.017)	(0.017)	(0.021)	(0.021)
Employer HSA funding Q correct				-0.047	-0.046	-0.051	-0.032
				(0.012)	(0.012)	(0.015)	(0.014)
Diversification Q correct				-0.017	-0.022	0.008	-0.039
				(0.018)	(0.019)	(0.023)	(0.023)
Inflation Q correct				-0.025	-0.035	-0.039	0.009
				(0.022)	(0.022)	(0.028)	(0.027)
Interest Q correct				-0.004	0.012	0.022	0.029
				(0.028)	(0.028)	(0.034)	(0.033)
Constant	0.453	0.116	0.063	0.322	0.309	0.312	0.266
	(0.014)	(0.009)	(0.007)	(0.038)	(0.038)	(0.043)	(0.047)
Controls	No	No	No	No	Yes	No	No
Survey response weights	No	No	No	No	Yes	Yes	No
Restrict to pass attention check	No	No	No	No	Yes	No	Yes
Observations	1643	1621	1621	1621	1607	1242	1086
R^2	0.032	0.046	0.038	0.144	0.185	0.154	0.139

information is simplified. The gradient suggests that many of those who prefer to smooth their expenses choose dominated plans while recognizing the financial costs of doing so.

Table G.7: Liquidity by Household Income

	Dominated health plan	Forego retirement match	Dominated plan AND forego match	Dominated health plan	Forego retirement match	Dominated plan AND forego match
	(1)	(2)	(3)	(4)	(5)	(6)
Liquidity constrained	0.151	0.156	0.143	0.210	0.231	0.126
	(0.041)	(0.037)	(0.032)	(0.047)	(0.043)	(0.035)
Constant	0.451	0.145	0.078	0.443	0.092	0.052
	(0.020)	(0.014)	(0.011)	(0.019)	(0.011)	(0.008)
Household income	<$125k	<$125k	<$125k	≥$125k	≥$125k	≥$125k
Observations	780	779	779	842	841	841
R^2	0.017	0.030	0.037	0.022	0.061	0.031

Figure G.3: Dominated Plan Choices by Budgeting Preferences



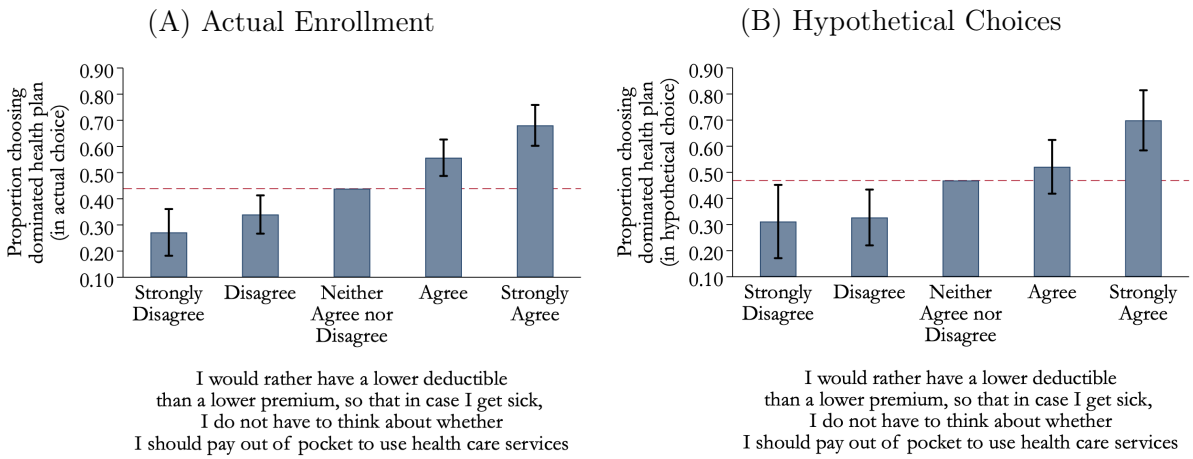
Inertia: Table G.8 presents regression results to test for the role of inertia in health insurance and retirement saving choices using administrative data from 2014–2018. The regressions compare outcomes for new employees to incumbent employees, controlling for age, salary, gender, faculty, health insurance coverage type, and year. Standard errors clustered by employees are in parentheses. New employees are more likely to choose the HDHP/HSA, consistent with work in other employer settings, though the magnitude is small in absolute terms: 92.0% of incumbent employees avoid the HDHP compared to 86.4% of new employees (column 1). Requiring an active choice does fairly little to reduce the probability of choosing a dominated health plan in this context. In terms of retirement, incumbent employees are more likely to contribute than new employees (column 2). Considering both choices together, new employees are 1.4 percentage points more likely to simultaneously choose a dominated plan and forego the match, which is 4% of the mean for incumbent employees.

Table G.8: Inertia

	Dominated health plan (1)	Forego retirement match (2)	Dominated plan AND forego retirement match (3)
New employee	-0.056	0.046	0.014
	(0.004)	(0.006)	(0.007)
Control mean	0.920	0.365	0.343
	(0.002)	(0.004)	(0.004)
Demographic and job characteristics	Yes	Yes	Yes
N	64,126	64,126	64,126
R^2	0.043	0.168	0.145

Nonstandard preferences: payment aversion: Figure G.4 shows a monotonic relationship between dominated plan choices and agreement with the statement: "*I would rather have a lower deductible than a lower premium, so that in case I get sick, I do not have to think about whether I should pay out of pocket to use health care services.*" 27.2% of those who strongly disagreed with this statement chose a dominated plan versus 68.1% of those who strongly agreed, with less strong preferences or indifference in between these rates (Panel A). We also compare hypothetical choices among respondents who do not exhibit choice reversals when the simplified frame is shown after the complex frame. Panel B of Figure G.4 shows a similar monotonic pattern between payment aversion and dominated choices, suggesting that many people who experience psychological costs from deductibles may choose dominated plans even if they recognize the financial costs.

Figure G.4: Dominated Plan Choices by Payment Aversion



Correlation between mechanisms: Below we present evidence showing the correlation between attention and benefits knowledge. Table G.9 shows regression results of the correlations between responses to the question "*Do you believe your household's health insurance choices would improve if you paid more attention to them?*" and the question "*Do you believe your household's long-run finances would improve if you paid more attention to them?*" Each column plots the results of a linear regression of an indicator for whether the respondent records that particular response to the question about long-run finances against indicators for their responses to the question about health insurance. The constant denotes the mean for participants who report they are already attentive to their household's health insurance choices. The regression excludes controls. Robust standard errors are in parentheses.

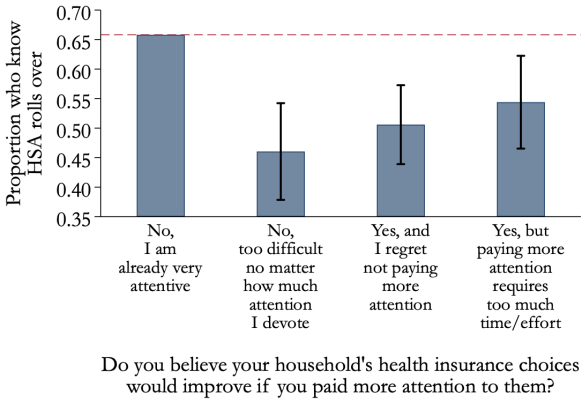
Table G.9: Correlation in Attention Responses across Domains

	Dependent var: Attention to long-run finances				
	"Already attentive"	"Too hard"	"Regret	"Not worth time/effort"	"Already set up to not require attention"
	(1)	(2)	(3)	(4)	(5)
Attention to health insurance					
Too hard no matter how	-0.162	0.126	0.117	0.019	-0.099
much attention I devote	(0.032)	(0.037)	(0.050)	(0.033)	(0.035)
Regret not paying	-0.216	-0.014	0.488	-0.062	-0.196
more attention	(0.024)	(0.018)	(0.035)	(0.020)	(0.022)
More attention not	-0.167	-0.003	0.074	0.199	-0.102
worth time/effort	(0.032)	(0.022)	(0.051)	(0.046)	(0.036)
Constant	0.257	0.050	0.354	0.104	0.233
	(0.016)	(0.008)	(0.018)	(0.011)	(0.016)
Observations	1087	1087	1087	1087	1087
R^2	0.050	0.028	0.111	0.042	0.040

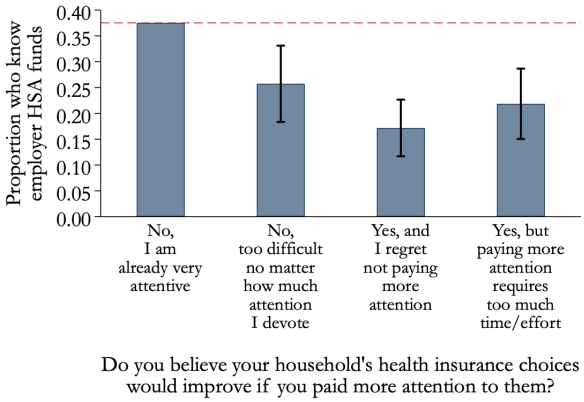
Attention and benefits knowledge are highly correlated. Figure G.5 presents regression results of each indicator of benefits knowledge against responses to the questions about whether the respondent thinks their choices would improve if they devoted more attention to them.

Figure G.5: Benefits Knowledge by Attention

(A) Know HSA rolls over



(B) Know employer HSA funding



(C) Know 403(b) match

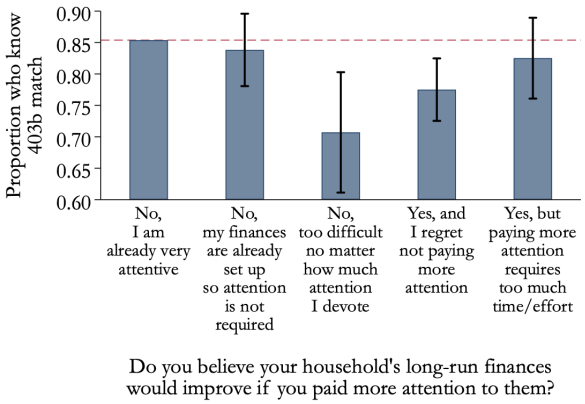


Table G.10 shows the correlation matrix for key measures of knowledge about benefits, financial literacy, the opt-out decision, and liquidity.

Table G.10: Correlation Matrix of Mechanisms

	Know employer match	Know employer HSA funding	Know HSA rolls over	Fin. lit: inflation Q correct	Fin. lit: interest rate Q correct	Fin. lit: diversification Q correct	Attempted optional task	Liquidity constrained
Know employer match	1							
Know employer HSA funding	0.068	1						
Know HSA rolls over	0.153	0.446	1					
Financial literacy: Inflation Q correct	0.128	0.137	0.172	1				
Financial literacy: Interest rate Q correct	0.139	0.111	0.134	0.371	1			
Financial literacy: Diversification Q correct	0.150	0.153	0.214	0.322	0.280	1		
Attempted optional task	0.126	0.076	0.081	0.149	0.177	0.070	1	
Liquidity constrained	-0.128	-0.112	-0.178	-0.248	-0.177	-0.326	0.020	1

Bivariate probit regressions in survey data: We estimate bivariate probit regressions (equations (2)–(4) in the main text) that include different covariates in each model to assess the relative importance of mechanisms. The focus of this exercise is on model fit based on a collection of variables rather than interpreting a particular variable in isolation. We therefore include indicators for each response to a particular survey question to flexibly model that variable. For example, when including variables for financial literacy, we do not code the variable as 1 if correct and zero otherwise (as in Table G.2), but we include separate indicators for each possible response, including if the respondent reports being unsure. We classify variables into the following categories:

- *Demographics, income, and job characteristics* (*Baseline*): Age bins; gender; married; tenure bins; household income bins; health insurance coverage type; non-white; faculty; academic division; health spending bins; experimental arms (48 variables).
- *Payment aversion*: Preference for paying higher premiums to avoid thinking about out-of-pocket costs (6 variables).
- *Liquidity*: Confidence in financing $2,000 expense; preferences for paying higher premiums to help plan a budget (12 variables).
- *Financial literacy*: Knowledge of interest rates; knowledge of inflation; knowledge of diversification (14 variables).
- *Information Frictions*: Knowledge of retirement match; knowledge of employer HSA funding; knowledge of HSA rollover; opt-out decision; attention check; whether health insurance choices would improve with more attention; whether long-run finances would improve with more attention; time spent on health insurance choices; time spent on retirement saving; source of information on health insurance (28 variables).

Table G.11 presents measures of model fit of bivariate probit regressions that include different combinations of mechanisms. The likelihood ratio index is defined as $1 - \frac{LL(\theta)}{LL(0)}$, where $LL(\theta)$ is the log likelihood from the model and $LL(0)$ is the log likelihood from the null model that restricts all coefficients to zero. This measure of model fit ranges from 0 to 1, where 1 corresponds to the model perfectly fitting the data, in which case $LL(\theta) = 0$. The Akaike information criterion (AIC) is calculated as $2k - LL(\theta)$, where k is the number of parameters. Lower AIC values indicate superior model fit and so this metric penalizes adding variables that do not improve the log likelihood.

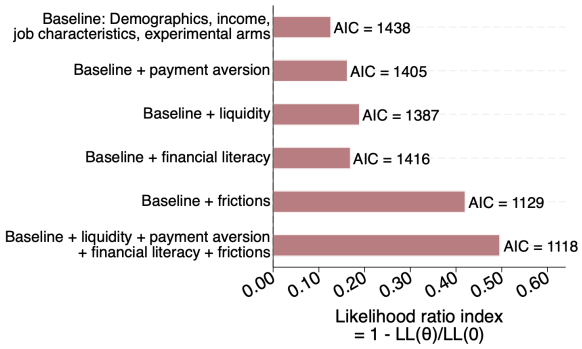
Figure G.6 presents the results of bivariate probit models restricted to employees in the Medical Division whose default contribution to the 403(b) is zero. The patterns are qualitatively similar to the full sample results shown in Figure 8 and Table G.11.

Table G.11: Bivariate Probit Model Fit

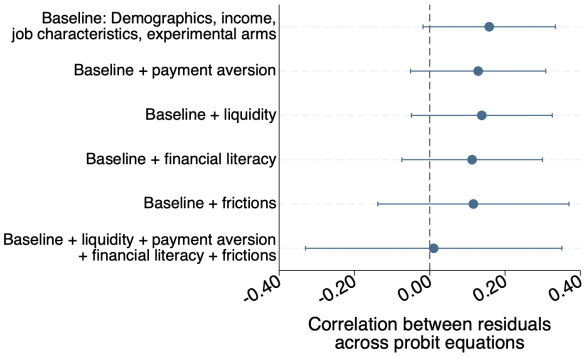
Model (# parameters)	$LL(\theta)$	Likelihood Ratio Index	AIC
1: Baseline: Demographics + income + job characteristics (99)	-1658	0.075	3486
2: Baseline + frictions (159)	-1164	0.350	2611
3: Baseline + liquidity (125)	-1543	0.139	3296
4: Baseline + financial literacy (127)	-1612	0.100	3438
5: Baseline + payment aversion (111)	-1605	0.104	3401
6: Baseline + frictions + financial literacy (187)	-1141	0.363	2609
7: Baseline + frictions + liquidity (185)	-1111	0.380	2544
8: Baseline + frictions + payment aversion (171)	-1131	0.369	2564
9: Baseline + liquidity + payment aversion (137)	-1519	0.152	3269
10: Baseline + liquidity + financial literacy (153)	-1513	0.155	3281
11: Baseline + payment aversion + financial literacy (139)	-1562	0.128	3359
12: Baseline + frictions + payment aversion + financial literacy (199)	-1562	0.128	2560
13: Baseline + frictions + liquidity + financial literacy (213)	-1090	0.391	2546
14: Baseline + frictions + liquidity + payment aversion (197)	-1088	0.392	2519
15: Baseline + liquidity + financial literacy + payment aversion (165)	-1489	0.169	3252
16: Baseline + frictions + financial literacy + liquidity + payment aversion (225)	-1067	0.404	2520
17: Frictions (63)	-1251	0.302	2628

Figure G.6: Bivariate Probit Regressions in Medical Division without 403(b) Default

(A) Model Fit



(B) Correlation between residuals (ρ)



Shapley-Owen decomposition of model fit: As a second way to measure the importance of each mechanism in explaining choices, we apply the concept of Shapley values to the bivariate probit models (Shapley 1953, Owen 1977). The contribution of each mechanism is calculated by measuring how its inclusion improves the model's fit to the data. We continue to assess model fit in two ways, based on an increase in the likelihood ratio index and a decrease in the AIC. This calculation is performed not just for the full model with all mechanisms, but for each combination of "sub-models" that exclude that particular mechanism (models 1–16 in Table G.11). The Shapley value for each mechanism is a weighted average of its marginal contribution when added to a sub-model, where the weights reflect the number of possible models with that permutation of mechanisms.

Define X as the full set of mechanisms mechanisms that could be included in a regression. In our case, $X = \{\text{frictions, liquidity, financial literacy, payment aversion}\}$. Define $v(S)$ as a metric of model fit when including the subset of mechanisms $S \subset X$. The change in model fit from adding mechanism m to the existing subset of mechanisms is $v(S \cup \{m\}) - v(S)$. There are $n = 4$ total mechanisms and $k < 4$ mechanisms in subset S. The Shapley value for mechanism m is a weighted average of the contributions over all possible permutations of subsets that exclude mechanism m:

$$V(m) = \sum_{S \subseteq X \setminus m} \frac{n!(n-k-1)!}{n!}(v(S \cup \{m\}) - v(S))$$

The weights $\frac{n!(n-k-1)!}{n!}$ are inversely proportional to the frequency of each sub-model that includes k mechanisms. This formulation assigns relatively more weight to the contribution when a mechanism is added to the baseline model or to a model with the three other mechanisms because there is only one possible sub-model for those cases. There are three possible sub-models for models that include either two mechanisms or three mechanisms as regressors, and so those models receive less weight in calculating mechanism m's contribution to model fit.

Table G.12 summarizes the results of this exercise. Consistent with Figure 8, frictions are the most important mechanism. Frictions explain 82% of choices when measuring fit based on the AIC and explain 76% when measuring fit based on the likelihood ratio index. Liquidity explains 10-12%, with financial literacy and payment aversion explaining 5% or less. Standard errors are shown in parentheses and are calculated by bootstrapping 200 samples with replacement.

Table G.12: Shapley-Owen Decomposition of Mechanisms (%)

	Decomposition of:	
	AIC	Likelihood ratio index
Information Frictions	82.1	76.6
	(2.4)	(2.0)
Liquidity	10.9	12.3
	(1.9)	(1.6)
Financial literacy	1.9	5.3
	(1.3)	(1.1)
Payment Aversion	5.1	5.8
	(1.4)	(1.1)

References

Owen, Guillermo. 1977. "Values of Games with a Priori Unions." In *Essays in Mathematical Economics.* , ed. R Henn and O Moeschlin, 76–88. Springer-Verlag.

Shapley, Lloyd. 1953. "A Value for n-Person Games." In *Contributions to the Theory of Games II.* , ed. Harold Kuhn and Albert Tucker. Princeton University Press.