

Overpaying and Undersaving? Correlated Mistakes in Retirement Saving and Health Insurance Choices

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Keywords: pandemic, financial stability, savings, inequality

JEL Codes: D14, D81, G5, I13

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Not everyone makes wise financial choices. A large body of research documents behavior inconsistent with well-informed consumers maximizing their expected utility of consumption. It remains unknown, however, whether such behavior is correlated across domains. This paper uses two novel datasets to test whether the quality of health insurance and retirement saving decisions are correlated. Using administrative panel data from a large employer, we find that people who overpay for health insurance by choosing a dominated plan are more likely to forego employer matching funds for retirement saving. One-third of employees overpay for health insurance each year by \$1,700 and simultaneously make no voluntary retirement contributions. Over just a few years, these choices result in lost savings equal to 4% of the median net worth of families at retirement. The losses are highest for employees with lower salaries, lower educational attainment, and for women. We find this positive correlation in choice quality across domains generalizes to other settings using a survey linked to administrative data on retirement accounts from 10 employers. This finding suggests consumers could reallocate funds from health insurance to retirement saving without sacrificing consumption. We find empirical support for several mechanisms explaining choice quality and consider implications for policy design to improve household economic security.

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1 Introduction

People face an increasingly complex set of financial decisions in daily life (Gomes, Haliassos and Ramadorai 2021). They must evaluate the best way to save, invest, borrow, insure, and pay for goods and services over their life-cycle. The growth and complexity of decisions in today’s economy is due to technology and market forces (e.g., E-trade and Robinhood), as well as public policy designed to provide consumers with a menu of options (e.g., health insurance), rather than a single one.

Yet, the proliferation of choices can pose challenges to consumer decision-making. Across a variety of domains, research documents behavior that deviates from the standard economic model of informed consumers making choices that maximize their expected utility of consumption and suggests low choice quality (Agarwal, Chomsisengphet and Lim 2017, Handel and Schwartzstein 2018, Beshears et al. 2019). Such behavior can make markets less efficient, and also affect the distribution of surplus between consumers and producers or between employees and employers based on how firms respond (DellaVigna 2009, Akerlof and Shiller 2015, Bubb and Warren 2020).

Little is known, however, about how the quality of consumer choices correlate across financial domains. Is it generally the same people who make low quality choices in multiple domains? Or do people “get it right” in some choices but not others? The correlation might be positive if there is a common factor that explains behavior. It might be negative if people exert substantial effort to make choices in one domain, leaving them with less time or attention to make choices in another. Knowledge of how behavior is correlated could also help inform how to best target assistance to particular individuals, and across multiple decisions, given the risk of information overload. This issue is particularly relevant in light of growing concerns about economic mobility and inequality. Lusardi, Michaud and Mitchell (2017) estimate that differences in financial sophistication account for 30–40 percent of wealth inequality in the United States. Understanding this correlation is therefore of both theoretical and policy interest.

In this paper, we analyze the correlation of choice quality in two domains with large financial consequences: health insurance and retirement saving. In the case of health insurance, research in other settings shows that many people choose dominated health plans, leading them to overpay for coverage (Handel 2013, Bhargava, Loewenstein and Sydnor 2017, Ericson and Sydnor 2017).¹ In the case of retirement saving, many people show

¹A large number of other studies have assessed choices when plans are not dominated, which requires stronger assumptions to label decisions to reflect low choice quality or “mistakes” (Abaluck and Gruber 2011, Ketcham et al. 2012, Heiss et al. (2013), Handel and Kolstad 2015, Ketcham, Kuminoff and Powers 2019, Keane et al. 2019, Handel et al. 2020, Gruber et al. 2020).

reluctance in taking advantage of opportunities for tax-preferred saving and forego employer matching contributions (Madrian and Shea 2001, Benartzi and Thaler 2007, Choi, Laibson and Madrian 2011). Using novel administrative data from a large employer, we test whether people who choose a dominated health insurance plan (i.e., who overpay for health care) fail to make voluntary retirement contributions and forego employer matching funds (i.e., who may undersave for retirement).

We use four years of administrative data from a large university to study the quality of consumer choices across domains. In our setting, a high-deductible health plan (HDHP) with a Health Savings Account (HSA) stochastically dominated the other two plans for almost all employees, which Liu and Sydnor (2022) show is common among many employers. Consistent with other research, we document that people many people choose dominated plans. The stakes of this decision are more substantial in our context than for many others: employees who do not choose the HDHP/HSA overpay for health insurance by \$1,700 on average.² In terms of retirement saving, we find that many people do not contribute to supplemental retirement accounts. Over one-third of employees forgo matching contributions from the employer, amounting to \$780 on average each year.

Our main finding is that there is a significant and substantial positive correlation in the quality of consumer choices across domains. People who choose a dominated health plan are also 29% more likely to forgo matching contributions. One-third of our sample choose both a dominated health plan and simultaneously make no voluntary retirement contributions, losing out on employer matching funds. The composition of this set of employees raises concerns about inequality. These employees are more likely to earn lower salaries, have lower educational attainment (as proxied by staff vs. faculty), and are more likely to be female.

Overpaying for health insurance while undersaving for retirement creates an opportunity to shift resources across domains and improve household economic security. The third of the sample who exhibit low choice quality in both domains overpay for health insurance by \$1,700 each year, on average (equal to 3.5 percent of their pre-tax salary). With the same resources, they could make substantial retirement contributions instead and get a 50% match for at least some of their contributions. We find that the choices of dominated health plans observed in our sample period translate into over \$12,700 in lost retirement savings, on average, over a 30-year horizon. These losses over just four years exceed 4% of the median net worth of families at retirement. As a share of salary, the losses are particularly prominent at the lower end of the salary distribution.

Importantly, this pattern generalizes outside of our empirical setting. Using a novel

²By comparison, the overpayments were below \$400 in Bhargava, Loewenstein and Sydnor (2017).

survey linked to administrative data managed by the Teachers Insurance and Annuity Association of America (TIAA), we document that people who choose a dominated health plan are 44% less likely to make supplemental retirement contributions in 10 other universities. We are unable to measure the dollar costs of these choices because we lack claims data for these other universities. However, we find that based on the premiums and cost-sharing at these other 10 universities, some offered dominated plans with an even larger potential for overpayments compared to our main setting.

We then use a combination of survey and observational data to investigate mechanisms driving choice quality. There does not appear to be one single mechanism that explains the majority of choices. Instead, we find empirical support for a number of factors that each provide partial explanations for behavior. To assess the role of liquidity, we simulate choices under the framework of [Ericson and Sydnor \(2018\)](#), who show how the timing of expenses within the year can explain dominated choices for those who must borrow at high interest rates to finance out-of-pocket costs. We also use information on 403(b) loans and survey responses about a person’s ability to pay for an unexpected \$2,000 in 30 days ([Lusardi, Schneider and Tufano 2011](#)) for the 10 universities in the TIAA survey-linked data. While in both approaches we find some support for a liquidity channel, it only explains a small fraction of dominated health plan choices. We also document support for financial literacy ([Hastings, Madrian and Skimmyhorn 2013](#), [Lusardi and Mitchell 2014](#)), health insurance literacy ([Loewenstein et al. 2013](#), [Handel and Kolstad 2015](#)), inertia ([Handel 2013](#)), and perceived hassle costs. Yet each of these mechanisms has limited explanatory power.

As an additional strategy, the features of our setting enable us to rule out certain explanations. In particular, our results hold when considering state-by-state dominance, which implies that probability weighting and loss aversion cannot explain choices. We view the financial stakes as sufficiently large to make rational inattention implausible for most employees, but choices might be consistent with some psychological models of inattention ([Gabaix 2019](#), [Schilbach, Schofield and Mullainathan 2016](#), [Mullainathan and Shafir 2013](#)).

Other mechanisms are also consistent with choices. If people underestimate exponential growth ([Stango and Zinman 2009](#), [Levy and Tasoff 2016](#)), they may both avoid supplemental retirement accounts and the HSA. Finally, we view alternatives to expected utility theory as highly plausible. People may not evaluate their health insurance and retirement saving choices together, but rather do so in isolation. This “narrow bracketing” in decision-making can lead people to make dominated choices ([Tversky and Kahneman 1981](#), [Rabin and Weizsäcker 2009](#)). Relatedly, people may view health insurance and retirement saving as separate mental accounts, even though money is fungible ([Thaler 1985](#), [Thaler 1999](#) [Prelec and Loewenstein 1998](#)). This heterogeneity in potential mechanisms poses a challenge for

policy design that seeks to improve decision-making: there may not be one single policy that is effective for everyone.

Our research makes several contributions. First, we link the large literatures that separately document low choice quality in health and retirement saving (Chandra, Handel and Schwartzstein 2019, Beshears et al. 2019). Our results show it is often the same people who make poor choices in each domain. Our paper relates to other work on consumer decision-making across domains in household finance. Two recent working papers also study decisions using observational data from the field: Jørring (2020) finds that those 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 employees who wait until the final day to choose a health insurance plan save less in retirement accounts and are less likely to annuitize. The focus of our study differs from these two papers, but we view the findings as complementary in analyzing consumer behavior across domains that departs from standard economic theory.

Our research further relates to studies that examine whether risk preferences are stable across financial domains. Einav et al. (2012) use data on employee benefit choices from a large manufacturing firm and find that only about 30% of employees make consistently risk-averse choices across their health insurance and 401(k) plans. Using a survey of military members, Bell et al. (2018) find that risk preferences are positively correlated across several different domains. Barseghyan, Teitelbaum and Xu (2018) find a positive correlation in the amount of risk taken when stakes are of similar magnitudes in auto and home insurance. Yet, they document that households incurring more risk in choices with small stakes incur less risk for choices with large stakes, and vice versa. This negative correlation within households is inconsistent with stable risk preferences.

Finally, our results may yield policy implications for both health insurance and retirement saving. Our finding that many employees substantially overpay for health insurance by choosing a dominated plan contributes to debates about the value of offering consumers a choice of health insurance plans (Ericson and Sydnor 2017, Ketcham, Kuminoff and Powers 2019, Ho and Lee 2021, Marone and Sabety 2021). Our results also suggest that high health insurance expenses combined with low choice quality may pose a barrier to retirement preparedness for many workers.³ We find the losses in retirement wealth from overpayments for health insurance are particularly consequential for employees who earn lower salaries, have less education, and who are women. These results contribute new

³For the debate about whether Americans are saving adequately for retirement, see Scholz, Seshadri and Khitatrakun (2006), Skinner (2007), Munnell, Rutledge and Webb (2014), and Ellis, Munnell and Eschtruth (2014).

evidence on the size of inequalities in financial outcomes by income, education, and gender that have already shown by other research to be large (Lusardi and Mitchell 2008, Goldin 2014, Bosworth, Burtless and Zhang 2016).

The paper proceeds as follows. Section 2 describes the institutional setting and data. Section 3 describes our approach to classify the quality of choices in health insurance and retirement saving and documents their prevalence. Section 4 presents our main empirical results on the correlation of choice quality across domains. Section 5 discusses the findings in the context of potential mechanisms. Section 6 briefly concludes and offers directions for future research.

2 Setting and Data

The large public university that we study offers employees a complicated set of retirement plan and health insurance choices. In this section, we describe the university administrative data on employees, and discuss their health insurance and retirement plan options.⁴ In the following section, we define choice quality in health insurance and retirement saving.

The administrative data from the university report annual earnings, semiannual demographics, monthly retirement plan contributions as a percent of earnings, annual health insurance choices, and annual health care claims data of each employee and dependent. Our data on earnings is collapsed into bins (of \$10,000-\$20,000 intervals) in order to eliminate the possibility that an individual could be identified. Demographic information consists of employee gender, age collapsed into bins (generally of five-year intervals) and marital status (which is incompletely collected). We further observe category of employment (faculty versus staff), 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 granular line-item claims detail. We focus on choices over the years 2014–2017, following the introduction of a third health insurance plan that stochastically dominated the two incumbent plans.

⁴It is worth emphasizing that many employers, including the one we study, provide copious information designed to assist employees in making choices about both health insurance and retirement plan accounts. Yet, considerable research, for example related to consumer protection (Bubb and Pildes 2014), demonstrates that simply providing information does not solve the problem.

2.1 Health insurance choices

Prior to 2014, employees had a choice between two conventional plans that differed in their premiums and the share of medical costs they covered. In 2014, the university introduced a high-deductible plan (HDHP) with a health savings account (HSA).⁵ The HDHP/HSA plan had substantially lower premiums and, with the high deductible, offered 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.

In spite of these terms, all the plans were relatively generous. Based on claims across 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, was about 88% in expectation for the high-coverage plan, with employees paying 12% out-of-pocket; about 85% for the medium-coverage plan; and about 77% for the low-coverage plan.⁶ Similar to other employers, the university contributes the same amount in premiums for each plan and plans with more generous coverage have higher employee premiums. Each plan had the same provider network, so differences between plans were only based on premiums and other plan parameters (deductible, co-pay, co-insurance rates, annual out-of-pocket maximum) determining financial risk.

The major differences across plans are in premiums and, for the low-coverage plan, the high deductible together with the employer contribution to the HSA. For example, annual premiums were \$2,904, \$1,092, and \$360 for the high, medium, and low coverage plans in 2015, for employee plus spouse coverage. While the deductible was \$500, \$1,000, and \$4,000, respectively, the employer made an HSA contribution of \$1,500 that year for the low-coverage plan, unconditional on any contribution by employees.⁷

The structure of the health insurance plans in our setting is common in many peer institutions. We collected information on plan offerings for the public and private universities that the university we study has designated as its peer group. As shown in Appendix

⁵An HSA is a tax-preferred personal savings vehicle, in which contributions are tax-deductible (even from FICA taxes, 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.

⁶The definition of actuarial value does not include employee premiums. In 2014, the percentage of spending covered by the high and medium plans were 90% and 87%, respectively, because the deductibles were lower for these plans.

⁷Other plan parameters were more similar; the co-insurance rate was 10% in the high coverage plan, compared to 20% in the medium and low coverage plans. The annual out-of-pocket maximum was also similar across plans, at \$10,000, \$11,000, and \$12,000 in 2015 for the high, medium, and low coverage plans. Appendix Table A.1 presents parameters for 2015 and 2017 for all coverage levels, and Appendix Figure A.1 graphically shows the differences for family coverage

Table A.2, fourteen out of nineteen have an HDHP/HSA plan, and among those, nine make substantial contributions to the HSA (for example, between \$600 and \$2000 for family plans). Similarly, the premium difference between the low and high coverage plans is often large. This pattern fits with broader evidence from employers reported in Liu and Sydnor (2022), confirming that the plan offerings in our setting are fairly typical.

2.2 Retirement saving choices

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 while the majority of staff are enrolled in the hybrid plan.⁸ In addition to the mandatory retirement plan, all employees can choose additional voluntary contributions. These voluntary contributions can be directed to a 403(b) plan and to a state-run 457 plan, with Roth versions of both available.⁹

The employer matches 403(b) contributions at a 50% rate, with limits that differ across academic and medical divisions. The match is substantial for most employees in the medical division: employees hired after 2002 receive the match for contributions up to 4% of their salary. The match limit is smaller (\$960 per year) for medical division employees hired before this date and for all employees in the academic division.¹⁰ Employees are immediately vested for their contributions and matching contributions from the employer.

People may borrow against their voluntary contributions in the 403(b). 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 is repaid periodically with after-tax dollars. In the case of default, the loan amount is considered a withdrawal and subject to a penalty tax of 10% along with income taxes. These terms are similar to features of retirement plan loans in other settings (Lu et al. 2017). Appendix A provides more details of both the retirement and health insurance options.

2.3 Sample selection and descriptive statistics

We select our sample to focus on employees with the opportunity to make choices in both domains. Starting with records for 24,939 employees during the 2014-2017 period, we

⁸As explained in Appendix A, the mandatory contribution rates varied between 10.4% salary and 13.9% salary depending on the employee’s date of hire.

⁹The 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.

¹⁰The more generous match rate for employees in the medical division hired after 2002 was coincident with a reduction in the employer’s contribution to the mandatory account from 8% salary to 4% salary.

restrict the sample to the following employees: (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. The first two restrictions exclude those whose benefit choices differ from the standard options studied in this paper (dropping about 17% of employees from the initial sample). In focusing on staff and faculty, we exclude post-docs, 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 for most and that itself represents a separate choice (dropping about 4% of the initial sample’s employees). We exclude employees with very low salaries since they may face different choice sets via Medicaid or highly subsidized Affordable Care Act coverage, or they may be employed full-time but for only part of the year (dropping 7% of the initial sample’s employees). We exclude employees who opt out of the health insurance plan (dropping 6% of the initial sample’s employees). Finally, we drop the employee’s initial year of employment for two reasons. First, the initial year is generally a partial year (e.g. September-December) and so features a different calculation of health insurance costs. Second, our study of retirement plan contributions in this setting found that most employees gradually ramp up their voluntary contributions within the first year (Friedberg, Leive and Cai 2020). This last restriction drops about 9% of the initial sample’s employees. This selection process yields a final analytic sample of 17,145 employees spanning 49,233 employee-years.

Table 1 presents descriptive statistics for the sample. 57% work in the academic division and 43% in the medical division. The mean salary is \$74,530 and there is large variation across employees (SD = \$45,445).¹¹ The average age is 45 years. Tenure with the employer—over 10 years, on average—is long in comparison to other U.S. settings.

Among health insurance options, we observe a large share of employees choosing *H*, the high coverage health insurance plan. 59% of the sample choose *H* in both divisions, about one-third choose *M* (the middle coverage plan), and 7% choose *L* (the low coverage plan). Average total health spending per employee (including any dependents) is \$8,634 (SD = \$29,800). In terms of retirement saving, employees contribute 4.3% of salary to voluntary retirement plans and 64% participate in the 403(b) or 457.

3 Choice Quality in Health Insurance and Retirement Saving

In this section, we first describe our definition of high quality choices in each domain. We then examine the prevalence of choice quality in each domain separately, and establish that

¹¹We do not adjust any salary or spending measures for inflation, since doing so would also require adjusting insurance deductibles, copayments, etc. Inflation was fairly low during this period.

Table 1: Summary Statistics

	Mean	SD
Annual salary (\$)	74,530	45,445
Age (years)	45.35	11.41
Faculty (%)	0.20	0.40
Academic division (%)	0.57	0.49
Tenure with employer (years)	10.38	9.38
Female (%)	0.60	0.49
Household size	2.03	1.28
Low coverage plan, L (%)	0.07	0.25
Middle coverage plan, M (%)	0.34	0.47
High coverage plan, H (%)	0.59	0.49
Total health spending (\$)	8,634	29,800
Voluntary retirement contribution rate (% salary)	4.32	7.17
Voluntary retirement participation (%)	0.64	0.48
N	17,145	
NT	49,233	

Note: Table presents means and standard deviations of demographic and outcome variables in sample. Administrative data on faculty at a large public university during 2014-2017. the number of unique employees and the number of employee-years. Salaries are not adjusted for inflation.

many people do not appear to make high quality choices, consistent with prior work. The following section then analyzes the correlations in choice quality across domains.

3.1 Health Insurance Choices: Avoiding Dominated Plans

Consumers should not choose a dominated plan if they seek to maximize the expected utility of consumption and are not liquidity constrained. We focus on second-order stochastic dominance (SOSD) in the cost distribution associated with enrolling in each plan. 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 consumer with a utility function that is non-decreasing and concave prefers a gamble that second-order stochastically dominates an alternative gamble. In our case, it means that higher spending outcomes have a lower mean and are less risky under one plan than under the others. We note, however, that if people must borrow to finance health care costs, then the timing of the premium payments and out-of-pocket costs may induce them to choose a dominated plan if borrowing costs are sufficiently high (Ericson and Sydnor 2018). We do not interpret that behavior as necessarily reflecting low choice quality and analyze liquidity constraints as a possible reason for choosing a dominated plan in our setting in [section 6](#).

We define costs for each insurance plan as the sum of premiums and OOP costs, 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 B 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. Given that the HSA has superior tax preferences to all other savings products as analyzed in [Leive \(2022\)](#), the value of HSA contributions are worth at least this amount.

During our sample period, over 93.8% of employees in our sample face a menu with a stochastically dominated health insurance plan. The employer’s large HSA contribution, along with the much lower premiums and only somewhat-higher risk-sharing compared to the other two plans, lead to stochastic dominance. We exclude the minority 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 4.2%, and we note over 82% of employees have zero out-of-network spending.¹²

As a more stringent definition, we also consider first-order stochastic dominance (FOSD), which means one gamble yields a higher value in each state of the world (i.e. for each possible realization of costs). Supplementary analysis shows results are similar when using FOSD. Our main results focus on SOSD since we lose a majority of the sample by restricting to FOSD.

To illustrate these concepts, [Figure 1](#) presents cumulative distribution functions (CDFs) of health care costs for the three plans in 2017, separately by the four different types of family coverage. These graphs pool all employees and the costs they would face in each plan. Each employee will face a particular distribution of costs under each plan according to their marginal tax rate and their age, gender, and lagged health spending, along with that of any dependents. As an illustration for a single employee, Appendix [Figure D.2](#) presents the cases for 40-year old male and female employees with employee-only coverage, a marginal tax rate of 25% and who are in the median tercile of lagged health spending.

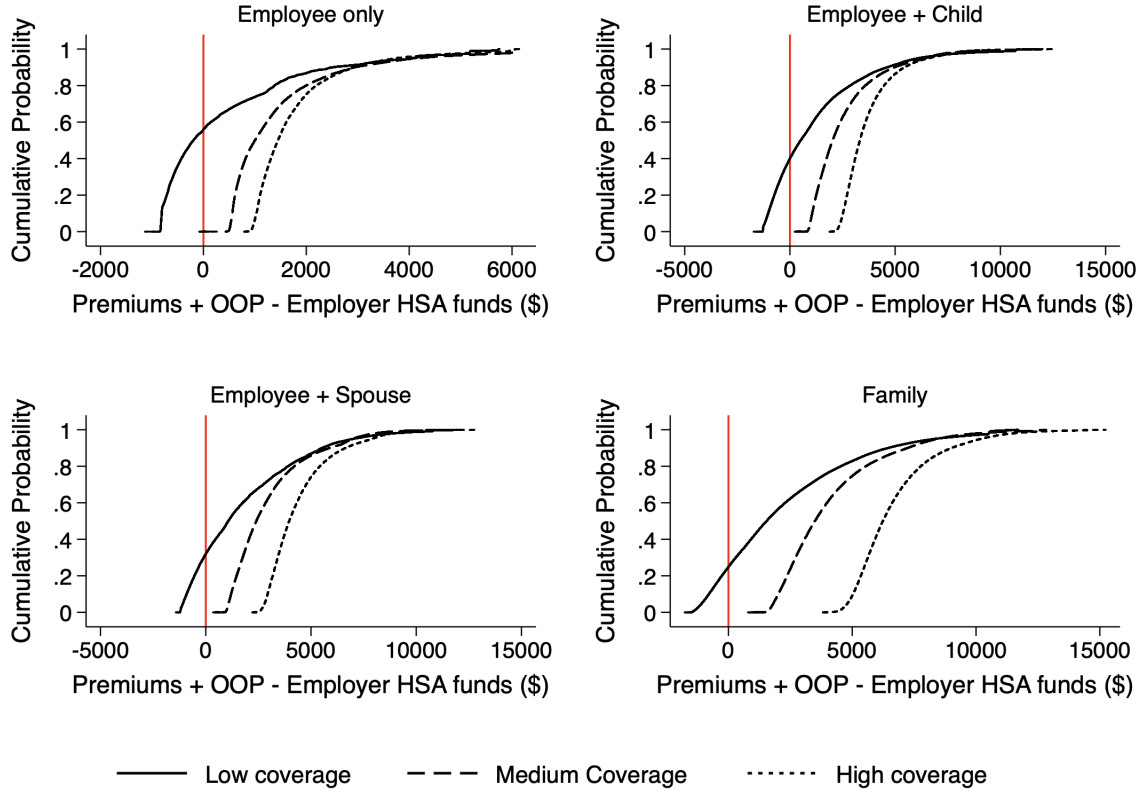
In both [Figure 1](#) and Appendix [Figure D.2](#), the differences in possible spending outcomes between the three plans is stark. The low coverage plan almost always has the lowest costs, followed by the medium coverage plan, and the high coverage plan has the highest costs. Due to the employer’s HSA contribution to the low coverage plan, much of the CDF lies below zero: the plan is heavily subsidized. Over time, the differences in costs between plans grew as premiums and deductibles rose in the medium coverage and in the

¹²Appendix [Table D.2](#) shows that the means of demographics and other variables among this set of employees are very similar to those presented in [Table 1](#).

high coverage plan.¹³

In keeping with the literature, Appendix Figure D.4 plots costs versus total health spending for the three plans. The density of spending is also overlaid to aid visualization of the second-order stochastic dominance seen in Figure 1. While L does not always have the lowest costs for *every* level of spending, those spending draws are quite rare, and in some cases, the costs are only moderately higher in L versus H or M .

Figure 1: Cumulative distribution functions of health care costs in 2017



Notes: Figure plots empirical cumulative distribution functions (CDFs) of health care costs across all employees under each available health insurance plan in 2017. The low-coverage plan second-order stochastically dominates the other plans. The distribution for the low-coverage plan located to the left of the vertical red line at zero denotes the fraction of cost realizations that would result in negative costs due to the employer HSA contribution.

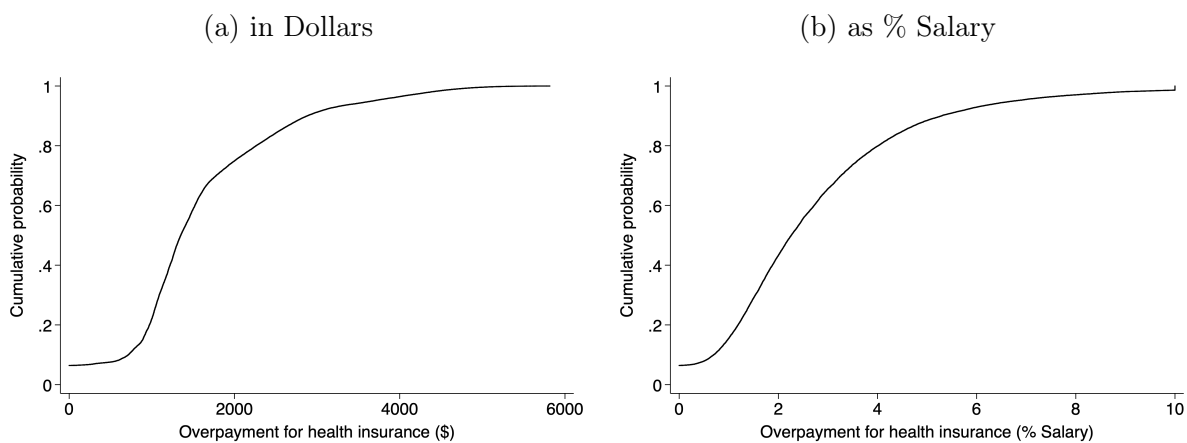
Most employees in our sample choose a stochastically dominated health plan. As seen in Table 1, the large majority of employees pick H , and another third choose M , even though both are stochastically dominated.

We also calculate the amount of money “left on the table” in expectation by choosing

¹³Appendix Figure D.3 shows the CDFs for 2014, which show patterns that are qualitatively and quantitatively similar to 2017.

a dominated plan. We define an overpayment as the sum of premiums and expected out-of-pocket payments net of employer HSA contributions in the chosen plan relative to L .¹⁴ If people are only losing a few dollars by choosing the dominated plan, then this behavior is less of a concern. Figure 2 shows the distribution of overpayments, and demonstrates they are large in magnitude. Half of the sample make overpayments costing at least \$1,350 a year (in expectation), and 25% costing over \$2,000 (Figure 2a). Figure 2b presents the distribution of overpayments in relation to salary. These amounts exceed 2% of pre-tax salary for over half of the sample, 3% of pre-tax salary for a third, and 4% for a fifth.

Figure 2: CDF of overpayments for health insurance



Notes: Panel (a) plots the distribution of overpayments for health insurance (in expectation) across all employees over all years in the sample in dollar terms. Panel (b) plots overpayments as a fraction of employee pretax salary. Overpayments are defined as the expected cost in the chosen plan relative to the HDHP/HSA, which stochastically dominated the other plans.

3.2 Retirement Saving: Obtaining Employer Matching Funds

The main retirement outcome we examine involve contributions to supplemental plans, which include the tax-deferred and Roth versions of the 403(b) and 457 plans. Choosing how much to save has first-order implications for lifetime wealth and consumption. We consider obtaining matching employer contributions to constitute high decision quality in retirement saving. A 50% risk-free return is high compared to other investment opportunities, and 403(b) contributions are not completely illiquid since employees are immediately vested and can take loans.

¹⁴We 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 as a savings vehicle. Incorporating these opposing forces would require making additional assumptions.

Our characterization of choice quality in retirement saving is less definitive than in the case of health insurance, for a few reasons. One is that the health insurance decision affects financial outlays in a single year only, in contrast to retirement saving decisions, for which saving in another year is a relatively close substitute for saving this year. Another is that our data on insurance claims for the entire population help pin down spending expectations, whereas family structure, past financial circumstances, and expectations of life expectancy and future spending needs (all of which may change the marginal utility of saving versus consuming in a particular year) are both quite heterogeneous and unobservable in our data set.

We find that many employees do not take advantage of the employer match for retirement saving: 36% do not contribute at all to a supplemental plan, thus forgoing matching contributions. This share declined a little, from 37.8% in 2014 to 35.9% in 2017. We note that, similar to the case of health insurance, liquidity constraints could prevent positive saving. Such behavior would not necessarily reflect low choice quality. We discuss this issue in the following section.

4 Results: The Correlation of Choice Quality Across Domains

We first classify employees into four types based on their choice patterns across each of the two domains. We then discuss the magnitudes of how much money is “left on the table”, both in dollar terms and relative to annual salary. [Figure 3](#) tabulates four types of employees based on whether they avoided a dominated health plan and obtained employer matching. We combine academic and medical divisions since the relative mix of types is fairly similar across divisions.

4.1 Choices across domains and demographic characteristics

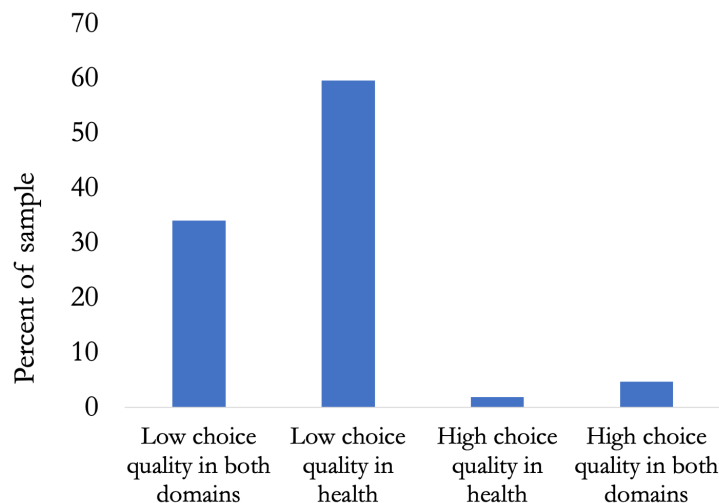
Fewer than 5% of employees avoid a dominated plan and obtain employer matching. We interpret this combination of choices to reflect high-quality decisions in both domains. These employees tend to have higher salaries, are more likely to be men, and more likely to be faculty ([Appendix Table D.4](#)). They also have the lowest levels of health spending, on average.

The least common type are those who do not choose a dominated plan and simultaneously do not make contributions to supplemental retirement accounts (1.8%). We note this combination of choices is consistent with a demand for liquidity in which employees limit any payroll deductions to maximize their take-home pay each month. These employees may choose the HDHP because of its low premiums, and not contribute to retirement due to concerns about financing shocks other than health care (e.g. car repair) or consumption

commitments (e.g. housing, children). Demographics are consistent with this interpretation: these employees are the youngest and have the lowest incomes, on average (Appendix Table D.4). We therefore classify this group as making high quality choices in health insurance, but not necessarily making low quality choices in retirement saving.

The most common type are those who choose a dominated health plan while making positive contributions to supplemental retirement accounts (59.6%). These employees generally are older, have higher salaries, and have the longest tenure with the employer (Appendix Table D.4). In the framework of [Ericson and Sydnor \(2018\)](#), high borrowing costs might induce people to choose a dominated plan if they cannot borrow against their future premium savings from choosing the HDHP. For these employees, however, they have access to 403(b) loans with low interest rates and most make substantial retirement contributions. So they do possess access to low interest credit. We interpret this group as exhibiting low choice quality in health insurance.

Figure 3: Proportion of Types Based on Behavior in Health and Retirement Choices



Notes: The figure plots the proportion of types based on quality of choices in health insurance and retirement saving. We define low choice quality in both domains as those who choose a dominated health plan and do not obtain employer matching funds for retirement saving (1st bar from left). Choosing a dominated health plan while obtaining employer matching funds for retirement constitutes low choice quality in the health domain (2nd bar from left). Not choosing a dominated plan and not obtaining employer matching funds for retirement saving constitutes high quality choice in the health domain (3rd bar from left). Finally, not choosing a dominated health plan and obtaining employer matching funds for retirement saving constitutes high choice quality in both domains.

Finally, just over one-third of employees choose a dominated health plan and forego employer matching by not making supplemental retirement contributions. Without supplemental retirement contributions, these people may not have access to 403(b) loans or other low-interest credit. Section 6 evaluates whether the timing of out-of-pocket expenses

relative to premiums could induce people to choose a dominated plan, and finds only a small fraction would do so even at high interest rates. Most of this group therefore could reallocate funds spent on health insurance to retirement saving instead, which would yield them employer matching funds. We therefore interpret most (but not necessarily all) of this group as exhibiting low choice quality in both domains.

The composition of this last group of employees who choose a dominated plan while foregoing employer matching funds raises potential concerns about equity. These employees are disproportionately composed of employees who are women, staff (as opposed to faculty), earn lower salaries, and incur high levels of health spending. [Figure 4](#) shows these differences are large in magnitude and statistically significant. For example, over 36% of women fall into this group versus 30% of men. Only 13% of faculty make this set of choices compared to about 35% of staff. This result is consistent with recent evidence from the Netherlands that education is positively associated with choice quality of health insurance deductible choices ([Handel et al. 2020](#)). Finally, the lower the employee’s salary, the greater likelihood they choose a dominated health plan and do not making supplemental retirement contributions. Comparing the top and bottom quintiles of salary, just 9% of employees earning over \$120,000 make this combination of choices versus over 60% of employees earning below \$40,000.

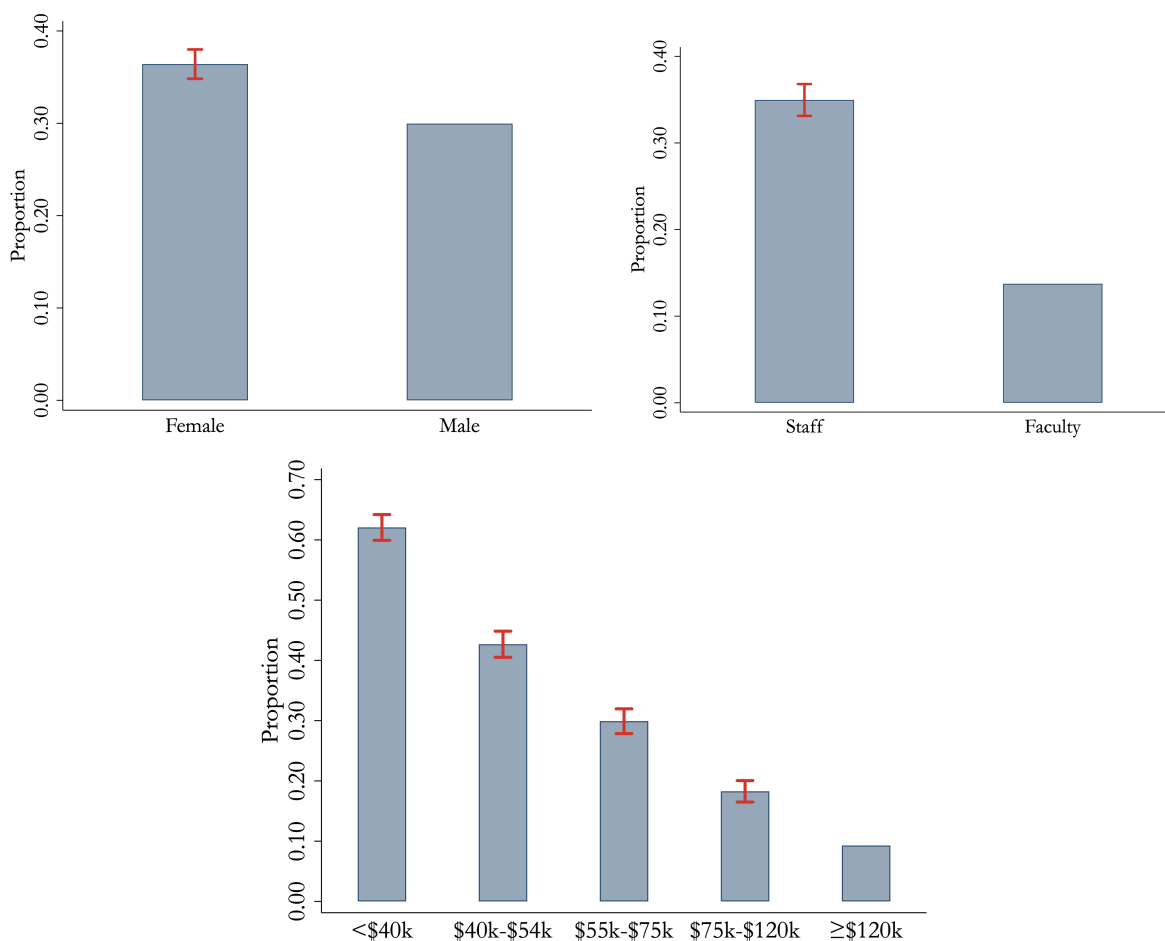
4.2 Linear probability models

The tabulation of types in indicates a strong positive correlation in choice quality across domains. Based on a linear probability model, choosing a dominated health plan is associated with an 8.2 percentage point higher probability of foregoing matching contributions for retirement ([Table 2](#)). This magnitude equates to a 29.2% increase from the baseline rate.

These results are robust to considering alternative definitions of dominance. When we consider first-order (state-by-state) dominance, choosing a dominated health insurance plan is associated with a 13.9 percentage point increase in the probability of foregoing employer matching funds for retirement saving ([Table 2](#), column 2). Relative to the baseline rate of 24.5 percent, this estimate translates into a 55.1% increase.¹⁵ We also obtain qualitatively similar results if we exclude employees with either observed or predicted spending that falls in the range where costs are lower in H than in L (columns 3 and 4). Our key finding is therefore not sensitive to how we classify dominated choices in health insurance.

¹⁵Appendix [Table D.3](#) replicates the distribution of the four types shown in [Figure 3](#) for those whose choices satisfy FOSD.

Figure 4: Heterogeneity in low choice quality across both domains



Notes: Figure plots the proportion of employees who simultaneously choose a dominated health plan and do not make supplemental retirement contributions (“low choice quality in both domains”) for different demographics. 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 calendar year and coverage type. The comparison between staff and faculty is restricted to the academic division.

Table 2: Linear Probability Model: Choice Quality Across Domains

Dep var: Zero voluntary retirement saving				
Choose dominated health plan	0.082 (0.013)	0.135 (0.030)	0.047 (0.016)	0.103 (0.018)
Constant	0.281 (0.012)	0.245 (0.029)	0.309 (0.015)	0.221 (0.017)
Definition of dominance	SOSD	FOSD	SOSD	SOSD
Additional sample restrictions	No	No	Yes	Yes
N				

Note: Table presents regression results of linear probability models correlating choice of a dominated health plan with the choice of not contributing to supplemental retirement accounts. Choosing the high-deductible health plan (HDHP) with Health Savings Account(HSA) constitutes high choice quality in health insurance because it stochastically dominates the other two plans. Making positive supplemental retirement contributions, which are eligible for employer matching, constitutes high choice quality in the retirement domain. Standard errors clustered by employee in parentheses. The first column presents results using second-order stochastic dominance (SOSD) and the second column presents results using first-order stochastic dominance (FOSD), each using the empirical distribution of out-of-pocket costs. Column 3 presents results using SOSD and excluding employees with observed spending that falls in the range where H has the lowest costs. Column 4 presents results using SOSD and excluding employees with LASSO-predicted spending that falls in the range where H has the lowest costs.

4.3 Quantifying money “left on the table”

To examine how much money is “left on the table”, [Figure 5](#) presents a binned scatterplot of overpayments for health insurance against voluntary retirement contributions, both expressed as a fraction of salary. The negative relationship between them is clear. It partly reflects the feature that health insurance overpayments are limited in dollar terms and therefore tend to decline with salary, and partly that retirement contributions generally rise faster than salaries do.¹⁶ This pattern is consistent with our finding using binary choices that the quality of decisions across domains is positively correlated.

The upshot of this relationship is that it creates the scope for improvements on both dimensions, particularly concentrated at the lower end of the salary distribution. Consider the finding that employees who do not make any voluntary retirement contributions commit, on average, overpayments in health insurance choices worth about 3.5% of their salary. They could make substantial retirement plan contributions and, in the medical division, get a 50% match, if they used their savings from choosing the low-coverage plan to stock their retirement accounts. Similarly, those with supplemental retirement contributions of 5% or less still overpay for health insurance by 2% to 3% of salary.

[Figure D.7](#) shows a binned scatterplot of mean overpayments for health insurance by salary level. Overpayments amount to a larger fraction of pre-tax salary for lower-income employees compared to higher-income employees (Panel A). However, higher-income employees overpay by larger amounts in dollar terms since they are more likely to choose a dominated health plan (Panel B).

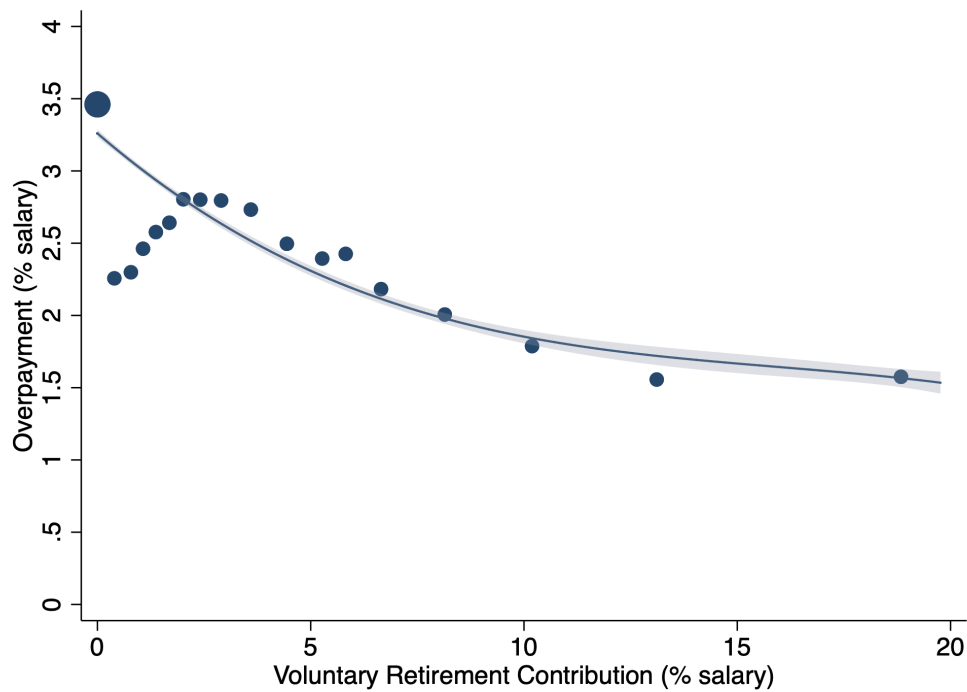
4.4 Long-term implications for retirement wealth

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 are costly due to (1) employer matching; (2) tax preferences for retirement saving; (3) compounding of interest and investment returns. This exercise calculates the losses in retirement wealth generated by the choices in health insurance and retirement saving while working, and finds the losses are extremely large in magnitude.

We use each person’s salary, estimated health insurance overpayment(s) in each year, observed level of voluntary retirement contributions, and matching schedule for retirement contributions. We then assume a real interest rate of 2% and a future marginal tax rate of

¹⁶The relationship is also negative when measuring the overpayment for health insurance in dollars, or when using FOSD to classify dominated health insurance choices (Appendix [Figure D.5](#)).

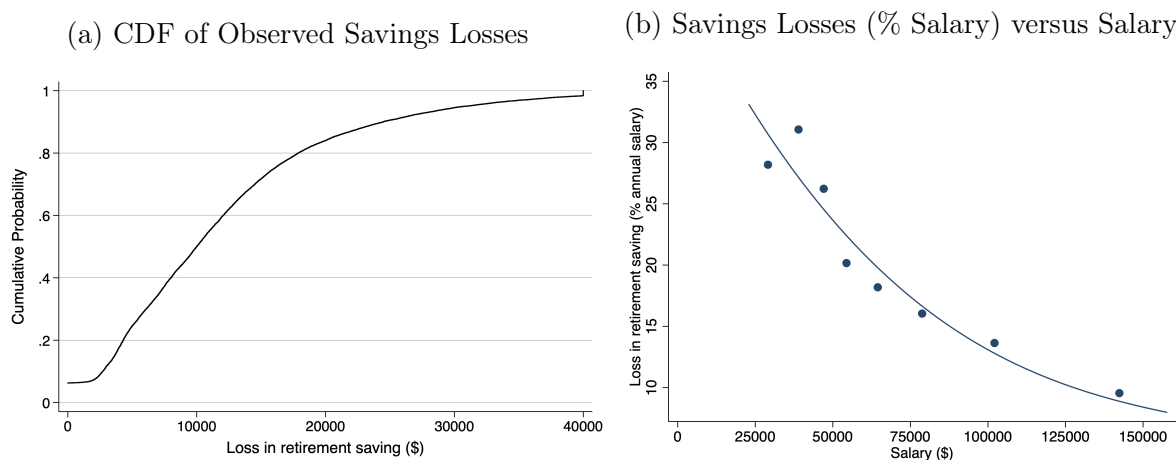
Figure 5: Overpayment for health insurance vs. voluntary retirement contributions



Notes: Figure presents binned scatterplots using the methods of [Cattaneo et al. \(2019\)](#) of overpayments in health insurance against voluntary retirement contributions, both measured as a percentage of salary. Line plots a 4th-order global polynomial, with the shaded area showing the 95% confidence interval on the polynomial.

25% (when assets are withdrawn). **Figure 6** shows the results are large for many employees. Panel (a) presents the distribution of retirement losses from health insurance overpayments across the sample. Among those with positive losses (94% of the sample), the mean loss in retirement saving exceeds \$12,700 and the median exceeds \$10,600. Twenty-five percent of the sample incur losses over \$16,000. Discounted to present value, the average loss exceeds \$7,000.

Figure 6: Losses in Retirement Wealth from Choosing Dominated Health Insurance Plans



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 salary versus salary in dollars.

These magnitudes are large. One way to benchmark the loss is relative to net worth at retirement. Based on estimates of net worth by age reported in [Bhutta et al. \(2020\)](#), the median loss after 30 years we document equates to over 4% of net worth at retirement.¹⁷ Expressed as a percentage of annual salary, the losses are largest for those with lower incomes as shown in Panel (b).¹⁸ The losses amount to 30% of annual salary for employees earning less than \$50,000 compared to 15% for those earning \$100,000. In effect, lower-salaried employees would need to work an extra 3-4 months to make up for repeatedly choosing a dominated health insurance plan during this period. These costs are underestimates because many people continued to choose dominated plans in subsequent years.

¹⁷Using 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.

¹⁸Appendix **Figure D.8** shows how the dollar amounts of these losses vary systematically with employee characteristics. The losses are larger for those with higher salaries, longer tenures, higher levels of health spending, and age.

5 Generalizability: Evidence from Other Universities

Do these results generalize or are they specific to this particular setting? To answer this question, we use survey data linked to administrative retirement accounts managed by Teachers Insurance and Annuity Association of America (TIAA). The survey was originally designed to study the association of financial literacy, financial fragility, and employer HSA funding with employee HDHP/HSA choices as analyzed in [Davis, Leive and Gellert \(2022\)](#). The survey instrument and additional survey details are described in Appendix E. The set of 15 universities was selected to be diverse geographically and by university type, and was stratified by level of employer HSA funding. 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 a majority of the universities included. This section uses this new data source to reproduce and extend the main results shown in the prior section. We refer to this data as the “TIAA survey-linked data”.

Beyond its wider scope, an advantage of the TIAA survey-linked data is that it includes other information on retirement accounts. For example, we observe total balances, asset allocation, and loan amounts. A second advantage is that it measures financial literacy, financial fragility, and reasons behind choosing or avoiding the HDHP/HSA. We analyze these potential mechanisms in the following section.

The main disadvantage of the survey is that we lack administrative data on health spending or insurance choices. Nonetheless, we are able to still assess whether a person chose a dominated health plan using their survey responses and the methods of [Liu and Sydnor \(2022\)](#) to classify dominated plans. As described in Appendix E, 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 rules, premiums, and any employer HSA funding at each university. This information is publicly available online.

Since we lack individual claims data in the TIAA survey-linked data, we cannot assess the extent of overpayments for health insurance. We note, however, that the stakes of choosing a dominated health plan are larger for some universities than in our case study, while in other universities they are smaller. Appendix [Figure E.1](#) presents the graphs of costs against total health spending for family coverage in each school. The potential overpayments are sometimes very large because several universities charge higher premiums to employees with higher salaries. Compared to our case study, survey respondents have higher salaries and are older (see Appendix [Table E.1](#) for sample means).

5.1 Results from TIAA survey-linked data

As shown in [Table 3](#), the positive correlation in choice quality is also observed among this wider set of universities. Choosing a dominated plan is associated with a 14.9 percentage point increase in not making supplemental retirement contributions (column 1). This represents a 44.6% increase from the baseline mean, which is larger than the magnitude in [Table 2](#). The estimates are similar if we exclude two schools that did not offer an employer match for supplemental retirement saving (column 2). The pattern is also observed when we split the sample above and below \$75,000 in annual salary, which corresponds roughly to the median of survey respondents.

Overall, 28.6% of survey respondents choose a dominated plan and do not make supplemental retirement contributions, 30.6% choose a dominated health plan but make some supplemental retirement contributions, 13.6% choose the HDHP/HSA and do not make supplemental contributions, and 27.2% choose the HDHP/HSA and make supplemental contributions ([Appendix Figure E.2](#)). Interestingly, the least common type are again those who choose the HDHP/HSA but do not make supplemental retirement contributions. Compared to the case study results from Sections 2-4, a smaller percentage of survey respondents choose the dominated health plan. Over one-quarter now exhibit high choice quality across both domains.

The proportion of types is fairly similar across salary levels, but employees earning below \$75,000 are more likely to exhibit low choice quality in both domains compared to those with higher salaries (33.5% vs. 26.4%) and less likely to exhibit high choice quality in both domains (22.5% vs. 33.6%).

6 Mechanisms

What mechanisms explain these decisions? Understanding the micro-foundations of choice patterns can help inform policy design for employers seeking to aid employee decision-making. For example, suppose liquidity constraints explain why employees choose a dominated health plan—as in [Ericson and Sydnor \(2018\)](#)—while not saving extra for retirement. Employees may be concerned about financing a large health shock before the premium savings from choosing the HDHP can build up. Rather than providing employees with smaller HSA deposits each year they choose the HDHP, an employer might instead fully fund the employee’s HSA in the initial year the HDHP is chosen and then not make contributions in future years. But if people avoid the HDHP and do not save for retirement because they misunderstand compound interest, then alternative policies should instead be considered.

Moreover, one mechanism may be important for some employees, while another may

Table 3: Choice Quality Across Domains, TIAA Survey-Linked Sample

Dep var: Zero supplemental retirement saving				
Choose dominated health plan	0.149 (0.028)	0.139 (0.029)	0.196 (0.039)	0.219 (0.039)
Constant	0.334 (0.021)	0.312 (0.021)	0.345 (0.031)	0.274 (0.027)
Salary levels	All	All	< \$75k	≥ \$75k
Exclude universities without retirement match	No	Yes	No	No
<i>N</i>	1,211	1,153	676	598

Note: Table presents regression results of linear probability models correlating the choice of a dominated health plan with the choice of not contributing to supplemental retirement accounts. Sample restricted to the set of universities in the TIAA sample where the HDHP/HSA stochastically dominated the other plans offered.

explain choices for other employees. Understanding heterogeneity across employees would inform the limits to any single intervention and provide guidance on the set of policies worth considering.

There are many potential reasons why people might choose a dominated health plan and not make supplemental retirement contributions. In this section, we use a mix of survey evidence and observational data to assess several possibilities. We begin with financial literacy and liquidity constraints, which are two mechanisms often posited to explain financial choices and are measured in the TIAA survey-linked data. We then consider inertia, inattention, hassle costs, search costs, learning, nonstandard beliefs, nonstandard preferences, and nonstandard decision-making. Appendix F provides additional details of the analysis of mechanisms.

6.1 Liquidity

[Ericson and Sydnor \(2018\)](#) show how borrowing costs and the timing of payments might lead people to avoid a dominated plan. Premium savings from the HDHP accrue gradually over the course of the year. Out-of-pocket expenses, however, may not be spread throughout the year and instead be charged when health spending occurs. If there is a large unplanned shock early in the year, then a person who is cash constrained may lack the ability to finance the out-of-pocket expense by borrowing against their future premium savings. In theory, the timing of spending shocks could therefore explain a demand for a high premium, low

deductible plan that is dominated. The prevalence of “wealthy hand-to-mouth” consumers suggests liquidity is often important at higher income levels too (Kaplan, Violante and Wiedner 2014).

We examine the role of liquidity in two ways. First, we simulate choices under a consumption-utility framework with borrowing constraints as in Ericson and Sydnor (2018) to assess whether liquidity can explain dominated choices. We only perform the simulation for our case study since we have both individual claims and insurance choices for that group. Second, we use survey responses about the ability to finance an unexpected \$2,000 expense, as well as the reasons why a person did not choose the HDHP from the TIAA survey-linked data.

Appendix F presents the details of the simulation’s specification, which assumes CRRA utility and that employees must borrow the full amount of out-of-pocket costs. There is uncertainty both in the amount of costs and in their timing throughout the year. Figure F.1 plots the percentage of the sample predicted to choose the HDHP for a range of interest rates on borrowing. Even assuming relatively high borrowing costs for everyone in the sample, liquidity alone does not rationalize the choices we observe. At a 2% monthly interest rate (equal to a 26% annual interest rate), over 96% of the sample would choose the HDHP. This rate is what might be charged on credit card debt, for example. Even at a 100% annual interest rate, over 90% of the sample would still choose the HDHP under this model. Most people are still predicted to choose the HDHP because the difference in out-of-pocket payments between plans is generally small, with large differences being relatively rare. So high borrowing costs for low-probability events are not enough to outweigh the sizable difference in premiums and HSA funds, which are certain. Liquidity therefore may explain why perhaps 5 to 10 percent of people avoid the HDHP in the case study.

Turning to the TIAA survey-linked data, we measure liquidity constraints by first asking the likelihood of whether households could finance an unexpected expense of \$2,000 within 30 days. This question (see Appendix E for exact wording) has been used in many other settings to measure “financial fragility” with respect to mid-sized shocks, starting with Lusardi, Schneider and Tufano (2011). We consider anyone reporting they either certainly could not or probably could not come up with the money as being liquidity constrained. Only 5% of the sample report being unable to finance an expense of that size, which is considerably smaller than the 18.9% documented in other recent surveys (Clark, Lusardi and Mitchell 2021). We supplement this measure with information on current retirement loans from TIAA’s administrative records. We also classify people as being liquidity constrained if they have a current retirement account loan. 11.4% of the sample are classified as liquidity constrained either because of a retirement account loan, because they are unable to finance

an expense of \$2,000 within 30 days, or both.

We then run a linear probability model of choosing a dominated health plan on this indicator for liquidity constraints. We include fixed effects for employers to account for differences in health insurance generosity across employers as well as differences in enrollment processes, information provision, etc. [Table 4](#) shows the probability of choosing a dominated health plan is 9.6 percentage points higher among those with liquidity constraints (column 1). This estimate, which is statistically different from zero, is robust to adding controls for demographics (column 2). These regressions provide evidence that liquidity is one reason why some people choose dominated plans.

Yet, this mechanism appears to only explain a tiny share of dominated choices in the TIAA sample. In particular, the point estimates from [Table 4](#) imply that relaxing the liquidity constraints for the employees in this sample would slightly reduce the percentage of people choosing a dominated plan from 59.2% to 58.4%.¹⁹ The difference is small because most survey respondents are not liquidity constrained and because liquidity has a relatively modest (though statistically significant) influence on choosing a dominated plan.

As further evidence, among respondents who did not choose the HDHP, 19.5% reported they did not do because the deductible was too high ([Appendix Table E.3](#)). This reason was considerably less common than expecting to incur high medical spending, which was reported by 69.5% of respondents who did not choose the HDHP ([Appendix Table E.3](#)). The survey evidence along with the case study’s simulation suggests that liquidity is not the primary reason why people choose dominated plans, though it does provide some explanatory power.

In terms of retirement saving, liquidity constraints are associated with not making supplemental contributions. The probability of not making supplemental contributions is 11.8 percentage points higher among employees liquidity constraints compared to others (column 3). This estimate rises to 13.7 percentage points controlling for demographics (column 4), and both are statistically significant. This result provides support to our interpretation that those who choose the HDHP/HSA but do not make supplemental retirement contributions likely face liquidity constraints and seek to minimize payroll deductions. It is perhaps surprising, however, how few employees fall into that group within our case study (1.8%). This set of choices represents a larger share (13.6%) of the TIAA survey-linked data, though it remains the smallest of the four types.

¹⁹In particular, 7.2% of the sample choose a dominated plan *and* are classified as liquidity constrained. Multiplying this share by the point estimate of 0.106 from [Table 4](#) (column 2) implies a reduction in the percentage of the sample choosing a dominated plan of just 0.76 percentage points. Using the upper bound of the 95% confidence interval results in a 1.35 percentage point decrease.

6.2 Financial literacy and health insurance literacy

A large body of research has shown financial literacy—defined as financial knowledge and the numeracy required to perform calculations—impacts retirement planning and a range of other financial behaviors (Hastings, Madrian and Skimmyhorn 2013, Lusardi and Mitchell 2014, Kaiser et al. forthcoming). It is conceivable that people with lower financial literacy may also struggle to compare the cost sharing and premiums of health insurance plans to determine which options are dominated. To our knowledge, there is no existing evidence on whether financial literacy predicts choosing dominated health plans.

The TIAA survey included the “Big Three” financial literacy questions about compound interest, inflation, and diversification (see Appendix E for exact wording). Survey participants recorded relatively high levels of financial literacy: 63% answered all three questions correctly, which is considerably higher than the average in other settings (Lusardi and Mitchell 2014).²⁰ We define high financial literacy as answering all three questions correctly, and lower financial literacy as answering at least one question incorrectly.

Table 4 shows the probability of choosing a dominated plan is 8.5 percentage points higher among people with lower financial literacy. This result is also robust to including controls for demographics (column 2). Performing a similar exercise as in the case of liquidity, if everyone answered the financial literacy questions correctly, the percentage of the sample choosing a dominated plan is predicted to fall from 59.2% to 57.2%.²¹ This change, which is small, is a bit larger than in the case of liquidity because those with lower financial literacy (who incorrectly answer at least 1 question) are a larger fraction of the sample.

In the TIAA sample, financial literacy is not strongly related to making supplemental retirement contributions. The estimate is positive, but it is small in magnitude and not close to statistical significance.

A similar concept particularly relevant to this context is health insurance literacy. 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 other aspects of health insurance more generally (Loewenstein et al. 2013, Bhargava, Loewenstein and Sydnor 2017). People may lack the knowledge and skills to translate how premiums, deductibles, coinsurance, and HSA funds ultimately affect their total after-tax costs. This calculation is further complicated by the fact that uncertainty in spending means they face

²⁰Financial literacy and liquidity constraints are negatively correlated in the TIAA survey, which is consistent with other settings. See e.g. Clark, Lusardi and Mitchell (2021).

²¹This reduction is calculated by multiplying the larger point estimate of -0.085 from Table 4 with 23.1%, which is the percent of the sample that chooses a dominated plan and answers at least one financial literacy question incorrectly. Using the lower bound of the 95% confidence interval results in a 3.2 percentage point reduction and so is still fairly small.

a probability distribution of costs. Recent experimental work by [Samek and Sydnor \(2020\)](#) shows that decision aids that provide people with quantiles of costs rather than the features of the contract can reduce the probability of choosing a dominated plan. In the TIAA survey, nearly 70% of people who did not choose the HDHP said they did so because they expected to incur high health spending that year. But that reason should not have mattered since the plans were dominated. Instead, the frequency of that response suggests many people struggle in mapping the features of the insurance plan to final costs, consistent with [Samek and Sydnor \(2020\)](#).²²

Some people did not realize they had access to an HDHP. Among those who reported not being enrolled in an HDHP, 33% (incorrectly) reported that an HDHP was not an option (Appendix [Table E.3](#)). This was the second most common reason for not choosing the HDHP. This belief represents a “mental gap” in the terminology of [Handel and Schwartzstein \(2018\)](#), rather than an information friction since the plan menu is easy to verify online with each university’s Human Resources website. This false belief might also reflect inattention, as discussed below, as well as a lack of understanding about plan features. Notably, only 1% of respondents who did not choose the HDHP did so because they thought the HSA could not roll over from one year to the next.

6.3 Inertia

Our finding that longer-tenured employees are more likely to choose a dominated health plan suggests a partial role for inertia. To explore inertia in each domain directly, we compare choices of those who must make active choices to those who instead have a default. After conditioning on other employee characteristics, differences in outcomes between these groups can be interpreted as capturing the role of inertia. The TIAA survey was restricted to employees with contributions in both 2019 and 2020 and so did not survey new employees. Our analysis of inertia is thus restricted to the case study.

We compare choices of new employees (who must make an active decision) to those of existing employees who are defaulted into their previous choice. The probability of choosing the HDHP is about 4 percentage points higher among new employees compared to existing employees, which is a 71% increase from the control mean ([Table F.1](#)). Yet, 90% of new employees still avoid the HDHP. Inertia therefore only appears to account for a small share of dominated choices in health insurance.

On the retirement side, new employees are *less* likely to make voluntary contributions

²²In field settings, [Gruber et al. \(2020\)](#) and [Bundorf, Polyakova and Tai-Seale \(2020\)](#) find that using decision aids based on artificial intelligence help reduce expected spending in choosing Medicare plans using a different approach based on generating expected utility scores.

Table 4: Liquidity Constraints and Financial Literacy, TIAA Survey-Linked Sample

	Dep var: Chose a dominated health plan		Dep var: Zero supplemental retirement contributions	
Liquidity constraint	0.096 (0.041)	0.106 (0.042)	0.118 (0.040)	0.137 0.041
Lower financial literacy	0.085 (0.027)	0.063 (0.029)	-0.014 (0.026)	-0.011 (0.028)
Age (relative to < 30)				
Ages 30-39		-0.098 (0.107)		-0.007 (0.100)
Ages 40-49		-0.055 (0.104)		0.015 (0.098)
Ages 50-59		-0.039 (0.103)		-0.023 (0.097)
Ages 60+		0.028 (0.104)		0.034 (0.097)
Female		0.029 (0.028)		-0.027 (0.027)
White		0.010 (0.036)		0.085 (0.035)
Married		0.023 (0.038)		-0.006 (0.037)
Faculty		-0.035 (0.030)		-0.026 (0.030)
Employer fixed effects	Yes	Yes	Yes	Yes
<i>N</i>	1,202	1,160	1,258	1,213
<i>R</i> ²	0.217	0.221	0.226	0.239

Note: Table presents regression results of linear probability models of choosing a dominated plan (columns 1-2) and not making supplemental retirement contributions (columns 3-4) against indicators for liquidity constraints and high financial literacy. Lower financial literacy is defined as answering at least 1 financial literacy question incorrectly. The indicator for being liquidity constrained is defined as having an existing retirement loan (collected from TIAA administrative records) or reporting on the survey they certainly or probably could not come up with \$2,000 to pay for an unexpected expense within 30 days.

than existing employees. There is instead a gradual increase in voluntary contributions, which we have documented in other work in this context (Friedberg, Leive and Cai 2020) and is also observed in other settings dating back at least to Madrian and Shea (2001). Inertia therefore appears less relevant in explaining low choice quality in both domains in this context.

6.4 Inattention, Search, and Learning

Given the complexity of insurance and saving decisions, making an optimal choice likely requires attention from consumers. They may also need to search for information. For example, some people may not recognize the employer deposits sizable HSA funds unconditionally, or that preventive care is covered for free under the HDHP. On the retirement side, some employees may not realize the employer matches their voluntary contributions.²³ The provisions around 403(b) loans are also likely not well understood, and require consulting the Summary and Plan Description, navigating to the vendor’s website, or contacting the vendor via telephone to get information.

Our results on overpayments from choosing a dominated plan and the amount foregone from employer matching can be interpreted as bounds on the costs of rational inattention (Mackowiak, Matejka and Wiederholt forthcoming) and/or search. We view the magnitudes documented in Section 4—over \$7,000 in present value from choices made during our sample period—as too high for most employees to justify not searching or paying attention. 80% of the sample have (pre-tax) salaries below \$100,000 and 95% earn below \$160,000. Recall that the employer provided comparison information and a decision support tool to help employees choose a health insurance plan. Information on matching contributions is clearly listed on the Human Resource Department’s benefits website and provided via communication.

Moreover, similar choices are made each year, so that attention can be amortized over many years. The average tenure in our sample is over a decade. We also note that such costs are additive, while the benefits from saving are exponential due to compounding. Survey responses from the TIAA sample suggest some importance of hassle costs, which we interpret as related to the costs of attention. Among those who did not choose the HDHP, 16% reported they did so because they thought managing the HSA would be confusing or a hassle (Appendix Table E.3).

²³Conditional on observables, medical center employees hired after 2002—whose 403(b) contributions are matched up to 4% of salary—are significantly more likely to make voluntary contributions than academic employees, who have a lower match limit. While that difference suggests some employees are aware of the higher match limit, the comparison is confounded by larger mandatory contributions for academic employees, so one should expect greater participation by medical employees regardless of the more generous 403(b) match.

Behavior might be explained by various behavioral models of inattention (Gabaix 2019) or by psychological models of limited “bandwidth” that negatively impacts decision-making (Mullainathan and Shafir 2013, Schilbach, Schofield and Mullainathan 2016). Concerns about a scarcity of money, time, or other resources can induce people to focus on the most pressing problems at the expense of longer-term ones. Time pressures may represent an importance source of scarce resources for employees in our context, in addition to possible concerns about finances.

Any learning about HDHPs and HSAs appears to occur slowly in our case study. As discussed in Appendix F, the large majority of employees still chose a dominated plan four years after the HDHP was introduced.

6.5 Nonstandard preferences, beliefs, and decision-making

Behavior may be also be explained various preferences or beliefs outside the standard economic model, or by departures from expected utility in the way decisions are made. Recent laboratory and survey research find several forms of “nonstandard” behavior are positively correlated (Dean and Ortoleva 2019, Stango and Zinman 2021). Further survey work is needed to measure these mechanisms in our context, but we discuss several candidate explanations in this subsection and in Appendix F.

First, we are able to use some features of our setting to rule out certain possibilities. Research in other insurance markets points to the importance of probability weighting (Sydnor 2010, Barseghyan et al. 2013). In the context of health insurance, laboratory evidence from Jaspersen, Ragin and Sydnor (forthcoming) documents the importance of both probability weighting and loss aversion in explaining choices. Yet, we find that our main results hold when we consider first-order stochastic dominance, in which probability distortions or loss aversion are not relevant. So these behavioral explanations cannot explain the choices we observe.

One possibility is that some employees may not realize the long-term value of compounding, suffering from exponential growth bias (Stango and Zinman 2009, Levy and Tasoff 2016, Ambuehl, Bernheim and Lusardi 2021). This bias might partly explain foregoing employer matching in retirement saving as well as the HSA. The HSA offers superior saving incentives to the 403(b), but these benefits might be diminished for people who misjudge the importance of compounding.

Finally, some people may not make decisions based on maximizing the expected utility of consumption. They may consider each choice in isolation, rather than together (“narrow bracketing”). This behavior may be true even though during open enrollment, a person choosing their health insurance plan can also adjust their retirement saving at the same

time on the same website. Theory and lab evidence show that under a range of preferences, narrow bracketing can lead people to make dominated choices (Tversky and Kahneman 1981, Rabin and Weizsäcker 2009).

Even if people do consider choices together, mental accounting (Thaler 1985, Thaler 1990 Thaler 1999) may be one model that explains behavior across domains. People may categorize funds for retirement saving and health insurance as representing different accounts, even though money is fungible. They may label their contributions to retirement accounts as “off limits” to finance other consumption, despite the favorable source of liquidity in terms of loans.

In choosing their health insurance, 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, rather than up front as a premium. In addition, people may not like to trade-off money and health at the margin, deciding whether the trip to the doctor is worth its cost. By contrast, more of the expense has already been pre-paid with generous coverage in a low deductible plan. Premiums are automatically deducted from each paycheck, so the payment may be less visible than with a deductible. Even if people recognize that the HDHP involves lower financial costs over the course of the year, some may prefer to be shielded from the psychic costs of paying at the point of service.²⁴

7 Discussion

Previous work has demonstrated that many consumers do not make financially sophisticated choices when it comes to their health insurance or retirement saving. Whether decision quality is correlated across domains has remained an open question. Using administrative data from a large employer, we document that people who choose a dominated health plan are significantly more likely to also forego employer matching funds for retirement saving. The costs of these decisions are sizable in each domain, but particularly in the health insurance choice. Over 90% of employees choose a plan that is second-order stochastically dominated, and forego over 2% of pre-tax salary, on average, each year.

This positive correlation in choice quality is important because of the large financial consequences, and because both behaviors could be addressed with no additional outlays by employees. One-third of employees choose a dominated health insurance plan and make no voluntary retirement contributions. For these employees, the overpayments for health

²⁴This behavior is similar to a preference for gym memberships rather than paying-per-visit, even if it means paying more in total as in DellaVigna and Malmendier (2006). That study concludes that overconfidence about self-control is a more likely explanation than a distaste of paying-per-visit, however.

insurance are 3.5% salary per year, which could be reallocated to either retirement saving or current consumption. Across all employees who choose a dominated health plan (94% of the sample), the mean loss in retirement saving exceeds \$12,700 just for the choices made during our sample period. As a fraction of salary, these losses are highest for employees with lower educational attainment, lower salaries, and for women.

Importantly, this correlation in choice quality is not restricted to our particular setting. Using data that links survey responses to TIAA’s administrative records on retirement accounts, we find the pattern holds in 10 other universities that offered dominated health plans. Collectively, our results suggest that choosing a dominated health plan may pose a barrier to retirement preparedness for many U.S. workers.

In terms of mechanisms, there appears to be substantial heterogeneity across employees. We find some evidence for financial literacy, health insurance literacy, liquidity, inertia, and inattention, though each is relatively limited by itself. There does not appear to be a single mechanism that drives choices. Behavior is also consistent with decision-making rules other than expected utility, such as narrow bracketing and mental accounting, and with biased beliefs, such as underestimating exponential growth. The stakes of the decision are too large for rational inattention to explain choices for the vast majority of employees. We also rule out loss aversion and probability weighting, since these are inconsistent with choosing a plan that has lower costs regardless of the amount of spending incurred. Based on our analysis using observational data and survey responses, we interpret most dominated plan choices to represent mistakes.

The heterogeneity in mechanisms that drive behavior poses a challenge to policy design. While our findings suggest that it is often the same people who need to be targeted with assistance across multiple types of decisions, different people are likely to benefit from different types of assistance. Understanding how to best structure such efforts, and whether their benefits and costs justify offering choice at all in these domains, is an important question for employers and policymakers.

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Appendix A: Institutional Details of Health Insurance and Retirement Plans [For Online Publication]

This Appendix presents more information on the rules and options for health insurance and retirement saving offered by the employer. 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 in each year. Maternity visits were also paid in full by each plan. Plans had slightly different prescription drug coverage. Nonetheless, we compared prices on ten common prescriptions 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 features of the plans 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 an online decision support tool to aid in choosing between the three plans.

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. Nevertheless, the overall choice set remains similar across many of these groups, and we have characterized decision quality in ways that can be applied uniformly across them.

Academic division, faculty. First, faculty face a one-time irrevocable choice at the outset of employment between the DB plan run by the state (described next) and the 401(a) DC plan with the mandatory contributions that we described earlier. A large majority chooses the DC plan. Second, mandatory contributions are made to the 401(a) plan. For faculty hired before July 1, 2010, the mandatory contribution rate is 10.4% from the employer. For faculty hired after, it is 8.9% from the employer and 5% from the employee.

Academic division, non-faculty employees. Non-faculty academic-division employees do not have a choice and 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.

Academic division, all employees. The employer provides a limited match to the university 403(b) plan. This consists of a 50% match for contributions up to \$80 per month.

Medical division, all employees. Medical division employees do not have a choice 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 \$80 per month. For employees hired after, it is a 50% match for contributions up to 4% of salary.

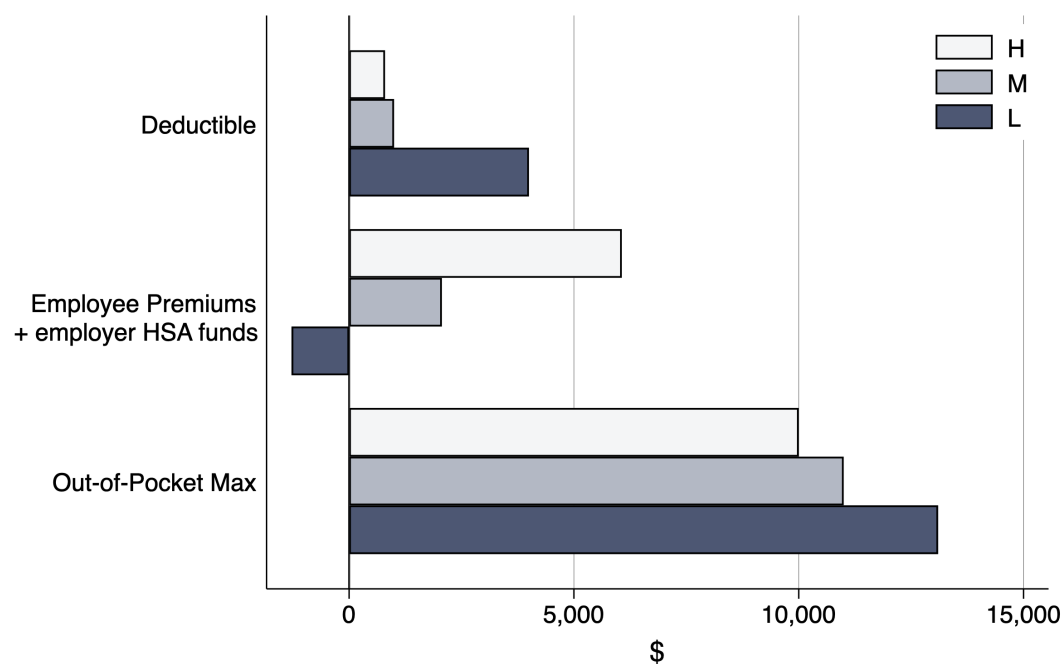
Table A.1: Summary of Main Features of Health Insurance Plans, 2015 and 2017

	2015			2017		
	Coverage level			Coverage level		
	High	Medium	Low	High	Medium	Low
<i>Panel A. Employee-only</i>						
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
<i>Panel B. Employee + child</i>						
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
<i>Panel C. Employee + spouse</i>						
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
<i>Panel D. Family</i>						
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

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

		Low coverage plan				High coverage plan		# plans
		Premium	Deductible	HSA Available	Employer HSA Contribution	Premium	Deductible	
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	

Figure A.1: Deductibles, Premiums, and Out-of-Pocket Max in 2017, Family Coverage



Notes: Key parameters of health insurance plans in 2017 for family coverage. Plan names "L", "M", and "H" stand for low coverage (HDHP/HSA), medium coverage, and high coverage, respectively.

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

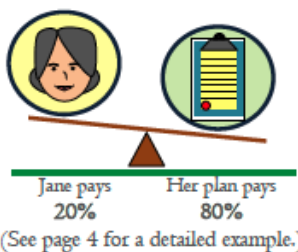
A request for your health insurer or **plan** to review a decision or a **grievance** again.

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.

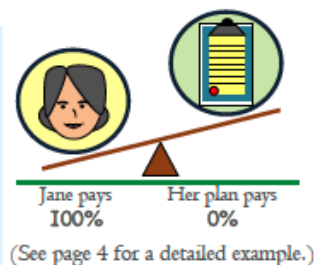


Co-payment

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.



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

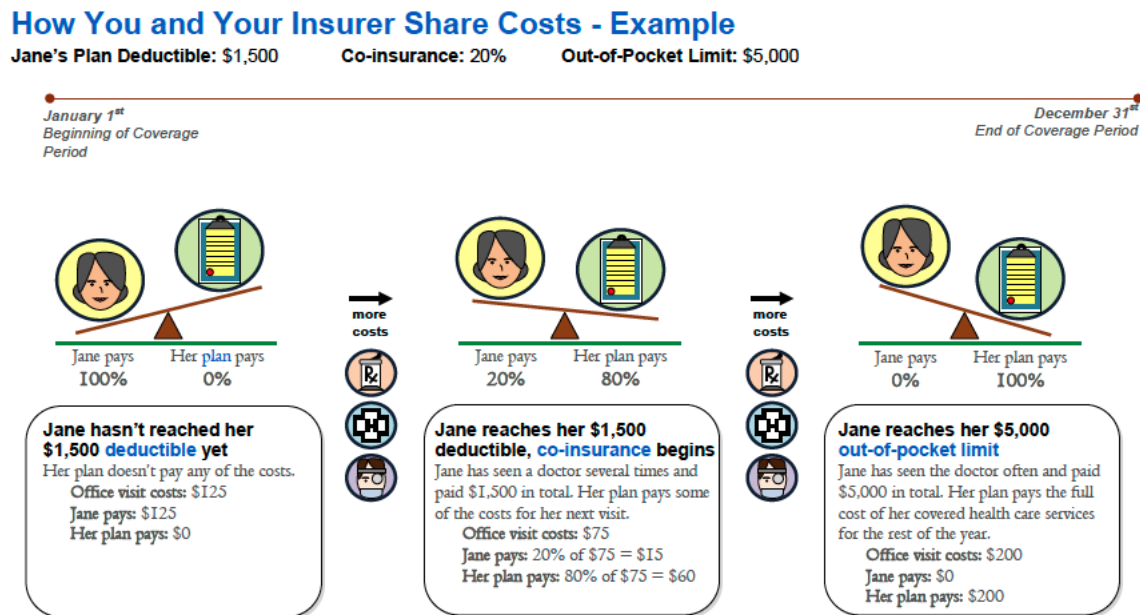
An illness, injury, symptom or condition so serious that a reasonable person would seek care right away to avoid severe harm.

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 example of deductibles, coinsurance, and out-of-pocket limit provided to employees.

Appendix B: Imputation of Marginal Tax Rates [For Online Publication]

This Appendix describes the procedure to impute marginal tax rates for each employee in our data. The marginal tax rates are used to adjust contributions to Roth accounts, which became available in in the later period we examine, to a pre-tax basis. 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.

Appendix C: Construction of Health Expenditure Distributions [For Online Publication]

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

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

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

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

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. Second, we implicitly allow for selection on moral hazard (Einav et al. 2013) by allowing the OOP distributions to differ based on the

plans people choose. But our approach of using the empirical distributions of chosen plans means we are assuming people do not vary in this dimension. Finally, 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 over health insurance plans.

References

Einav, Liran, Amy Finkelstein, Stephen Ryan, Paul Schrimpf, and Mark Cullen. 2013. “Selection on Moral Hazard in Health Insurance.” *American Economic Review*, 103(1): 178–219.

Appendix D: Details of additional analyses from case study [For Online Publication]

Additional Descriptive Statistics. Table D.1 presents sample means for employees in each plan, split by academic and medical division. Patterns are generally qualitatively similar across both divisions. In particular, mean income is highest among employees choosing high coverage, followed by those choosing low coverage (HDHP/HSA), and the lowest incomes among those choosing medium coverage. Employees who choose low coverage are younger, on average, than the other coverage types, and employees who choose high coverage are the oldest. Employees who choose the high coverage plan have the highest tenure with the employer. Household size does not differ substantially across coverage levels. Total health spending is highest among those choosing high coverage and lowest among employees choosing low coverage. The differences are quite large: over \$10,000 in spending for high coverage, \$6,000 in spending for medium coverage, and approximately \$3,000 in spending for low coverage. In terms of retirement saving, voluntary contributions are meaningfully larger among those choosing low coverage compared to those choosing medium or high coverage, on average.

Table D.1: Sample Means by Health Insurance Coverage Level

	Academic Division			Medical division		
	Health insurance coverage level			Health insurance coverage level		
	High	Medium	Low	High	Medium	Low
Annual salary (\$)	83,946	75,739	79,343	70,245	58,754	65,387
Age	49.85	43.05	41.52	46.19	38.78	38.41
Faculty (%)	0.36	0.32	0.38	0	0	0.01
Academic division (%)	1	1	1	-	-	-
Female (%)	0.5	0.47	0.46	0.76	0.73	0.73
Single (%)	0.34	0.21	0.2	0.57	0.46	0.5
Married (%)	0.35	0.29	0.27	0.17	0.16	0.15
Tenure with employer (years)	14.17	8.03	6.97	11	5.54	5.39
Household size	2.02	2.33	2.03	1.85	1.99	1.77
Family coverage (%)	0.5	0.59	0.45	0.46	0.51	0.35
Employee insurance premium	2,444	1,108	359	2,250	998	303
Employer insurance premium	7,876	8,694	8,010	7,473	7,916	7,021
Out-of-pocket spending	1,249	1,354	1,485	1,237	1,352	1,643
Total health spending	10,425	6,463	3,148	10,777	6,149	2,796
Voluntary retirement contribution (403b + 457)	4.97	4.17	7.11	3.7	3.23	5.06
403b Participation (tax deferred)	0.66	0.63	0.65	0.57	0.51	0.62
Roth Participation (403b + 457)	0.07	0.12	0.19	0.11	0.13	0.19

Note: Table presents means of demographic and outcomes variables in sample by health insurance coverage level chosen. Administrative data on faculty at a large public university during 2014-2017. Descriptive statistics calculated separately by employees in academic division (columns 1-3) and medical division (columns 4-6).

Table D.2 replicates Table 1 in the main text, restricted to the 93.8% of employees who face a stochastically dominated choice of health insurance plans. The means are extremely close to those from the full sample.

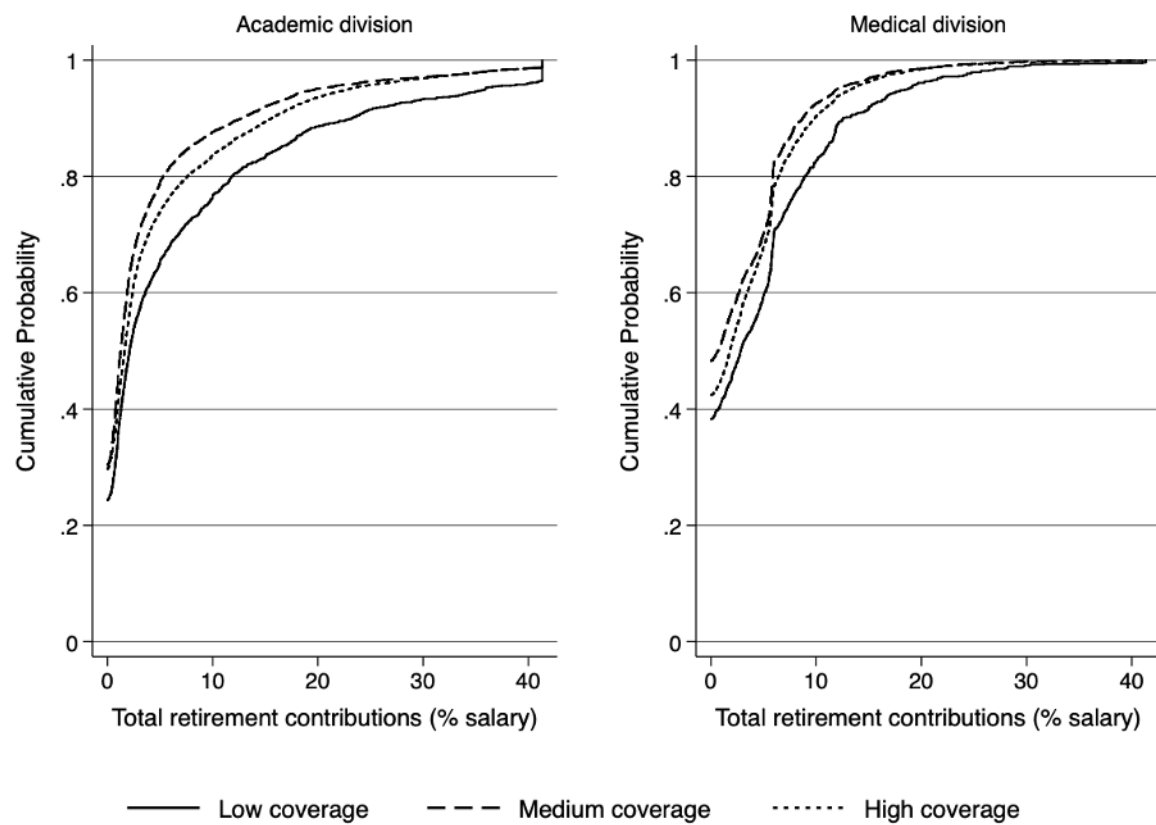
Table D.2: Summary Statistics, Choice Sets with SOSD Health Plans

	Mean	SD
Annual salary (\$)	73,770	44,311
Age (years)	45.07	11.20
Faculty (%)	0.19	0.39
Academic division (%)	0.56	0.50
Tenure with employer (years)	10.26	9.26
Female (%)	0.62	0.48
Household size	2.05	1.26
Low coverage plan (%)	0.06	0.24
Middle coverage plan (%)	0.34	0.47
High coverage plan (%)	0.59	0.49
Total health spending (\$)	8,248	28,030
Voluntary retirement contribution rate (% salary)	4.28	7.09
Voluntary retirement participation (%)	0.64	0.48
<i>N</i>	16,096	
<i>NT</i>	43,360	

Note: Table presents means and standard deviations of demographic and outcome variables in sample restricted to those facing second-order stochastically dominated health insurance plans. Administrative data on faculty at a large public university during 2014-2017. the number of unique employees and the number of employee-years. Salaries are not adjusted for inflation.

The higher mean saving rates among those choosing low coverage are not driven by the top of the savings distribution. Figure D.1 plots the distribution of voluntary retirement contributions for employees choosing each of the three plans, separately for Medical and Academic divisions. Employees in the low coverage plan make higher voluntary retirement contributions compared to employees in other plans throughout the distribution of contributions.

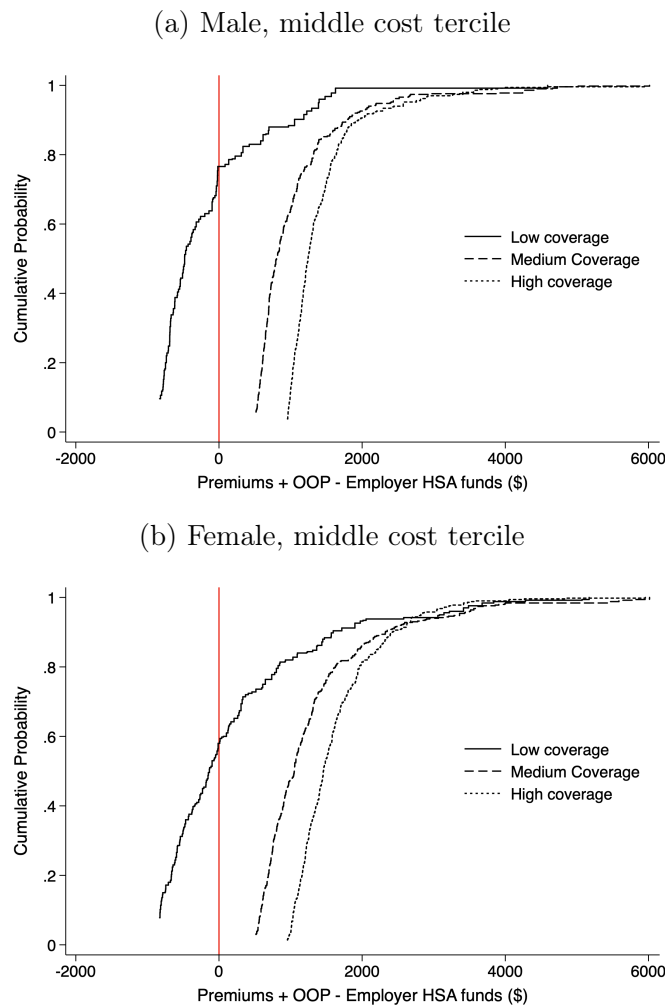
Figure D.1: CDFs of Retirement Contributions by Plan and Division



Note: Figure plots CDFs of voluntary retirement contributions among employees choosing each health insurance plan, separately by academic and medical divisions.

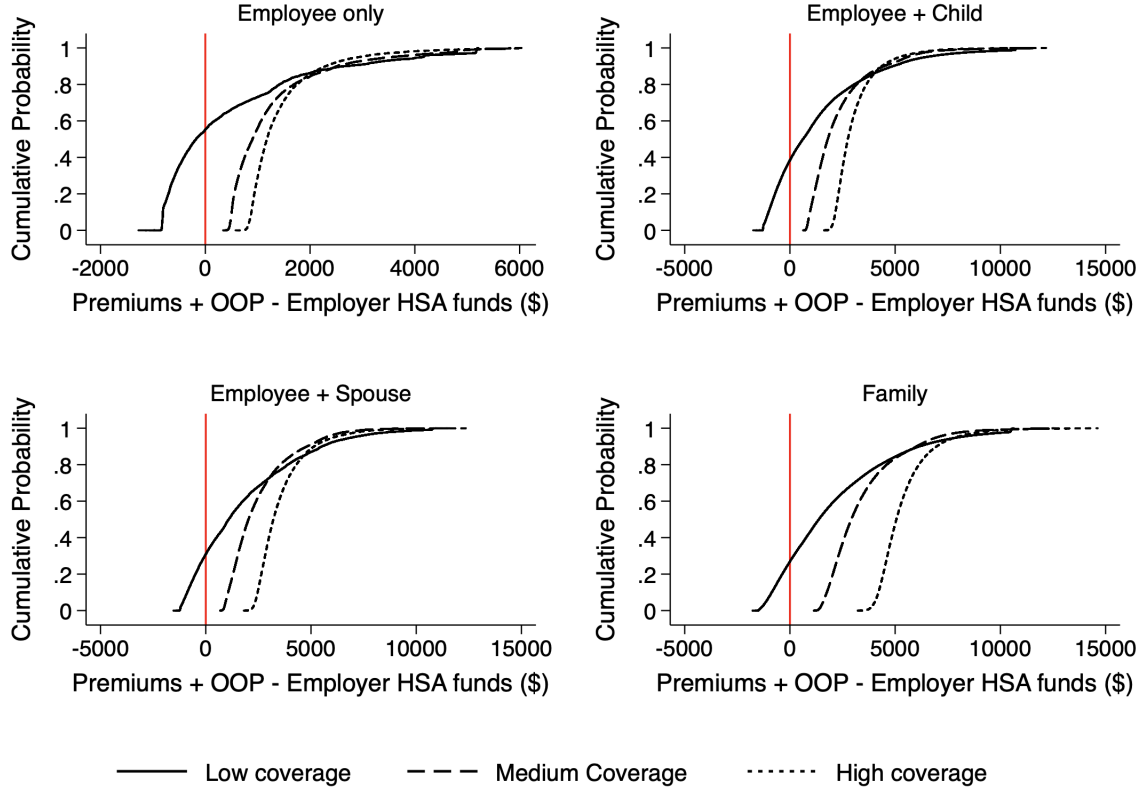
Health Care Cost Distributions. We provide additional examples of distributions of health care costs to illustrate the prevalence of dominated choices in health insurance. [Figure D.2](#) plots the cumulative distribution functions (CDFs) of health care costs for 40-year olds in the middle cost tercile in 2017 under each of the three plans, using the empirical distribution of costs as described in Appendix C. These costs are inclusive of premiums and HSA contributions from the employer in the low coverage plan. Based on second-order stochastic dominance, the low coverage plan dominates the other two plans for both men and women. For men, the CDF almost always lies above the other CDFs. [Figure D.3](#) aggregates all the distributions across employees for 2014. The patterns are similar to those for 2017 that are presented in the main text.

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



Note: Figure plots empirical cumulative distribution functions (CDFs) of health care costs for a 40-year-old male (top panel) and female (bottom panel) in the middle cost tercile who face a marginal tax rate of 25%. The low coverage plan is second-order stochastically dominated by the other plans for both men and women. The distribution for the low coverage plan located to the left of the vertical red line at zero denotes the fraction of cost realizations that would result in negative costs due to the employer HSA contribution.

Figure D.3: CDFs of Health Care Costs in 2014

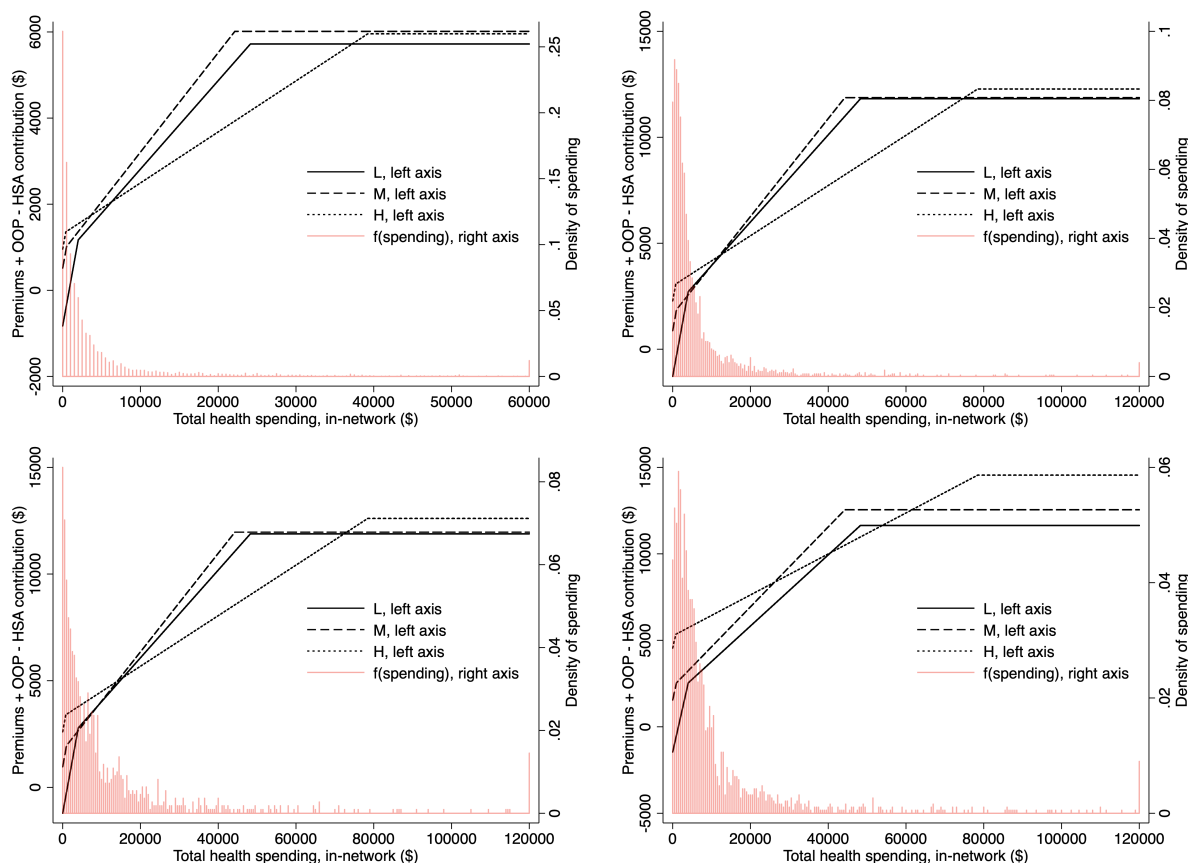


Note: Figure plots empirical cumulative distribution functions (CDFs) of health care costs across all employees under each available health insurance plan in 2014. The low coverage plan is second-order stochastically dominated by the other plans. The distribution for the low coverage plan located to the left of the vertical red line at zero denotes the fraction of cost realizations that would result in negative costs due to the employer HSA contribution.

As another way of illustrating the cost differences between plans, [Figure D.4](#) plots costs (on the left y-axis) as a function of total health spending for each plan, again stratified by coverage type. 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). 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. The calculations of the distributions of costs to calculate expected costs and assess stochastic dominance, such as in [Figure D.2](#) or [Figure D.3](#), use the observed patterns of costs. Each panel in [Figure D.4](#) also overlays the density of total health spending (on the right y-axis). For each coverage type, the large majority of the distribution of spending falls in the range where costs are lowest under L . There are regions where H has lower costs, but the small density over this region shows these spending outcomes are quite rare. These graphs illustrate how for most cases, L second-order stochastically dominates the other plans, but may often not strictly dominate (first-order stochastic dominance).

Notably, the greatest cost differences are not always at high levels of health care spending; this may be contrary to people's intuition, as they may believe that, in case of catastrophic spending outcomes, they would pay much more under the low coverage plan. But in fact, because the high deductible would get exhausted in this eventuality and the OOP maximum is similar under all three plans, spending outcomes are quite similar under all three plans when high health care costs are incurred.

Figure D.4: Costs vs. Total Health Spending by Coverage Type



Notes: Figures show costs plotted against total health spending for each plan, stratified by coverage type. Costs are 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. The density of spending is plotted on the right y-axis.

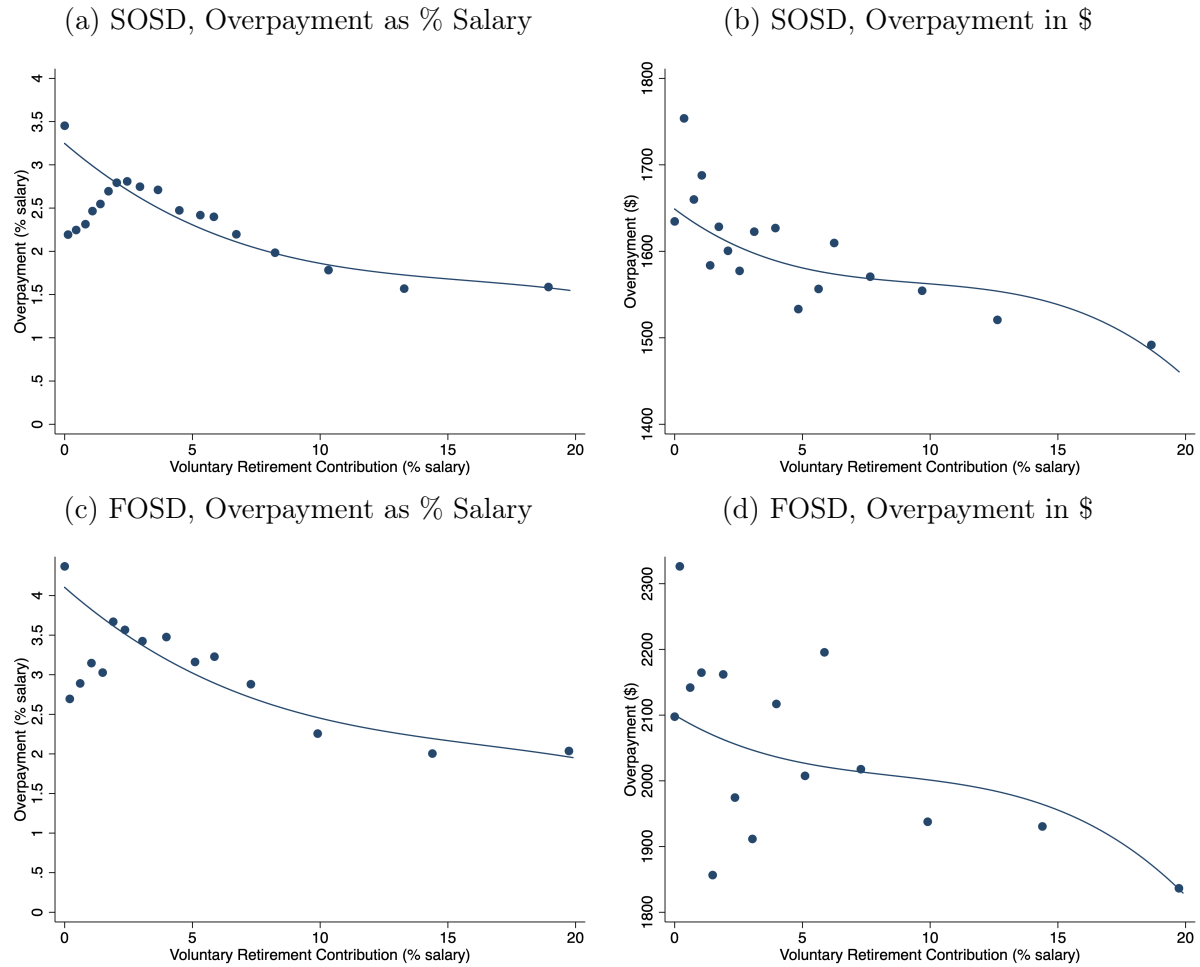
Robustness to Definition of Dominance. Table D.3 shows the distribution of the four types under different criteria for classifying dominance, and restricted to different sub-samples. The patterns are similar if we exclude employees who have either observed spending or predicted spending (via LASSO) that 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). Figure D.5 shows that binned scatterplots of overpayments for health insurance against voluntary retirement contributions are also similar using FOSD to define dominated plans.

Table D.3: Distribution by Type, Robustness

	Low choice quality in both domains	Low choice quality in health	High choice quality in health	High choice quality in both domains
<i>Panel A.</i> Choices based on empirical OOP distribution				
SOSD (Main analysis)	34.0	59.3	2.0	4.8
FOSD	35.5	59.2	1.2	4.1
<i>Panel B.</i> Excluding employees in range where H is lowest using observed spending using LASSO-predicted spending				
	32.0	57.8	3.1	7.0
	29.4	61.2	2.1	7.4
<i>Panel C.</i> Coverage type and division sub-samples				
Family coverage	28.8	63.5	1.7	6.0
Employee-only coverage	35.2	57.4	4.9	2.4
Medical division with 4% 403(b) match	42.3	51.4	2.5	3.8

Note: Table presents proportion of employees exhibiting each combination of behavior for alternative definitions of dominance and sub-samples.

Figure D.5: Robustness: Binned Scatterplots of Overpayments vs. Retirement Saving

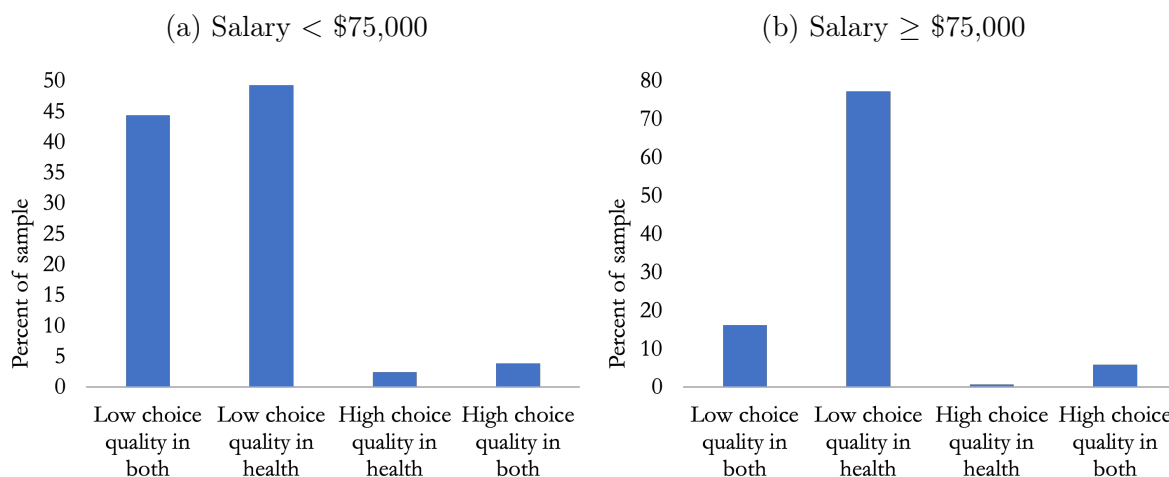


Notes: Figure presents binned scatterplots using the methods of [Cattaneo et al. \(2019\)](#) of overpayments in health insurance measured in dollars against voluntary retirement contributions, measured as a percentage of salary. Line plots a 4th-order global polynomial.

Characteristics Associated with Choice Quality. Which types of employees are more likely to exhibit low choice quality in both domains? Who is more likely to high choice quality in both domains? We first present correlations between observables and each of the four types that do not condition on other covariates. We then present the results of multinomial logits that estimate conditional correlations.

Figure D.6 shows how types differ by salary, splitting the sample by employees earning less than \$75,000 and employees earning at least \$75,000 in annual salary. This amount equates to roughly the median across the full sample. These tabulations pool academic and medical divisions. Higher-salaried employees are more likely to choose a dominated health plan only, given their higher contribution rates to voluntary retirement plans. Lower-salaried employees are more likely to exhibit low choice quality in both domains. We still observe a strong positive correlation in choice quality across domains within salary levels.

Figure D.6: Proportion of Types by Salary Level



Notes: The figure plots the proportion of types based on quality of choices in health insurance and retirement saving. We define low choice quality in both domains as those who choose a dominated health plan and do not obtain employer matching funds for retirement saving (1st bar from left). Choosing a dominated health plan while obtaining employer matching funds for retirement constitutes low choice quality in the health domain (2nd bar from left). Not choosing a dominated plan and not obtaining employer matching funds for retirement saving constitutes high quality choice in the health domain (3rd bar from left). Finally, not choosing a dominated health plan and obtaining employer matching funds for retirement saving constitutes high choice quality in both domains.

Table D.4 tabulates sample means of income, demographics, job characteristics, and health spending split by the four types. Those who obtain employer matching funds on retirement have higher incomes than those who do not. Those who avoid choosing the dominated health plan but fail to obtain employer matching on retirement have the lowest incomes, on average. Those who choose the dominated health plan have longer tenures and higher health spending.

Table D.5 presents multinomial logit results to assess the conditional associations between observable characteristics and types. The table presents marginal effects and so estimates can be interpreted in terms of predicted probabilities. To allow for non-linearities in age and salary, we group employees into 10-year age bins and four salary bins. We include

Table D.4: Sample Characteristics by Type

	Low choice quality in both domains	Low choice quality in health domain	High choice quality in health domain	High choice quality in both domains
Percent of sample	34.0	59.6	1.8	4.6
Income (\$)	54,742	84,436	49,933	85,432
Age (years)	43.9	46.2	36.4	42.4
Female (%)	67.2	59.9	67.4	55.2
Tenure (years)	10.2	10.7	4.1	7.5
Household size	2.0	2.1	1.8	2.1
Faculty (%)	7.7	25.1	11.0	30.1
Academic division (%)	45.9	61.4	49.6	67.4
Total health spending (\$)	8,876	8,430	4,352	2,776

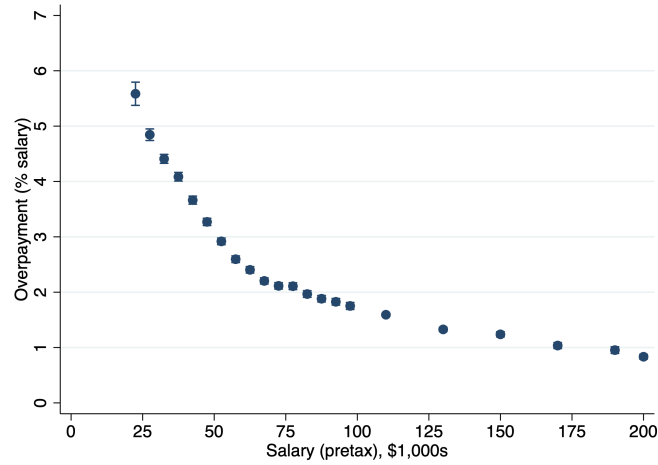
Note: Table presents means of annual salary, demographics, job characteristics, and total health spending by type of behavior.

indicators for coverage type since we lack complete information on marital status and only observe dependents if they are enrolled in the health insurance plan.

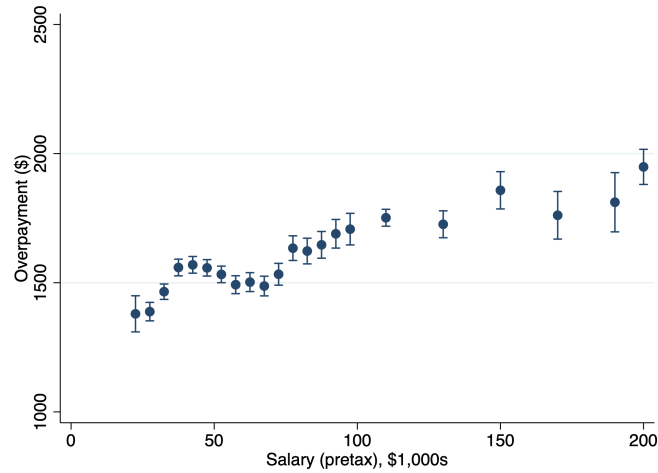
Compared to lowest-salaried workers, higher salaries are associated with a significantly greater share of “High choice quality in both domains” types and smaller share of “Low choice quality in both domains” or “high choice quality in health” types. Higher-salaried employees are significantly more likely to exhibit nonstandard behavior only in health insurance, since many employees with high salaries choose the high coverage plan. Age follows a similar pattern to income, with differences more pronounced the older that employees are. Conditional on age and income, employment tenure is negatively associated with standard behavior in both domains and positively associated with nonstandard behavior in both domains. Since the university typically hires both faculty and staff across a range of ages, we are able to include both tenure and age in these regressions without collinearity problems. There is some evidence that decision quality improves over time, with more employees avoiding the dominated plan and obtaining employer matching funds in later years compared to 2014. Yet the magnitudes of this improvement are small relative to the baseline level. We are unable to determine whether this pattern is driven by experience, peer effects, or responses to the rising premiums and deductibles in high coverage plan over time.

Figure D.7: Overpayment for health insurance vs. income

(a) as % salary



(b) in dollars



Notes: Figure presents binned scatterplots using the methods of [Cattaneo et al. \(2019\)](#) of overpayments in health insurance as a percent of salary (Panel A) and in dollars (Panel B) against employee pre-tax salary. Whiskers denote 95% confidence intervals.

Table D.5: Multinomial logit: characteristics associated with types

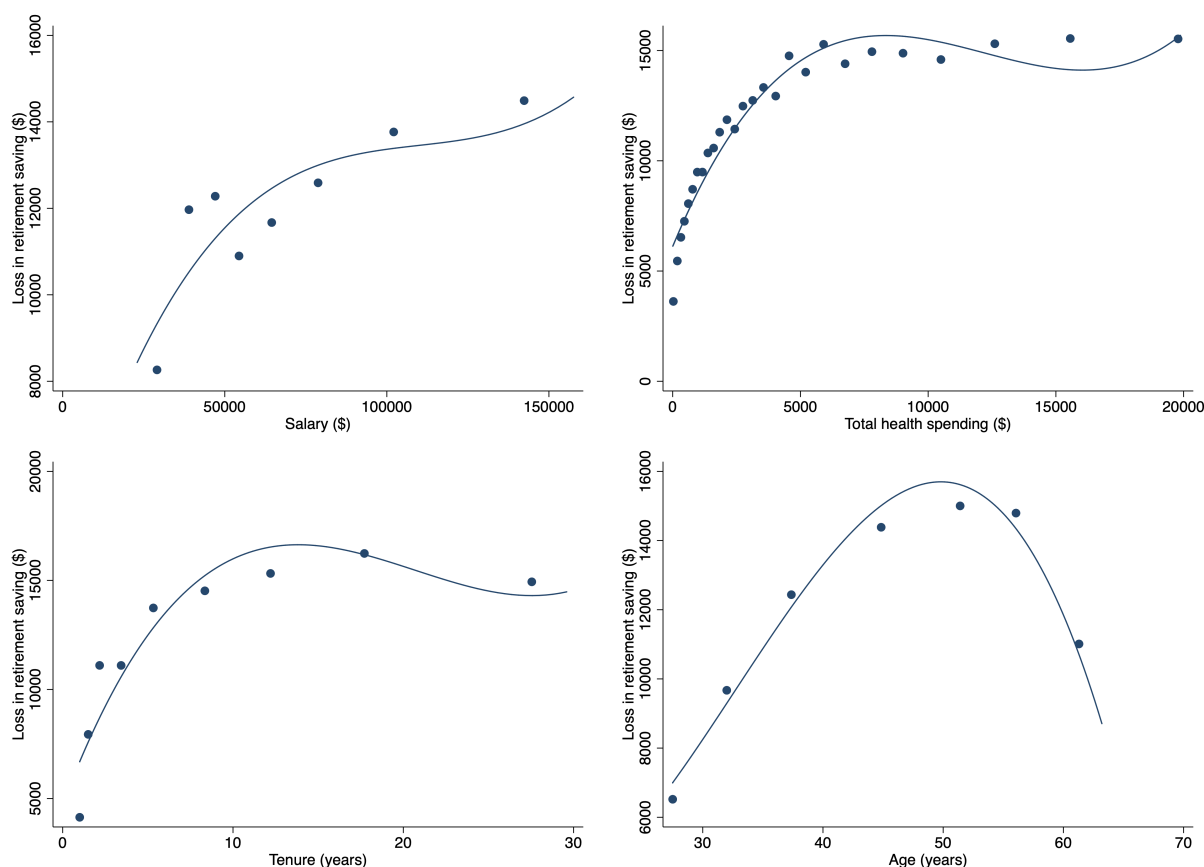
	Type:		Type:		Type:	
	Low choice quality in both domains	Low choice quality in health domain	High choice quality in health domain	High choice quality in both domains	High choice quality in both domains	High choice quality in both domains
	Marginal effect	SE	Marginal effect	SE	Marginal effect	SE
Tenure (years)	-0.002	(0.000)	-0.002	(0.000)	-0.001	(0.001)
Female	-0.004	(0.003)	0.000	(0.002)	0.018	(0.008)
Faculty	00.007	(0.005)	0.003	(0.003)	0.029	(0.012)
Salary (relative to <\$45k)						
\$45k - \$65k)	0.013	(0.004)	-0.012	(0.002)	0.169	(0.008)
\$65k - \$100k)	0.028	(0.004)	-0.014	(0.002)	0.280	(0.008)
\$100k+)	0.042	(0.005)	-0.027	(0.005)	0.426	(0.012)
Age (relative to <30 years)						
[30,40)	-0.018	(0.005)	-0.007	(0.002)	0.035	(0.011)
[40,50)	-0.022	(0.005)	-0.011	(0.003)	0.047	(0.012)
[50,59.5)	-0.027	(0.006)	-0.019	(0.004)	0.072	(0.012)
[59.5+)	-0.037	(0.008)	-0.018	(0.005)	0.070	(0.015)
Academic division	0.021	(0.004)	0.004	(0.002)	0.075	(0.008)
Coverage type (relative to Family)						
Employee only	0.005	(0.004)	-0.003	(0.003)	0.048	(0.011)
Employee plus child	-0.012	(0.005)	-0.016	(0.004)	0.045	(0.012)
Employee plus spouse	-0.011	(0.007)	-0.010	(0.005)	0.039	(0.015)
Year (relative to 2014)						
2015	0.002	(0.002)	0.005	(0.001)	-0.009	(0.003)
2016	0.006	(0.002)	0.009	(0.001)	-0.006	(0.004)
2017	0.016	(0.002)	0.018	(0.002)	-0.034	(0.004)

Note: Table presents marginal effects from multinomial logit of types, based on definitions of choice quality in health insurance and retirement saving. $N = 47,754$. Pseudo $R^2 = 0.119$. Standard errors clustered by employee in parentheses.

Loss in Retirement Saving from Choosing a Dominated Health Plan

As shown in the main text, the implications for retirement saving of choosing a dominated health insurance plan are substantial, even during the 4 years of our sample. **Figure D.8** displays how these losses are related to different employee characteristics in a series of binned scatterplots using the methods of [Cattaneo et al. \(2019\)](#). In dollar terms, there is a concave relationship between retirement savings losses (on the y-axis) and salary, annual total health spending, tenure, and age (on the x-axis). The retirement losses generally rise monotonically with salary. For both tenure and health spending, the curve flattens around the midpoint of each. The oldest employees in the sample have lower losses than middle-aged employees but higher losses than the youngest.

Figure D.8: Binned Scatterplots: Losses in Retirement Saving by Employee Characteristics



Notes: Figure shows binned scatterplots for the loss in retirement saving from observed choices of dominated health insurance plans made during the study period, against employee characteristics. Scatterplots constructed using the methods of [Cattaneo et al. \(2019\)](#) and the line plots a 4th-order global polynomial.

References

Cattaneo, Mattias, Richard Crump, Max Farrell, and Yingjie Feng. 2019. “On Binscatter.”

Appendix E: TIAA Survey Instrument and Additional Survey Results [For Online Publication]

In June 2021, we fielded a Qualtrix survey among participants holding retirement accounts with Teachers Insurance and Annuity Association of America (TIAA) at 15 universities. The set of employers was selected to be diverse geographically and by university type. We also stratified the survey by level of employer HSA funding. Survey responses were merged with TIAA's administrative records on retirement accounts. We restricted the survey to active participants, defined as having positive contributions (either by the employee or the employer) to a primary or supplemental employer-sponsored retirement savings account in both 2019 and 2020. We received responses from 2,388 individuals out of a total of 60,804 invitations sent, for a response rate of 3.9%. A total of 2,157 people completed the survey.

Details of survey instrument and questions: The following text was included in an email with a link to the survey, and on the landing page for the survey. The text listed the contact information for Brent Davis. In reproducing the survey below, we exclude the questions asking about demographics and employment categories (staff vs. faculty, part-time vs. full-time, etc.) for brevity.

HEALTH SAVINGS ACCOUNT SURVEY

The cost and financing of health care is an area of increasing concern for many workers. We are interested in learning more about how individuals use Health Savings Accounts. As part of our research, we are conducting a survey that examines workers' health plans and Health Savings Accounts.

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

Please click on the link below to complete our brief online survey. The survey tool is designed to work on either a computer or a mobile device. The estimated time to take this survey is 10 - 12 minutes and will be available to you for up to 14 days from today.

If you would like to contact the researchers, you may contact them based on the information below. You may call collect if you identify yourself as a research participant.

Q1: What is your approximate annual household income?

- Less than \$25,000
- \$25,000 to \$49,999
- \$50,000 to \$79,999

- \$75,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$249,999
- \$250,000 or higher

Q2: What is the approximate amount of your total household retirement assets? Include approximate assets in all of your household's Individual Retirement Accounts (IRAs), 401(k)s, and 403(b)s.

- Less than \$50,000
- \$50,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$249,999
- \$250,000 to \$449,999
- \$500,000 to \$999,999
- \$1 million or greater
- Don't know
- Prefer not to answer

Q3: Did you participate in a Defined Benefit plan in 2020 with your current employer? This is also known as a traditional pension that pays retirees a monthly benefit amount depending on their salary, age, and years of service.

- Yes
- No
- Don't know

Q4: Were you covered by employer-based health insurance in 2020?

Employer-based health insurance is one offered by your (or your spouse's) employer, and premiums are usually paid by both the employee and the employer.

- Yes, through my employer
- Yes, through my spouse's/partner's employer
- No
- Don't know

Q5 [If Q4 = Yes]: Who is covered by the employer-based health insurance plan?

- Only myself
- Myself and my spouse/partner only
- Myself and my children only

- My family (i.e. myself, my spouse/partner, and children)
- Don't know

Q6 [If Q4 = Yes]: Was that insurance a high-deductible health plan (HDHP)?

A high-deductible health plan (HDHP) has lower monthly premiums but a high-deductible that employees must meet before insurance begins to pay for medical claims. A HDHP usually provides access to a Health Savings Account (HSA).

- Yes
- No
- Don't know

Q7 [If Q6 = No]: Why did you (your spouse/partner) not choose the HDHP insurance plan? (Choose all that apply)

- A high-deductible health plan was not an option
- Deductible was too high
- Expected to have high medical spending in 2020
- Expected to have little medical spending in 2020
- Thought managing the HSA would be a hassle or confusing
- Thought the funds in the HSA could not be carried over
- It was not recommended to me

Q8 [If Q6 = No]: How likely are you (your spouse/partner) to choose a HDHP insurance plan in the future if it was offered?

- Very likely
- Likely
- Not likely
- Don't know

Q9 [If Q6 = No]: Have you (your spouse/partner) had an HDHP insurance plan with an HSA in the past?

Participating in a high-deductible health plan generally allows you to contribute to a Health Savings Account (HSA). You can save money on a pre-tax basis in an HSA to pay for medical expenses. You can only contribute to an HSA if you participate in a high-deductible health plan. Employers may contribute to an employee's HSA as well. Funds contributed to a HSA in a given year do not have to be spent that year; they can be invested and/or used in subsequent years, even during retirement. In 2020, the HSA contributions limits were \$3,550 under single coverage and \$7,100 under family coverage.

- Yes

- No
- Don't know

Q10 [If Q6 = Yes]: Why did you (your spouse/partner) choose the HDHP insurance plan? (Choose all that apply)

- A high-deductible health plan was the only option
- Premiums were low
- Expected to incur high medical spending in 2020
- Expected to incur little medical spending in 2020
- For the tax benefits of the Health Savings Account
- It was recommended to me

Q11 [If Q6 ≠ No]: Do you (your spouse/partner) have an HSA account with the current employer-sponsored HDHP plan?

Participating in a high-deductible health plan generally allows you to contribute to a Health Savings Account (HSA). You can save money on a pre-tax basis in an HSA to pay for medical expenses. You can only contribute to an HSA if you participate in a High-deductible Health plan. Employers may contribute to an employee's HSA as well. Funds contributed to a HSA in a given year do not have to be spent that year; they can be invested and/or used in subsequent years, even during retirement.

- Yes
- No
- Don't know

Q12 [If Q11 = No]: Have you (your spouse/partner) had an HDHP insurance plan with an HSA in the past?

Participating in a high-deductible health plan generally allows you to contribute to a Health Savings Account (HSA). You can save money on a pre-tax basis in an HSA to pay for medical expenses. You can only contribute to an HSA if you participate in a High-deductible Health plan. Employers may contribute to an employee's HSA as well. Funds contributed to a HSA in a given year do not have to be spent that year; they can be invested and/or used in subsequent years, even during retirement.

- Yes
- No
- Don't know

Q13 [If Q12 = Yes]: Did you (your spouse/partner) contribute to the HSA in 2020?

- Yes

- No
- Don't know

Q14 [If Q12 = Yes]: How much was contributed to the HSA in 2020?

- Less than \$500
- \$500 to \$900
- \$1,000 to \$2,999
- \$5,000 or more
- Don't know

Q15 [If Q12 = Yes]: Why was that contribution amount chosen? Select the most appropriate response

- It was the most I could afford to contribute
- It was the maximum amount matched by employer
- Based on my (spouse's/partner's) deductible
- Based on expected out-of-pocket healthcare spending
- To maximize the tax benefits of the HSA account
- Other [insert response]

Q16 [If Q6 = Yes]: Did your (spouse's/partner's) employer contribute to the HSA in 2020?

- Yes
- No
- Don't know

Q17 [If Q16 = Yes]: How much did your (spouse's/partner's) employer contribute?

- Less than \$500
- \$500 to \$999
- \$1,000 to \$1,449
- \$1,500 to \$1,999
- \$2,000 or more
- Don't know

Q18 [If Q16 = Yes]: Did these contributions require matching HSA contributions from your or your spouse/partner?

- Yes
- No

- Don't know

Q19 [If Q12 = Yes]: How long have you (your spouse/partner) had the current HSA?

- Less than one year
- 1 to 4 years
- 5 to 9 years
- 10 year or more
- Don't know

Q20 [If Q6 ≠ No or Q11 = Yes]: What is your (spouse's/partner's) approximate current HSA balance?

- Less than \$500
- \$500 to \$999
- \$1,000 to \$2,499
- \$2,500 to \$4,999
- \$5,000 to \$9,999
- \$10,000 or more
- Don't know

Q21 [If Q6 ≠ No or Q11 = Yes]: Did you (spouse/partner) make withdrawals from your HSA in 2020 to pay for health care expenses?

- Yes, I withdrew everything
- Yes, I withdrew most of the money in the account
- Yes, I withdrew some of the money in the account
- No, I did not occur health expenses
- No, I incurred health expenses but paid using other funds
- Don't know

Q22 [If Q6 = Yes or Q11 = Yes]: How are your HSA funds invested?

- Cash or Money-market funds
- Primarily Bond Funds
- Primarily Equity Funds
- Roughly equal split between Bonds and Equities
- Don't know

Q23 [If Q6 = Yes or Q11 = Yes]: How do you (your spouse/partner) want to use your (spouse's/partner's) HSA account? [strongly agree to strongly disagree for each, 5-options]

- To pay for current year health care expenses
- To pay for health care expenses in the next 1-5 years
- To pay for health care expenses in the next 5-10 years
- To pay for health care expenses in retirement
- To pay for other expenses in retirement
- Other [free response]

In this final section we would like to ask you a few questions on financial wellness.

Q24: 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
- Don't know
- Prefer not to say

Q26: 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
- Don't know
- Prefer not to say

Q27: 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

THANK YOU FOR COMPLETING THE SURVEY

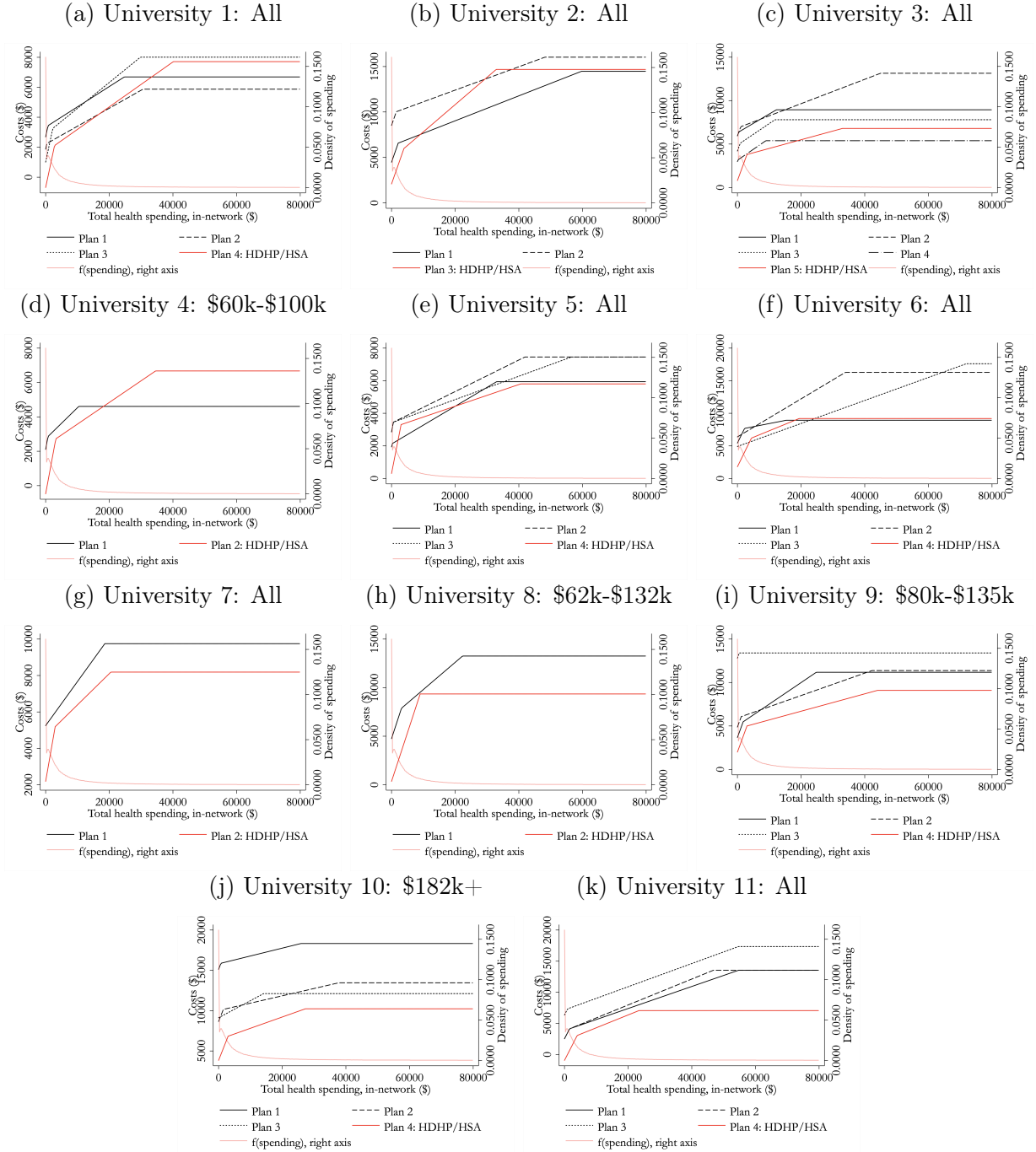
Characterizing dominated health plans: We continue to use second order stochastic dominance (SOSD) as our definition of dominated plans. For each plan at each university, we record the deductibles, co-pays, coinsurance rates, and other plan rules that are used to determine the plan’s actuarial value 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.²⁵ 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 D.4](#)). Since we lack claims for each university, we instead use the provided distributions of spending under “Silver Combined” worksheet in CCIIO’s calculator to evaluate SOSD by each university. 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 in Section 5 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](#) below. In Universities 7-11, the HDHP/HSA also first order dominates all other plans as shown by costs being lower for each possible level of spending. The differences in costs are considerably larger in some cases than in the case study shown in [Figure D.4](#)). For example, University 10 has differences exceeding \$10,000 between the highest premium plan and the HDHP/HSA for employees earning over \$182,000 (shown in the graph). 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.

²⁵The link is available here: <https://www.cms.gov/CCIIO/Resources/Regulations-and-Guidance/Downloads/av-calculator-final.xlsx>. (Accessed June 16, 2021)

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



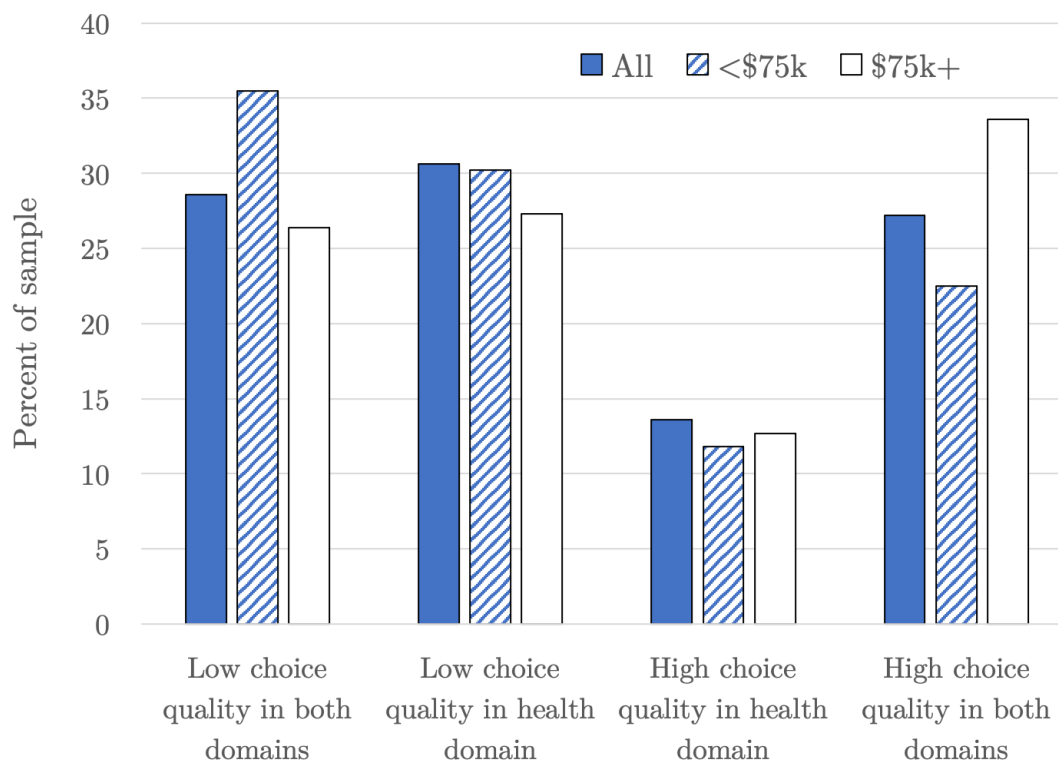
Notes: Figures plot employee costs, defined as premiums plus out-of-pocket payments less employer HSA contributions, as a function of total health spending for each plan in the TIAA sample. For universities that adjust premiums by salary (panels d, h, i, j), we have presented examples for particular salary levels.

Table E.1: Summary Statistics, TIAA Survey-Linked Data

	Mean
Household salary (\$)	92,759
Age (years)	53.96
Female (%)	60.7
Married (%)	14.5
White (%)	84.5
Faculty (%)	32.3
Defined benefit plan (%)	19.4
Total TIAA retirement contributions (\$)	8,046
Employee primary retirement contributions (\$)	2,787
Employee supplemental retirement contributions (\$)	4,274
Total TIAA balances (\$)	369,997
Equity percentage of TIAA balances (%)	67.1
Current retirement plan loan (%)	4.3
Chose HDHP/HSA (%)	40.8
Correctly answered 3 financial literacy questions (%)	63.0
Liquidity constraint (%)	11.4
<i>N</i>	1,211

Note: Table presents means and standard deviations of demographic and outcome variables among participants who completed the TIAA survey, restricted to those facing second-order stochastically dominated health insurance plans. Liquidity constraint is defined as replying they probably could not or certainly could not come up with \$2,000 if an unexpected expense arose in the next month, or if they have an existing retirement account loan.

Figure E.2: Proportion of Types Overall and by Salary Level, TIAA Survey-Linked Data



Notes: The figure plots the proportion of types based on quality of choices in health insurance and retirement saving in the TIAA survey-linked data for all employees (blue bars), employees earning below \$75,000 (striped bars), and employees earning over \$75,000 (white bars). We define low choice quality in both domains as those who choose a dominated health plan and do not obtain employer matching funds for retirement saving (1st bar from left). Choosing a dominated health plan while obtaining employer matching funds for retirement constitutes low choice quality in the health domain (2nd bar from left). Not choosing a dominated plan and not obtaining employer matching funds for retirement saving constitutes high quality choice in the health domain (3rd bar from left). Finally, not choosing a dominated health plan and obtaining employer matching funds for retirement saving constitutes high choice quality in both domains.

Table E.2: Sample Characteristics by Type, TIAA survey-linked data

	Low choice quality in both domains	Low choice quality in health domain	High choice quality in health domain	High choice quality in both domains
Percent of sample	28.6	30.6	13.6	27.2
Household salary (\$)	80,705	89,379	94,366	109,384
Age (years)	54.9	54.5	52.3	52.3
Female (%)	56.8	63.1	53.0	63.9
Married (%)	16.8	14.0	13.9	12.8
White (%)	86.0	81.1	87.3	85.3
Faculty (%)	34.0	31.5	38.2	28.8
Defined benefit plan (%)	19.1	20.5	13.9	21.6
Total employee retirement contributions (\$)	3,773	10,324	4,742	12,503
Employee primary retirement contributions (\$)	3,773	2050	4743	1839
Employee supplemental retirement contributions (\$)	0	8,274	0	10,664
Total TIAA balances (\$)	334,328	387,452	310,973	456,790
Equity percentage of TIAA balances (%)	66.5	67.4	67.8	69.4
Current retirement plan loan (%)	8.7	1.3	7.3	2.1
Correctly answered 3 financial literacy questions (%)	61.7	60.3	73.9	61.8
Financially fragile (%)	14.2	10.2	12.1	9.4

Note: Table presents means of demographics and assets by type using TIAA survey-linked data.

Table E.3: Reasons for Choosing or Not Choosing HDHP

Reason for choosing HDHP	%	Reason for not choosing HDHP	%
Premiums were lower	61.1	Expected to have high medical spending	69.9
For the option to have an HSA	53.0	HDHP was not an option	33.0
Expected to have little medical spending	31.4	Deductible was too high	17.7
Expected to have high medical spending	11.1	Managing HSA confusing or hassle	17.7
It was recommended	9.5	It was recommended	16.3
HDHP was the only option	4.6	Expected to have little medical spending	12.5
		Thought HSA couldn't roll over	1.0
$N = 494$		$N = 582$	

Note: Table presents percentage of respondents who record the specific answer for why they chose the HDHP or did not choose the HDHP. Respondents could check multiple boxes so percentages do not add up to 100.

Appendix F: Supplementary analysis of mechanisms [For Online Publication]

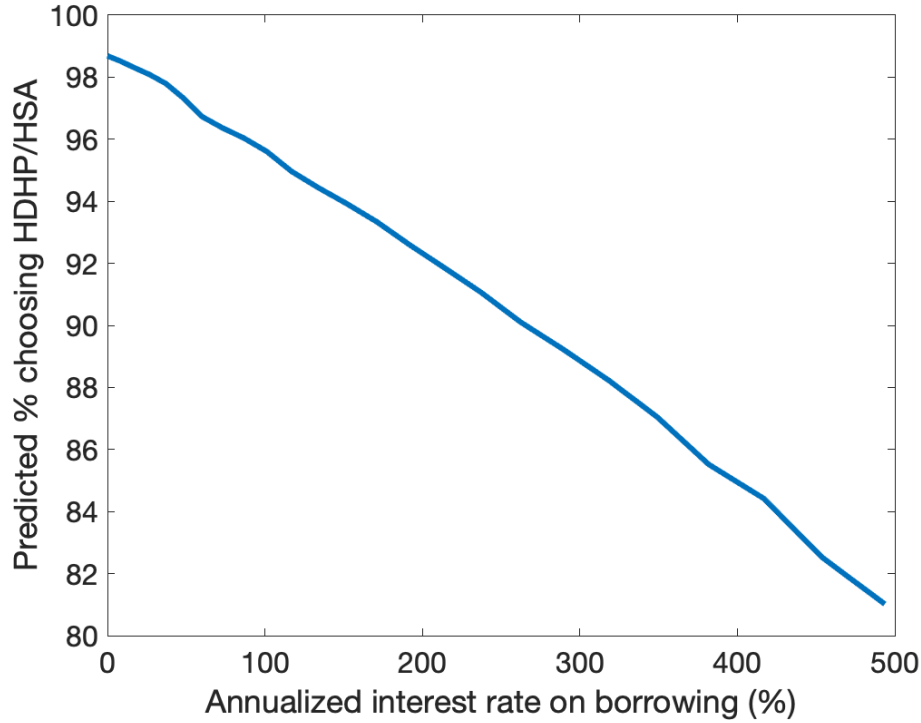
Liquidity: We simulate choices under a consumption-utility framework with liquidity constraints to assess the possibility that high borrowing costs might explain the choice of dominated health plans. Assume consumers have utility over consumption that satisfies constant relative risk aversion: $u(c) = \frac{c^{1-\gamma}}{1-\gamma}$ with γ denoting the coefficient of relative risk aversion. If they choose health insurance plan j , they pay monthly premiums π_j , which are excluded from taxable income y . A dollar of health insurance premiums reduces their consumption by $\$(1 - \tau)$ where τ is the marginal tax rate. If they incur health spending m while enrolled in plan j , their out-of-pocket costs are $OOP^j(m)$. We assume that the person is unable to finance *any* out-of-pocket payments 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. We assume spending occurs in only one month of the year, but with an equal probability of occurring in any month. If the shock occurs in month k , the person must borrow an amount $OOP^j(m)$ and must repay $OOP^j(m)(1 + r^b)^{12-k}$ at the end of the year. If they enroll in the L , they must repay $(OOP^j(m) - HSA)(1 + r^b)^{12-k}$. Their consumption if they enroll in plan j is defined as:

$$u(c^j) = \sum_{k=1}^{12} \frac{1}{12} \int_0^{\infty} u((y - \pi_j)(1 - \tau) - (OOP^j(m) - \mathbf{1}(j = L)HSA)(1 + r^b)^{12-k}) dF(OOP^j(m))$$

where $dF(OOP^j(m))$ is the density of out-of-pocket payments from enrolling in plan j , and $\mathbf{1}(j = L)$ denotes an indicator for choosing the HDHP, and HSA is the employer's unconditional HSA deposit.

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 $\gamma = 2$. **Figure F.1** shows that over 96% of employees would still choose the HDHP if they can only borrow at annualized interest rates of 20 percent, such as credit card debt. A large majority continue to choose the HDHP if they face extremely high interest rates. Even at annualized interest rates of 500%, over 80% of the sample would still choose the HDHP under this model. While such borrowing costs are extreme, high out-of-pocket costs in the HDHP are sufficiently rare so that the premiums savings and HSA deposit from the employer—which occur with certainty—still drive decision-making.

Figure F.1: Simulated HDHP/HSA Choices vs. Borrowing Rates



Inertia: Table F.1 presents regression results to test for the role of inertia in health insurance and retirement saving choices. The regressions compare outcomes for new employees to incumbent employees, controlling for demographics. New employees are more likely to choose the HDHP/HSA, consistent with work in other employer settings (Handel 2013), but the magnitude is small in absolute terms. 94.5% of incumbent employees avoid the HDHP compared to 90% of new employees (column 1). On average, incumbent employees overpay by \$1,615 per year compared to \$1,508 for new employees (column 2). Requiring an active choice does 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 3).

Learning: One might reasonably believe that employees learn over time about their benefits, and particularly so for complicated insurance products like HDHP/HSAs. In our case study, enrollment in the HDHP increased slightly from 5.0% in 2014 to 8.4% in 2017. Though large in relative terms, the growth was modest over a four-year period. Despite the large premium differences and tax-advantaged employer contributions to the HSA, the HDHP remained an unpopular option four years after its introduction. The growth in the HDHP coincided with an increase premiums and deductibles for the other two plans, so learning alone may not have increased enrollment in the HDHP. This pattern suggests that learning about HDHPs and HSAs likely occurs over a longer horizon for most employees.

Nonstandard beliefs: Research in other insurance markets points to probability weighting as being more important than concave utility in explaining choices (Sydnor 2010, Barseghyan

Table F.1: Effects of Inertia on Nonstandard Behavior

	(1) Chose dominated health plan (1 = yes, 0 = no)	(2) Health insurance overpayment (\$)	(3) No voluntary retirement saving (1 = yes, 0 = no)
New employee	-0.039 (0.004)	-106.93 (11.62)	0.073 (0.007)
Control mean	0.945 (0.002)	1615.47 (6.86)	0.341 (0.004)
<i>N</i>	43355	43355	43355
<i>R</i> ²	0.023	0.375	0.166

Note: Table presents regression results of nonstandard choices in health insurance and retirement against an indicator for new employees. Regressions also control for age, income, gender, faculty, health insurance coverage type, year. Standard errors clustered on employees in parentheses.

et al. 2013). In the context of health insurance, [Jaspersen, Ragin and Sydnor \(forthcoming\)](#) document the importance of probability weighting in choices using laboratory evidence. It is reasonable that some people may not have rational expectations about their health expenditure risk. They may overweight the low-probability events in which the HDHP/HSA has higher costs. If so, they may not perceive the choice as dominated. That view could be reinforced if they also face liquidity constraints that require them to borrow to finance the out-of-pocket payments. Yet, we find that our main results hold when we consider first-order stochastic dominance, in which probability distortions are not relevant. So probability distortions alone seem unlikely to explain the choice of dominated health plans.

Another possibility is that some employees may not realize the long-term value of compounding, suffering from exponential growth bias ([Stango and Zinman 2009](#)). This bias might partly explain foregoing employer matching in retirement saving as well as the HSA. The HSA offers superior saving incentives to the 403(b), but these benefits might be diminished for people who misjudge the importance of compounding.

Nonstandard preferences: A large literature on intertemporal choices documents many people exhibit a preference for immediate consumption. [Ericson and Laibson \(2019\)](#) refer to “present focus” as a collection of models that include hyperbolic and quasi-hyperbolic discounting, models of temptation, and models with multiple selves, among others. Some of these can explain a desire to forego retirement saving (e.g. models where people have present bias but are naive to it).

In terms of insurance choices, loss aversion has long been suggested as a possible explanation for choices ([Rabin and Thaler 2001](#)). [Jaspersen, Ragin and Sydnor \(forthcoming\)](#) find that loss aversion predicts risk attitudes in lab experiments of health insurance choices.

Yet loss aversion cannot explain choosing a plan that is first-order stochastically dominated, however. That study classified lab participants who chose first-order stochastically dominated plan as inattentive. So loss aversion by itself cannot explain many of the dominated choices in our context.

In terms of correlations in nonstandard preferences across domains, [Dean and Ortoleva \(2019\)](#) find a positive correlation between discounting and attitudes towards risk/uncertainty in the lab. This pattern is consistent with the behavior we document across saving and insurance choices.

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