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Choose to Lose? Employee Health-Plan Decisions from a Menu with Dominated Options

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Abstract

The economic rationale underlying the recent expansion in health plan choice presumes that individuals are able to sensibly choose among the complicated options available. We challenge this assumption by assessing the quality of over 50,000 health insurance decisions from a U.S. Firm which permitted employees to "build" their own plans from a standardized menu that included a large share of financially dominated options. The menu offers a unique litmus test for evaluating choice in that no set of standard risk preferences or beliefs regarding future health can rationalize enrollment into these dominated plans. Our central finding is that a majority of employees choose dominated options resulting in excess spending equivalent to an average of 41% of the annual plan premium. Employees additionally fail to improve plan choice over time, and older workers, women, the chronically ill, and those earning low incomes were disproportionately likely to make costly errors in choice suggesting potentially large welfare transfers between enrollees. A series of hypothetical choice experiments revealed that, while search complexity and, especially, deficits in health literacy likely contributed to these patterns, the majority of participants prefer dominated plans even when facing a small set of options from a simple menu. The observed choices presents a serious methodological critique to the standard practice of inferring risk from insurance choices, and raises doubts as to whether recent healthcare reform will deliver on its promised benefits.

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Among the many financial decisions facing Americans, those involving health insurance are some of the most economically consequential and poorly understood. A majority of insured Americans worry that unexpected health expenses pose a threat to a secure retirement and financial well-being, but only 14% of the insured are able to define the basic cost-sharing concepts fundamental to most health insurance plans (Loewenstein et al. 2013).[1] This lack of health-insurance literacy mattered less when most simply accepted the single-plan offered by their employer, Medicare, or Medicaid, but in recent years there has been a trend towards providing people with greater choice. Seniors have many options for Medicare Advantage and Part D plans, and the typical enrollee on an Affordable Care Act (ACA) exchange chooses from 47 available plans that vary on many features.

In theory, choice should improve consumer welfare both by enhancing the ability of individuals to sort into suitable plans and by encouraging provider competition. As Kathleen Sebelius, former Secretary of Health and Human Services, stated during the rollout of the ACA exchanges, "Exchanges offer Americans competition, choice, and clout. Insurance companies will compete for business on a transparent, level playing field, driving down costs, and Exchanges will give individuals… a choice of plans to fit their needs." However, recent research challenges the economic rationale for the expansion of health-plan choice by questioning whether consumers can sensibly navigate their options.

A series of influential studies have established that seniors make poor decisions in their choice of drug coverage on the highly complex exchanges of Medicare Part D. Abaluck and Gruber (2011), in an analysis of prescription drug claims and plan choices, conclude that a majority of enrollees could have selected alternative plans with both lower premiums and lower variance in cost suggesting widespread inefficiency in choice.[2] Kling et al (2012) find that providing seniors with simple information on the expected spending associated with different plans led to substantial plan switching, implying that seniors did not compare the financial value of different plans on their own. While there is evidence that seniors reduce excess spending over time (Ketcham, et al. 2012), they also appear to exhibit considerable inertia when it comes to changing plans (Ericson, forthcoming). Although evidence for sub-optimal decisions among the non-elderly is less clear, several studies have documented an insensitivity of employee plan "switching" to changes in plan prices (Strombom et al. 2002; Frank and Lamiraud, 2009). Handel (2013) documents cases in which this inertia leaves

[1] Survey involved 1,847 insured US adults and was retrieved November 2014 from http://newsroom.cigna.com/images/9022/media_gallery/knowyourbenefits/2014_Health_Financial_Well-Being-How_Strong_Is_The_Link-FINAL.pdf.

[2] See also Heiss, McFadden and Winter (2010) and Zhou and Zhang (2012) for similar evidence in this market.

employees with substantially dominated plans. The evidence for imperfect decision-making in the choice of health insurance echoes more general evidence from a range of settings that when faced with complex choices, due to limits to cognition, motivation, and self-control, individuals often fail to make self-interested decisions (see DellaVigna 2009).

In this paper, we examine the decisions of over 50,000 employees from a Fortune 100 firm who were given the opportunity to "build their own" health plan by selecting options for four cost-sharing dimensions (deducible, out-of-pocket maximum, copay and coinsurance). The resulting menu featured 48 different cost-sharing combinations and associated premiums. Importantly, these plans were otherwise equivalent across other features including provider network, out-of-network prices, and plan administration.

The plan menu at this firm provides a litmus test for assessing the quality of plan choice because a large share of the plans were *financially dominated* by other plan options. As an illustration of such dominance, employees shopping for single-person coverage (the focus of our analysis) had the choice of four different deductible levels ($1000; $750; $500; $250), and for each of the low-deductible options, the otherwise equivalent $1,000 deductible plan exceeded the largest possible cost savings (i.e., the difference in deductibles) in nearly every instance.[3] For example, employees in our sample typically had to pay more than $500 to reduce their deductible from $1,000 to $750—a price difference that cannot be rationalized by any level of health care utilization since, at most, such a reduction could save the employee only $250. We find that of the 36 low-deductible plans available, 35 were dominated in this manner, most even after accounting for differences in the tax treatment of premiums and out-of-pocket spending. Studying the choices of employees from this menu allows us to extend the evidence on quality of insurance choice beyond consumer inertia in response to changing options and the complexity of Medicare Part D. To our knowledge, we are the second study, after Handel (2013), to see employees given dominated health-plan options and the first to observe a large population given these options in an active-choice setting.

Our main empirical result is that the majority of employees chose plans that were financially dominated.[4] The economic consequences of these poor choices for those who made them were significant. The average employee opting into a dominated plan could expect to have saved $373 per year by choosing an otherwise equivalent plan with a higher deductible, which is equivalent to an

[3] While we focus on employees choosing single coverage plans, we find that choices of other employees are similar.
[4] 61% chose a transparently dominated plan before tax considerations, while 55% chose a dominated plan adjusting for the differential tax deductibility of premiums over out-of-pocket spending.

average of 2% of annual income and 42% of the average employee-paid premium. While other cost-sharing attributes do not involve options with strict price domination, given plausible risk preferences, a large majority of employees appear to choose inefficiently along these dimensions as well.

We find significant heterogeneity in the likelihood of opting into dominated plans and little evidence of improvement over time. Lower-income employees, female employees, older employees, and employees with chronic health conditions were all significantly more likely to select dominated contracts. Particularly important for the individual-welfare consequences of these choices, we document that the employees in the lowest income band could have saved over 4% of annual income if they had chosen a single natural counterfactual option. Consistent with prior studies documenting consumer inertia, we find that only a modest share of employees switched into new plans the subsequent year—including disproportionately fewer low earners. While the plurality of these switchers moved to financially superior plans, switching rates were lower for low-income employees.

Why would a firm give employees plans that have dominated options? Although we are not privy to the full details of the process the firm used in setting prices with their insurance-consulting firm, we document that the menu appears consistent with the widespread actuarial practice of average-cost pricing. We see that the individuals who opted into dominated plans had much higher health-care expenditures, implying some combination of significant adverse selection and/or moral hazard.[5] Because of these large average health-spending differences, the plan pricing can be rationalized if an actuary correctly predicted the observed sorting patterns and attempted to provide prices that equalized employee premiums as a share of covered health spending across plans. Of course, from the employee perspective the resulting price differences are extreme and generate dominated options, and a firm can choose to avoid average-cost pricing and enforce greater cross-subsidization among its employees. However, while plan menus may not generally reflect the severe degree of dominance we observe, given the potential for adverse selection in health care and both standard actuarial practice and competitive forces in market settings favoring average-cost pricing, we suspect that plan menus featuring relatively expensive low-cost sharing options are likely common.[6]

Given the financial consequences of plan choice, why do employees choose so poorly? We explore candidate explanations for these plan choices by complementing our empirical analysis with

[5] Handel (2013) presents similar arguments for the emergence of dominated options in the employee-sponsored health plans he studies. See also Sydnor (2010) for evidence of high marginal costs for increased insurance coverage that appear consistent with average-cost pricing in the realm of home insurance.

[6] An analysis of ACA exchange pricing suggests that choosing a representative plan from the third (of four) most efficient plan tiers, given a particular level of realized medical need, would lead to excess spending equivalent to 21 to 52% of annual premiums (Bhargava, Loewenstein, and Benartzi 2014).

two online experiments. These experiments ask a total of over 3,000 subjects to make hypothetical choices from stylized plan menus resembling the options observed at the firm, but featuring far fewer plans. Our approach here parallels recent studies using hypothetical plan menus to explore the effects of insurance choice architecture (e.g., Johnson et al. 2013; Schram and Sonnemans, 2011; Bhargava, Loewenstein and Benartzi 2014), but matches our empirical setting by using dominated options.

Perhaps the most obvious candidate explanation for the observed choice patterns is that employees faced substantial "search frictions" in navigating their options. A particularly likely friction arises in this setting because employees needed to use a sequential-choice platform to compare plans, which made it time-consuming to compare all options. The large number of options and the complexity associated with having to choose across multiple dimensions of cost sharing could also have contributed to poor decisions. We explore these issues in our first experiment by randomizing the way subjects see plan options: including comparisons of simple tables versus sequential choices and plans varying by one attribute (deductible) or two attributes (deductible and out-of-pocket maximum). Although we find that simplifying the comparisons lowers the probability people will choose a dominated plan, the effects of simplifying menus is small and overall the choices patterns of experimental subjects look very similar to those of employees at the firm. Most strikingly, the majority of subjects state they prefer a dominated plan even when comparing a simple table of four plan options that vary only on deductible, suggesting that menu complexity and "choice overload" are not the primary drivers of poor plan choices.

We find more support for low insurance literacy as a primary driver of the observed choice patterns. In our second experiment we find that lower insurance literacy significantly correlates with the choice of dominated plans in the cross section and that an education treatment targeting the recognition of dominated options substantially reduces the share of subjects choosing a dominated plan. Another possibility we explore in this study is that despite the large costs they pay for health insurance, people may not be motivated to carefully compare their options if they assume the options their employer provides will all provide similar value. Although the we find that the majority of subjects trust that their employer will not offer low-value health-plan options, we find little support in our experiment for this as a primary explanation for the choice patterns. Overall, we find that even in our most effective treatment, nearly 30% of participants select dominated options, suggesting both the likelihood that deficits in literacy are not easily addressed and the possibly that there is a very strong underlying preference for plans with low-cost sharing.

The policy consequences of pervasive poor health care plan choice are profound. The magnitudes of excess spending we document are generally far larger than other factors (e.g., the effect of exchanges on premiums), that have attracted considerable policy and academic attention. We estimate that even after accounting for plausible levels of risk aversion, there would have been large average welfare gains for employees if there had been a decision aid available to help them avoid dominated plans. However, the long-run benefits of such a decision aid are less clear if we assume the firm would adjust prices to keep its spending on health care for employees roughly constant. Similar to Handel (2013), our calculations suggest a small average welfare loss in this situation, though there would remain large welfare gains for the quarter of employees we observe making the most costly plan choices. Our findings also speak to the value of a simplified choice environment and decision-aids to combat low insurance literacy. Notably, our experiments suggest that to the extent that those with low literacy and self-reported income made worse choices, simplification and education had the effect of leveling differences in choice quality across sub-groups. The persistence of a non-trivial share of poor choice across our studies, however, implies that even a very sophisticated choice environment is subject to a ceiling in its capacity to improve decisions.

These findings also cast some doubt on the logic that consumer choice will necessarily create competitive pressure to lower insurance prices. Recent theoretical work demonstrates that widespread limits to consumer decision-making may restrict the extent to which firms compete to lower prices and raise quality (Sandroni and Squintani 2007; Ho, Hogan, and Morton 2014; Gabaix and Laibson 2006; DellaVigna and Malmendier 2004; Heidhues and Koszegi 2014). Our findings are also relevant for discussions of the benefits of using greater cost-sharing in health insurance as a means of slowing health-expenditure growth, as they add to a growing literature documenting that individuals may misconstrue or ignore important health incentives (e.g., Loewenstein et al. 2013; Winter et al., 2006; Handel and Kolstad 2013). Ultimately, if informed decisions are a priority, it may be necessary for policymakers to move even beyond simplifying choice environments to simplifying and standardizing the basic insurance products made available, or perhaps to eliminating choices altogether.[7]

Finally, our study presents an important new challenge for the sophisticated empirical literature that has recently taken up the challenge of estimating preferences from insurance choices and analyzing welfare in insurance markets (see Einav, Finkelstein and Levin, 2010 for a review). The

[7] Our findings on the deleterious effects of complexity are in the spirit of prior work demonstrating the influence of informational complexity in economic domains ranging from school choice (Hastings and Weinstein 2008), retirement savings (e.g., Choi et al. 2009), and take-up of social benefit programs (Bhargava and Manoli 2012).

paradigm in this literature builds from a model of informed insurance customers making decisions based on their combination of risk and risk aversion. Our setting, in which individuals make active choices from a menu of dominated options (coupled with our complementary survey evidence), provides the first unambiguous test of that paradigm. The substantial variation in choices people make for insurance and the often low correlation between risk and insurance choices has generally been interpreted within this literature as evidence for substantial heterogeneity in risk preferences. The choices of the majority of the employees we observe, however, cannot be rationalized with informed decisions for any degree of risk aversion or any beliefs about health risk. Our results, then, give strong support for a recent literature that has started to extend this paradigm by studying the effects of cognitive limitations and search frictions (Fang, Keane and Silverman, 2008; Handel and Kolstad, 2014; Spinnewijn, 2014), non-standard risk preferences (Koszegi and Rabin, 2007; Sydnor, 2010; Bordalo et al.., 2012; Barseghyan et al., 2013, 2014) and decision heuristics on insurance choices (Ericson and Starc, 2012). Better understanding these issues may have profound effects on welfare analysis for insurance markets and may change key policy implications.

SECTION 2. DATA AND INSTITUTIONAL BACKGROUND

In our main analysis, we draw on administrative data on medical claims and plan choice for 2010 and 2011 from a Fortune 100 firm whose identity we suppress for confidentiality. This section summarizes relevant institutional detail, the data, and descriptive statistics. We separately describe the data and participant characteristics for the mechanism experiments in Section 4.

2.1. Background and Institutional Detail

Structure of Health Plan Menu. The firm, in 2010, replaced its existing menu of three plans with a highly varied bundle of plan attributes (Basic, Plus, Premium), with a "Build Your Own" regime in which employees were offered a choice from a standardized menu of 48 plans (i.e., "Plan 1" to "Plan 48"). For employees choosing single coverage, the focus of our analysis, these plans represented the full conjoint of available options across 4 deductibles ($1000; $750; $500; $350), 3 levels of maximum-out-of-pocket spending ($3000; $2500; $1500; MOOP), 2 coinsurance rates (80%; 90%), and 2 office copayments ($15 for Primary Care Visits / $40 for Specialist Visits; $25 for Primary Care Visits / $35 for Specialists). Out-of-network, all plans featured a $3,500 deductible a $7500 out-of-pocket maximum and either a 50% or 60% coinsurance rate depending on the choice of in-network

coinsurance. Beyond the described variation in cost-sharing, plans were otherwise identical. In the following year, the set of available plans did not change with respect to their cost-sharing features. Table 1 reports details for the plan menu.[8]

Plan Pricing and Dominated Choices. Our ability to characterize choice quality rests on the price domination reflected in plan menus and a high degree of plan standardization which facilitates easy comparisons across plans. For example, Plan 13 is identical to Plan 37, except on the deductible level which varies by $500 across the two options. Plan 13 (with the $500 deductible) costs $638 more in annual premium than Plan 37 (the $1,000 deductible). Because the difference in plan premiums exceeds the difference in deductibles, Plan 13 is financially dominated by the otherwise equivalent plan with the $1,000 deductible. Of the 36 low-deductible plans, 35 are financially dominated as indicated by the highlighted sections of Table 1, with the premium of Plan 24 falling $20 short of a fully dominated plan menu by deductible.

As an alternative depiction of dominance, Figure 1 displays the cost schedules for the 24 plans with $25 office copayment (the price schedules for the 24 plans with the $15 copay level are nearly identical and are available from the authors on request).[9] Each panel of the figure depicts how the total costs of health care for the employee (i.e., premium plus out-of-pocket costs) varies with total medical spending for the four different deductible levels within each set of remaining cost-sharing features. A plan is dominated if the plan's cost schedule is always below that of another plan within the same panel. The figure offers graphical illustration for the dominance of the $1,000 deductible plans, relative to low-deductible equivalent plans. The only exception is the $500 plan depicted in Panel A, which is Plan 24 mentioned above.

Given that health-insurance premiums are generally tax deductible, while out-of-pocket expenses are not, plans that appear to be dominated on a nominal basis may not be strictly dominated after adjusting for an employee's marginal tax rate. Table 1, which also depicts plan dominance using the average marginal tax rate across employees of 19% to adjust for premium deductibility, shows little erosion in the share of dominated plans. When feasible, we report our analysis of plan choice after adjusting for taxes using estimates of employee-specific marginal federal income tax rates.

[8] Plan prices feature small differences across geographic area and business units. Prices are averaged across geographies and business units (but not coverage tier) for our analysis. According to the Firm, such price differences are modest, and do not meaningfully affect price differences across plans for a given geography area x business unit.

[9] These schedules report plan costs assuming no office visits. Given that office visits are priced identically in each panel, the relative pricing of plans by deductible is insensitive to the number of visits.

Our analysis includes a description of plan switching by employees in 2011. While the 2011 plan menu was identical with respect to the structure of plans, plan prices grew by an average of 31% across plans and this increase was fairly consistent across plans by level of cost-sharing. The consistency in this price increase actually led to an increased degree of price domination in 2011 such that, without adjusting for tax deductibility issues, all 36 low deductible plans were financially dominated.

Plan Enrollment. During the open enrollment period in May 2010, eligible employees, excluding new hires, were asked to enroll in a medical plan for Plan Year 2010, with coverage extending from June 1st, 2010 through June 30th, 2011. [10] For simplicity, we refer below to plan years by the year in which the selection was made (e.g., 2010 refers to PY 2010). Eligible new hires were permitted to choose a plan outside the enrollment period, after a three month waiting period, unless the hiring date was proximal to the enrollment period. All of the plan options changed in 2010, so employees were generally forced to make an active choice in their health plan. If an employee with existing coverage did not use the plan-choice interface to select a plan, he or she was defaulted into Plan 48, which had the maximum possible cost-sharing on each dimension. While we cannot distinguish enrollment into Plan 48 due to default from an active election, given intensive marketing effort prior to open enrollment, the firm reported that active choice of plans was high.[11] It is further worth noting that while there was a default option available for existing employees, within the plan-choice interface there was no default option.

The online enrollment interface was designed to emphasize that employees could "build" their own health plan. Employees were asked to build candidate plans through the sequential choice of each of the four cost-sharing attributes, (e.g., "Which annual deductible meets your needs?"), after which point the plan's cost-sharing features, along with its monthly cost, was displayed on a column of a plan comparison matrix. After building a first candidate plan, employees had the option of enrolling in that plan or building subsequent plans which would be iteratively added to the plan matrix. As such, the interface encouraged side-by-side comparisons of plans, but did not make it easy to compare all the plans at once. The interface offered employees the option of viewing the entire plan menu in a link but it was not prominently displayed. The fact that it took some effort to compare plans could have affected the ultimate comparisons employees make, which is an issue we discuss in

[10] Employees could change plan elections outside of open enrollment only in the event of a change in "qualified status" (e.g., birth of a child, or change in marital status).
[11] Employees elected made other benefit elections during the same open enrollment period, and online interface, such as enrollment in Dental and Vision plans.

more detail below as we consider both patterns of plan choices and our experiments. Finally, employees were repeatedly urged, through the interface, to consider the tradeoffs between price and coverage (e.g., "Remember, a lower deductible means higher annual paycheck costs.").

2.2. Data on Plan Choice, Spending, and Utilization

Overview of Data. The data documents employee-level plan choice, medical utilization, and medical spending for benefit eligible employees in 2010 (subject to restrictions below), and only plan choice for 2011. Utilization data summarizes employee visits to a primary care physician, specialist, and ER and for preventative care. Medical spend data reflects total medical expenses for each employee as well as the decomposition of spending into the share of employee's out-of-pocket expenses and the residual expenses covered by the firm. Importantly, the firm additionally estimated counterfactual medical spend, for both the member and firm, associated with each of the 47 plans not chosen by the employee (assuming fixed employee utilization). These estimates assume prices that are averaged across different locations and, as such, obscure the geographic price variation that likely exists. We obtained additional employee-level demographic and health characteristics including age range, gender, salary range, location (3 digit zip code), start year of employment, position at the firm, length of firm tenure, and the presence of pre-existing chronic medical conditions.

Sample Restrictions. Starting with the original set of benefit eligible employees, the firm generated a restricted sample for analysis using three screens. First, in order to simplify the calculation of medical spending, the sample was restricted to employees continuously enrolled for the entirety of the plan year (June 2010 through end of May 2011). Second, for data integrity, employees who changed plans outside of open enrollment due to a life changing event were excluded. Finally, a small number of employees were excluded due to incomplete basic demographic information.

2.3. Summary Statistics

After imposing the sample restrictions, the resulting data describe plan choice, utilization, and medical care spending in PY 2010 for 51,192 employees, of whom 23,894 are employees with single-only coverage. Table 2 reports summary statistics for this latter sample. Overall, the sample is disproportionately female (71%), and only 7% of employees were newly hired in 2010. The average premium for employees, $1,205, is in line with the $999 national estimate for the average single-coverage employee premium, while the plans offered by the firm have lower deductibles and cost-

sharing than typical firms of its size.[12] The firm covers approximately 45% of total employee medical spending, which falls below national averages, while employee medical utilization is approximately in line with national averages.

SECTION 3. ANALYSIS OF PLAN CHOICE AND SWITCHING

In the previous section we introduced the plan menu offered by the firm and established that the majority of plan options with lower deductibles were financially dominated. In this section we document employee choices and the financial consequences of those choices.

3.1 Plan Choice Patterns

Figure 2 presents histograms of 2010 plan choice by employees electing single coverage. Despite the fact that all but of the low deductible plans is financially dominated prior to tax-considerations, 63% of employees selected a low deductible (Panel A). After adjusting for the tax-deductibility of premiums using the inferred marginal tax rate for each employee based on their reported salary range, 55% of employees selected a financially dominated plan, of which 27% of employees chose $350 or $750 deductible plans that were, for the most part, dominated by large margins. The focus on deductibles alone, however, obscures meaningful patterns in plan choices. Panel B of the figure depicts the distribution of choice across all 48 plan combinations ordered by the degree of plan cost-sharing (by deductible, out-of-pocket maximum, coinsurance, and then copayment). The wide variety of chosen plans—every one of the 48 plans has a non-trivial share of enrollees—is strong evidence that the online enrollment process did not privilege the choice of one plan or particular attribute levels. Employees appear to have a rage of plan preferneces and/or search strategies. The single most popular plan was the default option, Plan 48, which was the least expensive and featured the highest degree of cost-sharing on all dimensions. However, we cannot distinguish between those actively choosing Plan 48 from those defaulting into the plan.[13]

A close examination of the choice patterns in Panel B reveals what appears to be a number of distinct strategies governing the selection of plan attribute combinations. Many employees opting for the expensive $350 deductibles appear to minimize cost-sharing across all dimensions, while

[12] National averages are reported in the 2013 Kaiser Family Foundation study of Employer Health Benefits.
[13] Recall, however, that while there was a default plan for those with prior enrollment who did not use the build-your-own interface, within the build-your-own system there was no default plan and the employee had to make an active choice on each dimension.

employees who chose the $500 and $750 deductible levels choose plans consistent with the desire to balance across cost-sharing dimensions. As an example, the modal plan for employees selecting the $500 deductible, and those selecting the $750 deductible, both involve the mid-level MOOP ($2,500). Ignoring the default option, such balancing is also evidenced among employees choosing the $1,000 deductible where a significant share of employees chose the high-cost sharing MOOP ($1,500). This coherence in attribute patterns suggests that employees may have had some understanding of the tradeoffs between the level of coverage associated with plan attributes and plan premiums.

3.2 Savings from Counterfactual Plan Choice

While characterizing the degree of dominated plan choice does not require considering an employee's health care spending, such spending is useful in assessing the financial consequences of these choices. For example, consider that for an employee paying an additional $501 in premiums to lower the deductible from $1,000 to $500, the magnitude of excess spending due to plan domination could be as high as $501 or as low as $1 depending on the employee's use of medical care for the year.

Figure 3 presents an analysis of the financial consequences of employee plan choices. Each panel in the figure compares the distribution of actual total employee spending (premium plus out-of-pocket health-care costs) to estimated spending with a distinct counterfactual plan choice. Counterfactuals are calculated at the individual level for each employee, are tax-adjusted, and assume the total health spending of each employee is unchanged across plans—that is we assume that employees are not subject to moral hazard in their utilization of care. Although health insurance plans with lower deductibles likely result in some degree of moral hazard, it is generally difficult to disentangle moral hazard from adverse selection (Einav and Finkelstein, 2011). If present in this setting, moral hazard would imply that our analysis would *underestimate* the financial consequences of plan choice. Such underestimation would arise since a share of the spending associated with low cost-sharing plans might be deemed unnecessary in the event of the shift to the high-cost sharing plan and could lead to even greater savings for such individuals.

The first panel of Figure 3 depicts potential cost-savings for each employee currently in a low deductible plan, relative to a switch to the otherwise equivalent plan with a $1,000 deductible (i.e., same MOOP, coinsurance, and copayment). We show the empirical cumulative distribution of this net savings separately for each of the three low deductibles. The lines associated with the choice of $350 and $750 deductibles both start above $0, indicating that, consistent with the earlier demonstration of dominance, all employees in such plans would have benefited from the prescribed

plan switch. Among employees who chose plans with $350 deductibles, the average savings amounts to $590 with an inter-quartile range of $439 to $843. The top 10% (generally those with little to no health expenditures) would have saved over $1,000. The average potential savings for those selecting plans with the $750 deductible is $343 (IQ range of $239 to $430), and for those choosing $500 deductibles, the average savings is $159 (IQ range of $102 to $502) inclusive of the 2% of employees with negative potential savings reflecting the absence of financial domination for all of these plans.

Overall, we find that the individuals who selected plans with deductibles lower than $1,000 could have saved $353 in after-tax dollars had they chosen the $1,000 alternative with virtually no risk of losing money. Considering that over half of these employees have annual salaries below $30,000, the $353 in potential after-tax savings likely represents significant economic value. We calculate that the potential savings for these employees selecting dominated plans represents on average 2% of the employees' annual salaries and 41% of the annual premiums paid by the average employee.

In Panel B we present a similar analysis but consider potential savings relative to the "actuarially best" plan associated with the lowest average spending across all employees (Plan 41 with a $1,000 deductible, $2,500 MOOP, 90% Coinsurance, $25 Copay).[14] This exercise permits us to investigate the benefits of moving to a single plan menu and how such a shift would affect employees who already chose a $1,000 deductible. While Plan 41 does not fully dominate the other options, 84% of all employees, and 97% of those with lower deductibles, would have benefited, or been left no worse off, under the contemplated switch. Across employees, average savings would have amounted to $320 including $448 for those in low deductible plans, and $103 for those with the $1,000 deductible. The largest loss for any single employee under the projected switch is less than $1,000 and no more than 5% of employees would lose more than $20. These results suggest that, assuming fixed plan prices, an informed third-party could have made a simple plan recommendation that would have benefited the vast majority of employees.

Finally, we replicate the analysis but with Plan 48, the default plan option for employees and the plan with the highest cost-sharing, as the counterfactual plan of interest. We estimate that 85% of employees would have benefited, or been left no worse off, by such a switch, and that the average savings across all employees would have been $182. As with the other counterfactuals, most of these savings would have been collected by those choosing low deductibles for whom savings would have averaged $283. Relative to the other counterfactuals, the switch to the high cost sharing plan would

[14] Only 1% of employees actually selected this plan and 26 plans were chosen more frequently.

have generated greater risk of loss with a maximum loss of about $1,600 and 5% of employees incurring losses of $650 or more. Nonetheless, the large share of employees, particularly those currently with low deductibles, could have benefitted from being placed in the default plan but unfortunately for them actively chose an alternative.

3.3 Heterogeneity in Choice and Counterfactual Savings

Having documented that the majority of employees opt into dominated health-insurance plans with large consequence, here we explore the heterogeneity in these choice patterns. Figure 4 displays the share of employees choosing dominated plan options by a primary dimension of interest – employee salary (Panel A). While substantial shares of employees at every salary band chose dominated plans, employees in the bottom two salary bands (i.e., $0 to $20k, plotted as $10k, and $20 to $30k, plotted as $25k), representing over half of all employees, were even more apt to have chosen dominated plans. The second panel of the figure communicates the economic importance of this heterogeneity in choice quality by depicting potential savings relative to employee salary. These estimates use the actuarial best plan (Plan 41) as the counterfactual, since that allows us to conduct the analysis over all employees, yet, as we demonstrated above, presents an option for which very few employees would be worse off. For the 19% of employees in the lowest salary band, the plot implies average savings, amounting to over 4% of annual salary; for the 33% of employees earning from $20 to $30k, excess spending represents an estimated 1.7% of salary. While the average dollar value of potential savings is not negligible for employees in higher salary bands, generally around $250, these savings represents a lower share of annual salary.

Table 4 presents an analysis of heterogeneity in dominated plan choices across a broader set of employee characteristics. Each column represents a separate regression, where the dependent variable in the first column is an indicator for dominated plan choice, and in the final two columns is the magnitude of potential savings from a switch to a counterfactual plan (with premiums adjusted for tax deductibility in all cases). The regressions of plan choice confirm the pattern of Figure 4 in demonstrating a significant gradient in choice quality by salary. Lower-salary employees were 24 to 30 percentage points more likely to choose a dominated deductible than the highest salary employees holding other factors constant.[15] The table suggests additional heterogeneity across gender, with female employees 6 percentage points more likely to choose dominated plans. The table also suggests,

[15] It is worth noting, however, that lower-income employees have more financially dominated options to choose from since the tax deductibility of premiums is less significant for individuals with lower incomes.

conditioned on other characteristics, significantly higher shares of dominated plan choices for older, more highly tenured employees, and those with chronic conditions. Because the dominated plans in this setting are those offering the highest coverage (i.e., low cost-sharing), if people choose naively here the gender and age difference in decision quality may be consistent with prior work documenting the preference of females and older employees for low cost-sharing plans.

The second column of the table shows how these characteristics predict the expected counterfactual savings the employees could have achieved by switching to the counterfactual $1,000 plan deductible. For this regression we include all employees and code the savings for an employee in a $1,000-deductible plan of any sort as $0 by construction. These estimates are consistent with earlier patterns with respect to employee income, age, and tenure. Interestingly, however, for both women and those with chronic conditions we find a different pattern. Although these groups were more likely to choose plans that were financially dominated, the expected savings from a switch to higher cost-sharing is less pronounced given their higher relative levels of health-care spending. The final column considers the expected savings from a switch to Plan 41 and yields similar patterns to the choice estimates but with generally larger marginal effects which suggests that the same characteristics that predict the choice of a dominated deductible also tend to predict the choice of plans with lower average value on other dimensions as well.

3.4 Employee Plan Switching

The preceding analysis documents that in the first year of the firm's plan regime, the majority of employees selected into dominated plans at great financial cost. In the following year, the firm offered the identical plan menu to employees, with plan prices which increased by an average of 31% across plans which led to a slight increase in plan dominance such that all 36 plans were financially dominated (on a tax-unadjusted basis). Employees, who were insured in 2010, but did not actively choose a plan in 2011, were defaulted into the same plan. In this section we consider whether employees significantly altered their plan choices during the second year with this menu available.

Figure 5 summarizes switching behavior for employees by deductible choice. Overall, 77% of employees retained their existing plan, which is consistent with numerous studies documenting substantial consumer inertia in insurance choices (e.g., Strombom et al. 2002; Frank and Lamiraud, 2009; Sydnor, 2010; Handel, 2013; Ericson, forthcoming). Switching rates were higher for those in the lower-deductible plans relative to those already with the $1,000 deductible, particularly when specifically considering plan switches involving a change in deductible, but were not any higher for

those with the $350 and $750 deductibles for whom the potential cost-savings from switching were potentially largest.

With respect to the plans that employees switched into, switching appears to generally result in higher deductibles but not always to the optimal high deductible choice. In particular, a significant share of plan switchers, particularly 51% of those in the $350 deductible, incrementally switch into the next highest deductible. Overall, the analysis from Panel B suggests that switching generally goes in the direction of higher deductibles but not uniformly toward non-dominated options.

Finally, in light of the significant heterogeneity in choice quality by employee income, it is natural to ask whether such employees are more likely to switch into efficient plans in the following year. We find that employees in the lowest two salary bands are actually significantly *less* likely to switch plans, with a switching rate of 18%, relative to higher income employees who switch at a rate of 28% ($p < .01$). Among those who do switch, low income employees are also significantly less likely to switch into the $1,000 deductible. Indeed, the considerable plan inertia in this setting, if anything, serves to exacerbate the already substantial differences in choice quality across income.

SECTION 4. MECHANISMS UNDERLYING POOR CHOICE

A number of explanations exist for why employees in our setting may have chosen poorly. To test candidate explanations, and to assess the generalizability of poor plan choice across choice contexts, in this section we describe the results of two experiments in which online participants are asked to make hypothetical health plan choices from a series of stylized plan menus.

4.1 Candidate Explanations for Poor Plan Choice

A first explanation we test considers the possibility that search frictions induced by the complexity of the enrollment interface, from which employees evaluated and chose plans, led to poor decision quality. We broadly define interface complexity to encompass the size of the plan menu, the number of attributes characterizing each plan, and the ease through which employees can compare options. Interface complexity may be particularly relevant for our setting. While the employees in our main analysis faced a highly standardized set of plan options, they selected plans from a large menu using an online interface that did not encourage intensive plan comparison. The interface required that employees iteratively "build" candidate plans through the sequential choice of each cost-

sharing attribute, after which the employee could observe a plan's total monthly cost, and then make a selection from a displayed matrix of possible options.[16]

A second, related, mechanism we consider is whether poor plan choice is the result of documented deficits in health insurance literacy (Loewenstein et al. 2013). We interpret literacy to include definitional knowledge of cost-sharing features (e.g., the ability to define and identify a plan's deductible and coinsurance rate), the conceptual ability to apply definitional knowledge to evaluate and compare the financial value of plans (e.g., recognizing that the difference in plan deductibles, fixing other cost-sharing parameters, signals the maximum difference in potential benefit across plans), and the computational ability to carry out required calculations. While an individual's understanding of insurance likely interacts with the complexity of the enrollment interface to shape choice quality, we assess each participant's health insurance literacy and evaluate whether high literacy leads to better choices in a simplified choice setting.

A third mechanism we examine is the possibility that poor choice may result from the insufficient motivation to search and compare plans. We first assess the possibility that consumers may falsely believe that the choice of plans is not financially consequential, and then explicitly test whether attempts to heighten search motivation lead to better choices. Finally, we remark upon the possibility that the observed patterns may be the result of preferences that may privilege dollars spent out-of-pocket over dollars deducted from one's payroll.

4.2 Search Frictions and Menu Complexity (Experiment 1)

In our first study, conducted in June 2014, participants were paid to take an approximately 10 minute survey in which they were asked to select an insurance plan from a hypothetical plan menu. The stylized menus featured fewer plans than the firm menu but reflected the same degree of price domination. While our study was not incentive compatible, other researchers have detected no differences in choice quality due to incentive compatibility in similar studies (Johnson et al. 2013). The size and structure of the plan menu, as well the effort required to compare plans, was randomized between subjects in order to test how transitioning from a fairly complex interface, roughly approximating the firm environment, to a highly simple interface influenced the quality of decisions.

Participants. The first study involved N = 2,379 U.S. participants drawn from the Qualtrics Online Sample. Of 3,895 participants who began the survey, 1,516 participants failed an early attention

[16] It was possible for employees to access a larger menu in which multiple plans were listed but a link to this simultaneous plan view was not made obvious to employees.

screen and subsequently were not allowed to complete the instrument.[17] The final sample, while not strictly representative of the US population, was diverse across gender (57% female; 43% male), age (M=46.5, s.d. = 11.1), education (48% college graduate; 33% some college; 18% high school or equivalent), race (84% white; 9% black; other 8%), and inferred income (M = $67,700; s.d. = 26,900). Much like the employee sample in the main analysis, participants were predominately full-time employees (91% full-time; 3% part-time; 6% unemployed or student) who had employer-provided insurance (86% employer insurance; 9% insured but not through employer; 5% uninsured). Overall, the experimental sample was older and wealthier than the employees in the main analysis.

Research Design. The study, hosted on the Qualtrics platform, required participants to complete a series of initial questions on demographic and health background, after which participants were asked to imagine that they needed to select a health plan (assuming single coverage) from a plan menu presented to them by their employer. The menu confronting participants featured hypothetical plan options resembling the plan menu of the firm in prices and features, but was far smaller in the number of plans and the attributes that characterized plan differences. In an attempt to parallel the language of the actual firm interface, participants were presented with a table that defined each attribute, and were instructed to consider their expected health usage when choosing a plan. Apart from the variations communicated, participants were told that plans were otherwise equivalent and involved a "modest copay" for doctor visits.

We randomized the choice interface across three dimensions of interface complexity in a conjoint design. The first dimension varied whether plan premiums were expressed annually or monthly, and the second varied whether menus featured plans differing across two attributes (i.e., four deductibles and three MOOPs resulting in twelve options), or a single attribute (i.e., four deductible resulting in four options). The final dimension varied whether plan options and prices were displayed simultaneously on a single table, permitting easy plan comparisons, or whether plan selection required sequentially choice of each attribute.[18] In the sequential plan choice condition, designed to mimic the experience of firm employees, participants were asked to make each attribute choice, after which the resulting plan price was displayed. Participants then had the opportunity of either confirming their

[17] The screen involved a question with introductory text and 4 response options. The last line of the text asked participants to not click on any response but instead, to simply click on next (unlike other forced-response questions, in this question, participants were permitted to click "next" without indicating a response option). We pre-committed ourselves to not collecting any data from anyone who failed the attention screen.

[18] In the menu featuring plans varying across only deductible, participants were told to assume a $1,500 out-of-pocket maximum.

choice or "building" another plan through the same sequential process.[19] Examples of interventions are displayed in the Appendix (Figure A1).

Experimental Results. An initial result of the study is that the overall distribution of participant choice of deductible resembles that of employees in the main analysis (Figure 6, Panel A). This speaks, albeit loosely, to the ecological validity of the online environment. The second panel of the figure reports decision quality, reflected by the share of $1k deductible choice, across experimental interfaces which vary in complexity from the complex analogue to the setting of the firm (2 attributes, sequential choice, monthly premiums), to a highly simplified menu featuring a table of plans characterized by a single attribute with premiums expressed in annual terms. The pattern of choice across this gradation of complexity suggests significant gains from increasing the ease of plan comparisons through the simultaneous display of plans ($p = 0.01$). Further simplification through the display of annualized premiums, or the movement from 2 attribute choices (and 12 plans) to a single attribute (4 plans) did not improve choice quality. Strikingly, of participants presented with the simplest menu featuring 4 plans varying by deductible and annualized premium, 66% of participants chose a financially dominated plan option.

In consideration of the heterogeneity in choice quality by employee salary in the main analysis, we observe heterogeneity in overall choice quality in the study, as well as in the efficacy of simplification, by participant income. In a linear model of overall response across conditions, controlling for other observable demographics, we estimate those reporting annual earnings of less than $30k, and between $30k and $50k, make inferior choices to those earning greater than $80k ($p < 0.01$; $p < 0.05$ respectively). [20] In comparing responses across highest and lowest interface complexity, simplifying the interface disproportionately improves choice of low income participants (Panel C).

4.3 Health Insurance Literacy and Search Motivation (Experiment 2)

While the first study explores how interface complexity influences choice quality, in a second experiment we investigate whether participant literacy of health insurance concepts and financial motivation to scrutinize plan menus affects decision quality in the face of simplified menus. In the

[19] We note, however, that while this condition was designed to most clearly mimic the setting at the firm we study, we suspect that introducing sequential choices is especially likely to cause low effort in a hypothetical setting, as there is no compelling reason for a participant to go back and "build another" plan.

[20] In the survey we elicit income in five income ranges but we consolidate the highest two income categories (income greater than $120k, and income between $80k to $120k) for increased power and analytic tractability.

second study, lasting less than 10 minutes, we first assess participant literacy and beliefs regarding the financial consequences of plan choice, and then test whether attempts to improve literacy and heighten motivation through informational interventions leads to better plan choices.

Participants. The second experiment involved N = 624 U.S. participants who were recruited from the same Qualtrics panel as the first study in July 2014, and who survived the same attention screen. The final sample again reflects a diversity of gender (56% female; 44% male), age (M=49.8, s.d. = 12.3), education (39% college graduate; 38% some college; 21% high school or equivalent), race (86% white; 7% black; other 7%), and inferred income (M = $50,600; s.d. = 30,700). Participants in the second study were more diverse in employment (43% full-time; 13% part-time; 43% unemployed) and insurance (37% employer insurance; 52% insured not through employer; 12% uninsured) status than either the original study or the empirical sample.

Research Design and Protocol. The second experiment replicated the structure and basic design of the first with a few key differences. After completing a set of demographic questions, the study assessed health insurance literacy by presenting participants with a short scenario describing an individual's recent purchase of health insurance, and then asking participants to link the figures in the scenario to the corresponding health insurance concepts (i.e., annual deductible, out-of-pocket maximum, coinsurance and copayment). We additionally assessed participant beliefs regarding the possibility of facing plan options of low financially value by asking: "When enrolling in health insurance, typically you would be asked to choose from a set of health plans with very different prices (premium). What would you expect to be true about these plan options?" Participants could indicate that the price differences usually reflect differences in quality or coverage ("you get what you pay for"), price differences usually won't reflect differences in quality or coverage ("many plans are simply a bad deal") or that they were unsure of what a menu might present.

To experimentally test whether improving health literacy and search motivation might affect choice quality, we randomized subjects into one of three conditions. In the control condition, subjects were told to imagine themselves making a series of health plan choices from simple plan menus provided by an employer. The first choice involved a dominated menu of 4 plans varying by deductible, and the second choice involved a table of 12 plan options varying by deductible and MOOP. In both menus, the low deductible options were dominated, and prices were approximated from the firm menu but nominally changed across questions to avoid presenting participants with identical plans. While our main objective was to test for the detection of plan dominance, a third

choice asked participants to make a choice among two non-dominated plans after which we assessed participant expected medical utilization.

The second condition resembled the control except that, prior to making plan choices, participants were urged to carefully consider their decision due to the financially consequences of the choice and were told that the typical real-life employee facing such a menu chose a plan which resulted in about $500 of excess spending. In a final condition, before making their choices, participants were guided through a scenario-based tutorial offering instruction as to how to compare the financial value of plans, including a quiz, and rule-of-thumb guidance through which participants could detect plan domination (i.e., if other plan features were identical, participants were told that dominance can be detected by comparing the difference between plan deductibles and plan premiums).

Experimental Results. A majority of the study participants did not report suspecting that plan menus typically contained options of low economic value.[21] Moreover, echoing prior work, 71% of participants were not able to identify the basic cost-sharing features from a simple health scenario.[22] This assessment of literacy was highly predictive of participant ability to detect dominated plan options (both pair-wise comparisons, $p < 0.01$), as reported in Figure 7 (Panel A). We observed only a suggestive correlation between belief in low value plan menus and choice quality (in the single attribute choice, pair-wise comparison not significant; in the two attribute choice, pair-wise comparison, $p < 0.10$). The experimental interventions aimed at improving literacy through real-time education significantly improved choice quality relative to the control (both questions, $p < 0.01$), but cautioning individuals that the choice they face may be consequential did not improve choice (Panel B). Finally, in inspecting the heterogeneity of the treatment effects, we document that the education intervention led to larger relative increases in response quality for those of low, as compared to high, baseline literacy (Panel C). As in the first study, we observe a ceiling in choice quality, such that at least 30 to 40% of participants persist in poor choices regardless of intervention.

Overall, the experiments demonstrate that even with highly simplified menus featuring a small number of plans and plan attributes, a significant majority of participants fail to detect dominated plans. The robustness of poor plan choice in simple settings, along with the correlation of sensible choice with our assessments of definitional knowledge, and the efficacy of educational interventions in improving choice, implicate the importance of health literacy in determining the quality of

[21] 28% expected plans to typically feature such options, 54% believed that price differences typically reflect quality differences, and 18% were unsure.

[22] We counted inverted responses for the coinsurance question as correct, otherwise 82% of participants failed to identify the four cost-sharing principles correctly.

decisions—a conclusion which is perhaps not surprising in light of the widespread lack of plan understanding observed in the sample. Among the different types of enrollment and menu complexity we tested, we find moderate evidence for the importance of facilitating easy plan comparisons. Our explorations into the role of employee beliefs regarding the value of the plan menu offered mixed results. While there is pervasive naiveté regarding the financial consequences of choice, we did not find evidence that awareness of financial consequences alone led to improvements in choice. It may be the case that the knowledge of the financial consequence of choice is not sufficient, unless accompanied by the ability to discern across plans, or that our attempt to spotlight the stakes involved caused participants to anxiously avoid risk.

Finally across studies, these results point to a ceiling in the efficacy of fairly aggressive interventions to improve choice, as 30 to 40 percent of participants continued to make costly mistakes in choice across our conditions. An intriguing implication of these interventions for policy is that, to the extent that those with low income and insurance literacy make inferior choices, simplification and education had the effect of leveling choice quality across sub-groups.

4.4 Differential Valuation of Payroll Deductions and Out-of-Pocket Dollars

As an alternative to the tested mechanisms, it is possible that the observed choice of plans may, at least in part, reflect explicit preferences for avoiding cost-sharing. A strong preference for reducing cost sharing could come from an awareness of budgeting problems (or high costs to budgeting) and liquidity constraints that could make it worthwhile to finance health spending through regular monthly premium payments even at very high costs. Models of non-standard risk preferences also predict a strong demand for reductions in cost-sharing. Individuals, for instance, may rely on a different "mental account" for expected monthly payroll deductions as compared to unanticipated out-of-pocket expenses, and differentially value such accounts finds support in "pain-of-paying" theories of hedonic mental accounting (e.g., Prelec and Loewenstein 1998). Koszegi and Rabin's (2007) model of reference dependent preferences assumes that unexpected expenses, such as those associated with out-of-pocket spending, are subject to loss aversion, while predictable spending, such as premium payments, is not and that this difference can lead people in some situations to pay for even transparently dominated insurance contracts.

Assessing the viability of these types of preferences as an explanation for the choices we observe is outside the scope of this paper. However, we can fairly easily generate an estimate of how big the "wedge" between willingness to pay and expected value for reduced out-of-pocket spending

generated by these types of preferences would have to be to rationalize choices. The average employee who selected a dominated plan paid $631 more for that plan than the equivalent $1,000-deductible plan and on average saw out-of-pocket spending reduced by $259 relative to the higher-deductible alternative. This implies that individuals must value reductions in out-of-pocket spending at a rate of around 2.4 times their value of money paid for premiums. This wedge strikes us as difficult to rationalize through liquidity constraints. With standard loss-aversion estimates in the neighborhood of 2 to 2.5, the simple formulation for loss-averse deductible choice presented by Sydnor (2010) and the Koszegi-Rabin (2007) choice-acclimating-personal equilibrium could largely rationalize these choices. We are skeptical that the psychology of the reference dependent explanation is right in this setting, especially given our survey evidence that most individuals lack insurance literacy. However, to the extent that these choices stem in part from a strong underlying desire to avoid cost-sharing, there are clear negative consequences of moving people into environments with greater health-insurance costs sharing.

SECTION 5. UNDERSTANDING THE EMERGENCE OF DOMINATED MENUS

We turn our focus now to understanding the origins of the pricing of plan options at this firm. Having seen that the majority of employees select into costly dominated plans, and don't improve plan choice over time, it is natural to ask why the firm offered these dominated options in the first place. Moreover, the welfare implications of these plan choices (discussed in more detail below) depend critically on the degree to which our firm menu is more broadly representative of plan menus confronting other enrollees.

5.1 Actuarial Practice and Average-Cost Pricing

While we are not privy to the full set of considerations that shaped the price and structure of the firm's plan menu, informal discussions with firm executives, and the marketing material used to communicate plan options to employees, persuade us that the motive underlying the build-your-own plan paradigm arose from a desire to create value for employees by expanding plan choice and flexibility. We do know that the firm partnered with an actuarial/health-insurance consulting firm to help price the plan options. As Handel (2013) notes, the standard actuarial practice for plan pricing is to set such prices so that they, largely, reflect the average insurance payments made to enrollees

selecting into each plan. This practice of average-cost pricing results in employees being asked to pay a similar share of their health-care costs *on average across plan options.*

Average-cost pricing can result in dominated plan options given sufficient heterogeneity in employee health risk, and sorting of employees by risk into different plans. Handel (2013) studied the evolution of plan pricing at a large firm and concluded that the considerable adverse selection in initial employee plan choice caused plan prices to move towards average-cost pricing in subsequent years which led certain plans, which were not initially dominated, to become financially dominated as pricing gradients widened. In this section we assess whether the degree of plan domination exhibited by our firm's menu is consistent with the strategy of average-cost pricing.

5.2 Does the firm Menu Reflect Average-Cost Pricing?

Table 4 presents a series of regressions to explore the consistency of the firm's menu with an average-cost pricing strategy. In the first column of the table we regress each of the 48 plan premiums on indicators for different cost-sharing features omitting the highest-cost sharing option in each category. The estimates in the first column capture the marginal difference in plan price associated with each cost sharing feature. For example, plans with $500 deductibles cost an average of $625 more than the equivalent plan with a $1,000 deductible which is consistent with the earlier discussion of plan dominance. While the pricing of the firm menu likely reflects meaningful interactions between cost-sharing provisions, the simple regression, with an R-square of 0.99, explains most of the observed variation in prices across plans. The second column of the table estimates the expected marginal benefit to an employee—or equivalently, the marginal increase in costs to the firm—associated with each cost-sharing attribute (again, relative to the omitted high cost-sharing options). The regression relies on estimates of the levels of health spending associated with counterfactual plans as described above, averaged across all employees, and as such assumes that health utilization is not sensitive to plan membership. Comparing Column 2 to Column 1 confirms the large potential savings from avoiding dominated deductibles. The typical employee, for example, would have to pay $625 to lower her deductible from $1,000 to $500, but such a shift would only yield $226 in expected benefits through reductions in out-of-pocket spending.

The final column of the table offers evidence that the observed menu could be rationalized by average-cost pricing. The column reports the results of an employee-level regression of health spending covered by the employee's *chosen* insurance plan. The coefficients from this regression reflect both the average marginal effect of cost-sharing on covered health spending (equivalent to Column

2), as well as the differences in total health spending between typical employees and the employees actually selecting into each plan. In this sense, the final column offers strong evidence for non-random sorting of employees into plans by health needs (adverse selection), and, possibly, moral hazard. As an illustration, the employees choosing $500 deductibles incurred an average of $1,100 more in health spending than those choosing high deductibles, which is nearly 5 times the expected marginal increase in covered spending for an average employee sorting between these options given in Column 2. Comparing the average firm costs from the final column for each cost sharing-feature, with corresponding employee costs reported in the first column suggests that the pricing menu is highly consistent with average-cost pricing. Indeed, these estimates suggest that employees choosing deductibles of $500 or $350 are actually paying a lower share of their total covered spending than employees choosing the $1,000 deductible, while those with the $750 deductible are paying a slightly higher share.

In Figure 8 we provide evidence that the final menu of prices for plans came close to equalizing the share of health spending covered by insurance (e.g., "total premium" if the firm had purchased the coverage from an insurer) that was paid by employee (i.e., "employee premium"). On average we calculate that this share is just over 40%. The figure plots the share of covered costs for all plans associated with each cost-sharing provision. Consistent with the analysis in Table 4, except for plans with $750 deductibles, plan prices appear to result in stable cost-sharing across employees.

5.3 Average-Cost Pricing and Dominated Plan Menus

We interpret the prior analysis of plan pricing as strongly consistent with the possibility that the dominated prices from the firm menu arose out of a combination of standard actuarial average-cost pricing, largely accurate forecasts about the extent to which employees would sort by health risk into plans, and, at least implicitly, the assumption that employees would fail to recognize or negatively react to dominated plan pricing.[23] Such an interpretation, however, raises the important question of why such dominated plan menus are not more pervasive across insurance settings with significant adverse selection. While prior work has documented the regularity of insurance menus in which low-cost sharing options are highly priced, we are not aware of any evidence suggesting that menus with severely dominated plan options are widespread.

[23] Given the wealth of information actuarial consulting firms have about health-care use across plans they help to design and administer for different companies, it is not particularly surprising to us that they would have good projections that capture the type of risk sorting we see here.

A potential explanation for this puzzle may be that the firm's efforts to offer choice to employees was *too* ambitious. The plan menu generated by the firm permitted employees to choose between plans that differed *only* in their deductible, while most employer-sponsored plans bundle together multiple cost-sharing features. The consequence of such plan flexibility is that employees may sort across plans that differ in cost-sharing only on the narrow dimension of a deductible. In the presence of average-cost pricing, expected differences in health spending across employees by deductible choice would generate large differences in plan prices that can lead to dominated pricing. In traditional settings, where different deductible options are typically bundled with cost-sharing attributes that also differ, the sharp differences in prices generated by expected employee sorting is supported by a wider range in cost-sharing, and, as such, may not generated a dominated plan menu.

As a simple illustration of this point, consider what we might observe had our firm offered just the two plans with greatest and lowest cost-sharing (i.e., Plan 48 and Plan 1). Next, suppose, for the purposes of this illustration, that employees presently choosing the $350 or $500 deductible, would sort into Plan 1 ($350 deductible, $1,500 MOOP, 90% Coinsurance, and $15 Copay) under the new regime, and that those presently with $750 or $1,000 deductibles would sort into Plan 48 ($1,000 deductible, $3,000 MOOP, 80% Coinsurance, $25 copay), Based on the counterfactual estimates of plan spending, the firm's share of average health-care spending would be $3,847 for Plan 1 and $1,849 for Plan 48. If the firm required employees to pay premiums that cover 40% of their expected covered spending (consistent with Figure 8), this would suggest a premium difference of $799 between the two plans. For the individuals sorting into Plan 1 in this scenario, the difference in health spending that would be covered between Plan 1 and Plan 48 is on average $622. Despite the excess price of Plan 1 over expected value, Plan 48 would not dominate Plan 1 in this scenario since the maximum potential reduction in out-of-pocket spending for the employee is over $2,500 and 28% of the time these individuals would benefit with Plan 1 over Plan 48.

This scenario, while just a hypothetical, helps to illustrate the ingredients required for the emergence of dominated plan menus: a) a set of menu options that include variation on very small cost-sharing differences, b) meaningful sorting by risk type (and/or moral hazard) across those options, and c) standard actuarial pricing based on an average-cost strategy. Finally, menu designers must presume that consumer demand is not sensitive to the presence of dominated plans. While plan menus with fewer options may feature plans with high relative prices—the selection of which may have significant financial consequences for indiscriminating employees—such menus are much less likely to have the clearly dominated options evidenced by the menu used by our firm.

SECTION 6. IMPLICATIONS FOR WELFARE AND POLICY

The previous sections document the pervasive choice of dominated health-plan options and large consequences of these decisions. In this section we explore the welfare implications of eliminating these dominated plan choices and transitioning to a restricted menu, as well as broader implications of our findings for empirical work on insurance choices.

6.1 Assessing Welfare Implications of Shifting to a Restricted Plan Menu

Although there are clear and large losses to the employees who chose dominated options, focusing solely on the expected value of forgone savings could be misleading. Low deductible plans have less variation in out-of-pocket medical spending, which, at least partially, reduces the welfare loss of choosing dominated options for risk-averse enrollees. In this section we assess the potential welfare gains from transitioning to alternative plan menus after accounting for risk preferences.

Since the observed choices are inconsistent with informed decisions and standard risk preferences, we cannot make inferences about risk aversion at the individual level. Instead we take a more normative approach and assume individuals have "plausible" levels of curvature in their underlying utility of wealth function. We use CARA utility for tractability.[24] We set the coefficient of absolute risk aversion to 0.0001, which is approximately the threshold above which the Rabin-critique (Rabin, 2000) dictates that the implied level of risk aversion over large stakes becomes implausible.[25]

The other variable required for welfare analysis is the employee's expected distribution of potential medical spending. For analytic tractability, we suppose that employees in our data can be characterized by one of 48 different "risk types", each corresponding to the enrollee's plan choice.[26] That is, we assume that the employees who chose each plan represent one risk type and use the distribution of observed medical spending across the individuals in the plan to proxy for employee expectations.

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[24] In particular, the CARA specification allows us to abstract from issues involving the level of wealth across employees and how that interacts with the welfare effects of different plan choices. While this is clearly an important issue, for the purposes of the simple illustration in this section we feel the CARA simplification is helpful.

[25] Specifically Rabin (2000) includes the example of an individual who would turn down a 50/50 gain $110 lose $100 gamble as one of his least extreme examples where the implications of small-scale risk aversion for large-scale risk aversion start to get extreme. Within the CARA model, an individual just turns down this gamble for absolute risk aversion at or above 0.0001.

[26] While we can generate individual-level estimates of the distribution of possible claims (and doing so does not meaningfully change the results), to keep the analysis simple for this section.

With these assumptions, denote the chosen plan as $k \in [1, 48]$ and the equivalent plan with a \$1,000 deductible as k'.[27] Let m_{ij}^k denote the out-of-pocket medical spending for individual *i* from chosen plan *k* in the scenario where plan *j* was selected. Finally, denote the premium for a plan as p_k. The expected utility for the risk-type who chose plan *k* and has wealth *w* is then given by:

$$EU_k(k) = \frac{1}{N_k}\sum_{i=1}^{N_k}(1 - e^{-r\left(w-p_k-m_{ik}^k\right)}).$$

In order to quantify the welfare effect of a switch to non-dominated plans, we can denote a lump-sum transfer payment, *T* that would equalize the expected utility under the current plan with the expected utility under the equivalent \$1k-deductible plan. *T* is set such that:

$$EU_k(k,T) = \frac{1}{N_k}\sum_{i=1}^{N_k}\left(1 - e^{-r\left(w-p_k-m_{ik}^k+T\right)}\right) = \frac{1}{N_k}\sum_{i=1}^{N_k}\left(1 - e^{-r\left(w-p_{k'}-m_{ik'}^k\right)}\right) = EU_k(k').$$

Solving for *T* for each chosen-plan group *k* we have:

$$T_k = -\frac{1}{r}\frac{e^{rp_{k'}}\sum_{i=1}^{N_k}\left(e^{rm_{ik'}^k}\right)}{e^{rp_k}\sum_{i=1}^{N_k}\left(e^{rm_{ik}^k}\right)}.$$

Figure 9 graphs the average value of these transfer payments needed to equate the expected utility of the chosen plan with the \$1k-deductible alternative given the original plan menu (Panel A). Each bar gives the weighted average of the 12 transfer payments for the plans with that deductible level. This figure confirms that forgone welfare gains from avoiding dominated contracts we calculated earlier are not meaningful affected by accounting for risk aversion. We calculate average welfare gains of \$578, \$256, and \$324 for employees in the \$350, \$500 and \$750 deductible levels respectively. There is, of course, no welfare change for those already in the \$1,000-deductible plans.

In practice, were employees to all switch into high deductible plans, either due to a restricted menu or an effective decision-aid, we would expect the firm to react by adjusting premiums. In the second panel of the figure we consider the net welfare effects of a switch to the \$1k-deductible options after permitting the firm to adjust premiums so that the employee share of covered health spending

[27] For plans with \$1,000 deductibles, $k' = k$

remained at the present rate of approximately 40%. This more general-equilibrium approach implies substantial welfare gains to the employees presently in $350 and $750 deductibles, a modest welfare loss to the employees in the $500 deductibles and a large transfer away from the $1,000-deductible employees. The average change in aggregate surplus in this scenario is actually slightly negative reflecting the fact that, after price adjustments, the switch in plan regimes would result in a transfer from the high-deductible to lower-deductible employees but increased cost-sharing for most. While this finding that average welfare would fall by eliminating dominated choices is consistent with similar arguments in Handel (2013), here we suspect that because the disproportionate share of low earners in low-deductible plans would actually cause the net welfare effects to be positive for any welfare function which incorporated differences in the marginal value of a dollar across wealth or income.[28]

Finally, to the extent that plan choices represent forms of random error in the decision process, more choice may be equivalent to entering naïve employees into a plan choice "lottery". Reducing options could produce significantly improve aggregate welfare in some scenarios by reducing the variance in spending introduced by the tendency towards decision-making errors.

6.2 Broader Implications for Policy and the Expansion of Choice

Our findings have a number of implications for policy, as well as the underlying rationale propelling the movement towards greater choice in both employer and government sponsored plan offerings. Beyond challenging the logic for improving individual welfare through offering choices better suited to individuals, our findings question the likelihood of lower premiums and better products that are expected to result from increased competition across providers. According to recent work, the benefits of competition on prices are not obvious when firms interact in markets with a large share of unsophisticated consumers (Sandroni and Squintani 2007; Ho, Hogan, and Morton 2014; Gabaix and Laibson 2006; DellaVigna and Malmendier 2004; Heidhues and Koszegi 2014). If individuals cannot sensibly compare plans differing across simple cost-sharing features, it is unlikely that they will be able efficiently make comparisons across varying plans from different providers in a

[28] Beyond these simple counterfactuals it is challenging meaningfully estimate potential welfare effects of alternative plan regimes. If all employees have the same degree of risk aversion, it will be welfare improving overall for higher-risk individuals to pool with lower-risk individuals, since the increased medical spending for the high-risk individuals means they benefit more from reductions in premiums that come from pooling than the low-risk individuals are hurt by increases in premiums due to pooling. If the employees are going to pool on a single plan, it will generally be best if they can do so on a plan with low cost-sharing, provided the cost-sharing minimizes moral-hazard effects. In reality, however, once we consider the possibility of heterogeneity in the extent of the diminishing marginal utility of wealth and the fact that individuals can potentially opt out of plans, welfare analysis of plan-option design becomes much more complicated.

way that will pressure firms to lower premiums (particularly if providers have incentives to shroud products in a way to inhibit such comparisons).

Our findings also have some relevance for understanding the viability of competitive insurance markets under adverse selection. Akerflof (1970) raised the concern that competitive insurance markets can unravel as low risk types leave the market to avoid cross-subsidizing those with higher risk. Rothschild and Stiglitz (1976) and the research that followed highlighted that competitive insurance markets could exist even in the presence of adverse selection by allowing different risk types to sort into separate contract options. However, this work also highlighted that the equilibria can be quite fragile and that with too much heterogeneity in the population it could be possible to offer options that would lead the market to unravel. In our setting we observe a firm that to an extent can be thought of as embracing the move toward choice too fully in that it offered so many different contract options that with any meaningful sorting by risk type (as we observe) the "market" *should* have unraveled to only the highest cost-sharing plans. The remarkable finding of this paper is that individual's decision processes deviate so far from the rational economic benchmark that a set of options that should not have been feasible – because they are *dominated* – were actually chosen by the majority of individuals. Overall, we think our findings suggest a need for caution in the introduction of options for health insurance. A blind move toward substantial plan choices will likely generate menus of options that theory predicts should lead to unraveling of the market, and to the extent that the market does not unravel it is because it is supported by the decisions of the unsophisticated. [29]

This work also have relevance for related debates about the appropriate extent of cross subsidization in health-insurance markets. We document, in both our empirical analysis and experiments, that many individuals are willing to select dominated plans and that these individuals have higher health-care spending. Debates around the degree of cross-subsidization in health insurance center on the question of the extent to which lower-risk types should be forced to pool with unhealthier individuals. Standard economic theory suggests that in a competitive market if healthier individuals want to separate from unhealthy individuals, they will have to incur costs in the form of increased cost-sharing or even forgoing insurance altogether to achieve that separation (Akerlof, 1970; Rothschild and Stiglitz, 1976). Unless there is a cost to the healthy types of separating, the unhealthy

[29] A further important consequence of these dynamics is that apparent stability of health-insurance markets could be highly misleading. In particular, if one were able to introduce an effective decision aid into a situation like the one we observe, we would likely see a massive and rapid change in consumer choices. It may be, then, that markets that appear initially stable may collapse and unravel suddenly if unsophisticated consumers are better informed about available options.

will "follow" them and maintain pooling. To the extent that the patterns we observe hold in competitive settings as well, they suggest that the sophisticated and healthy may not have to give up much to avoid cross-subsidizing, because the relatively unsophisticated and unhealthier individuals are willing to pay for their higher health spending ever without getting much more insurance.

SECTION 7. CONCLUSION

The principle finding of this study is that violations of dominance in the health-insurance decisions of a large and diverse sample of working Americans are both widespread and costly. Unlike most prior work, our paper is able to transparently assess choice quality without assumptions of risk preferences or beliefs by analyzing employee choice from a standardized plan menu with a large share of financially dominated options. For the majority of employees who chose dominated plans—a disproportionate share of whom were of low income—the financial consequences of poor choice far larger than many of the factors (e.g., the effect of the exchange on insurance premiums, or the penalty associated with the individual mandate) that tend to dominate political discourse regarding health reform. Confirming prior evidence, we find once an employee selects into a plan, she is unlikely to switch into a better plan the following year.

A first question is why employees make such costly decisions? Through a series of online experiments with hypothetical choices made from stylized plan menus, we find evidence for the modest role of search/menu complexity, and potentially much larger role of low health literacy. Confirming other research, we find widespread deficits in employee understanding of the insurance choices they face. Even with simple and small menus, with few plan options, we find significant errors in plan choice suggesting that plan choice is difficult to improve. A policy prescription emerging from these findings is that recent reforms aimed at expanding choice, and increasing provider competition, may be promising benefits on a faulty assumption that enrollees will make sensible plan choices. While efforts to improve choice through simplification, education, and other design improvements may improve choice quality, an alternative policy strategy involves moving efforts to simplify of insurance choices to the fundamental simplification of the incentives that underlie such choice (Loewenstein et al. 2013; Liebman, and Zeckhauser 2008).

Our results prompt two important questions. First, why did the Firm offer employees such perilous menus, and are such menus representative of the choices faced by employees more broadly? We show that the dominated plans are a natural consequence of the standard actuarial practices applied in a context where employees sort into plans based on medical need, and plan menus feature a

significant amount of choice over a narrow range of cost-sharing. While the unique build-your-own paradigm of our Firm may have contributed to a heavily dominated plan menu, we argue that average-cost pricing may lead to expensive low-cost sharing plan options, even in the absence of dominated menus, and such pricing may nudge consumers into financially inefficient choices.

Our study raises several questions, and otherwise has a number of implications, for future work. First, our findings stress the importance of alternative models of insurance choice which take seriously the possibility that fundamentally deficits in literacy or other limits to self-interested decision-making require choice models. The strong departures we observe from the basic predictions of traditional models of insurance demand cast the common practice of inferring risk preferences from observed insurance decisions in doubt. Researchers working in this area have at times been faced with small pockets of observations that could not be rationalized within the existing paradigm, and have typically excluded such seeming anomalies from their analysis.[30] In our data we see that these violations of the model are the norm and not the exception. It might be tempting to conclude that our setting is unique, however, our observations come from a Fortune 100 company using a menu constructed from accepted actuarial practices. While we suspect that dominated plan menus are not the norm— and as such, represent a unique opportunity to cleanly test for the rationality of choice— menus featuring expensive low cost-sharing options, that may also lead to highly inefficient employee decisions, are far more popular.[31] Recent work has focused on modeling "frictions" and noise in insurance choice. While we think this is a fruitful direction, our results also suggest a need for a more sophisticated understanding of what drives "noise" in decisions.

With respect to how employees make complicated insurance decisions from plan menus, our mechanism experiments indicate that a large share of individuals do not suspect employee-sponsored menus with plans of low economic value. While our attempts to heighten search motivation by providing information did not lead to improved choice quality, the role of employee trust in poor financial choice across a range of setting deserves further exploration. Finally, our study, including the existence of varying choice heuristics that lead to distinct bundling strategies, among the employees in our sample, suggests that additional examination of the role of such heuristics, and their interaction

[30] See for example Einav et al., 2013 page 189 or the extensive discussion in Barseghyan et al., 2014. A notable exception is Handel, 2013, who specifically leverages the fact that employees do not switch out of menus that become dominated in his analysis of the effects of choice inertia.

[31] As we documented in Section 5, if the company had offered fewer options, we might have seen similar sorting and since we would not have observed violations of dominance might have simply concluded that people were "quite risk averse".

with plan menus, would be worthwhile both for insights into the optimal design of choice architectures, as well as for theoretical insights into decision-making. A better understanding of these underlying decisions processes and preferences may be cruicial for the assessment of the welfare effects of health-insurance reforms.

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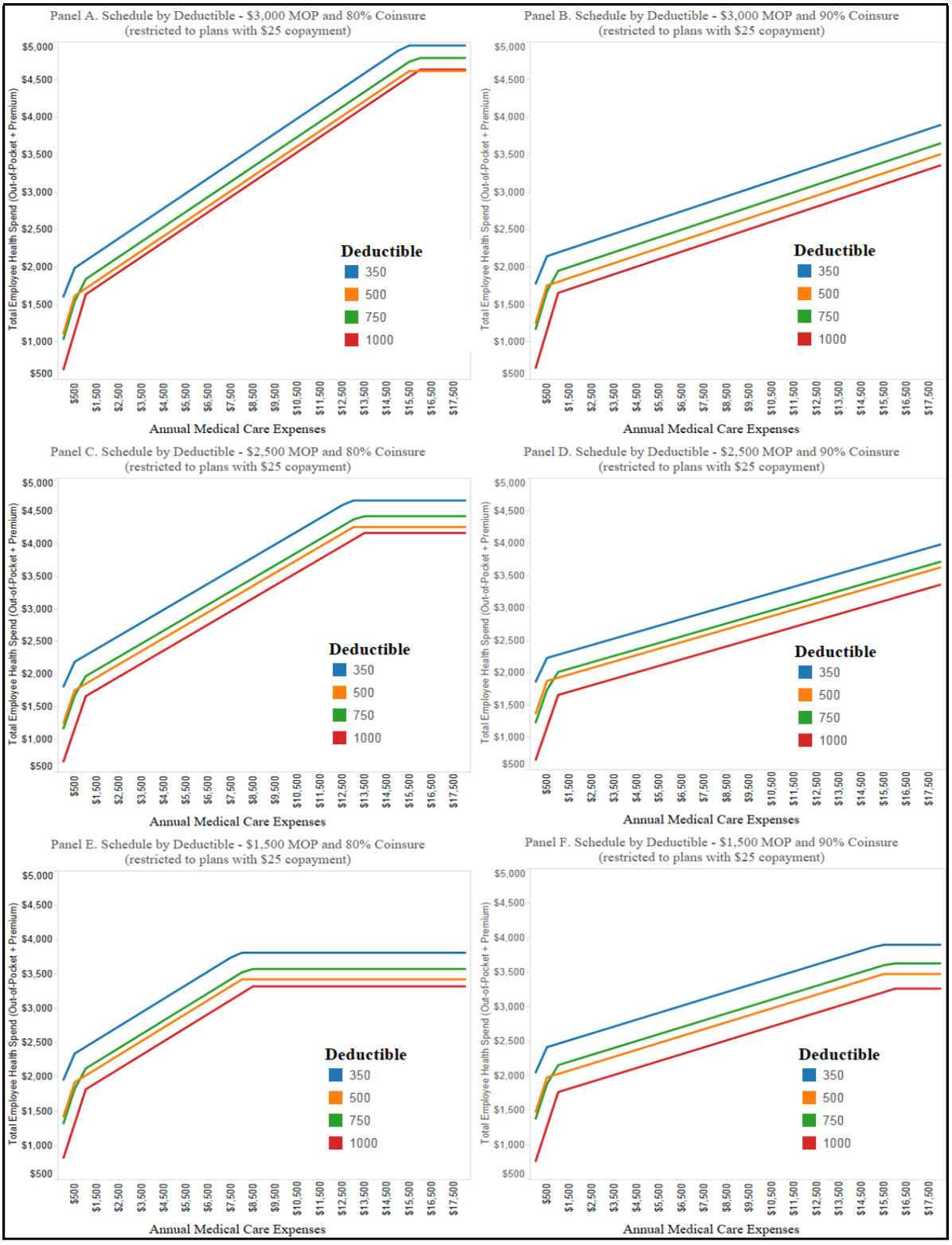
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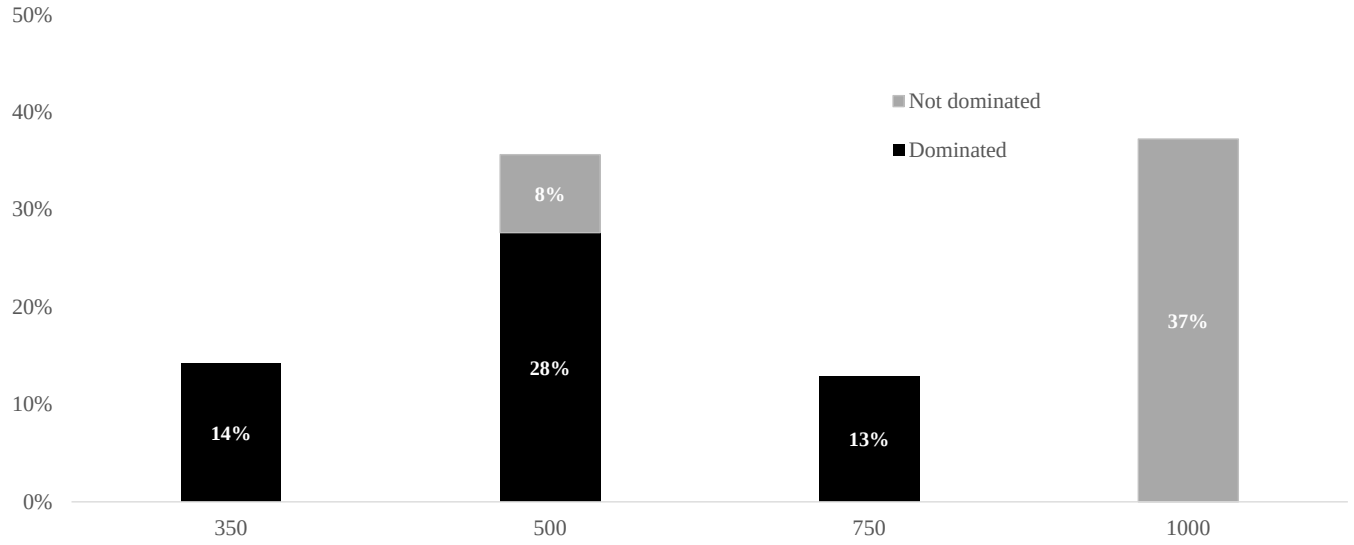
Figure 1. Employee Health-Cost Schedule for Different Plan Options



Notes: The figure depicts plan pricing schedules for 24 of the 48 available plans (restricted to those with the $25/40 copayment). Each panel displays the total out-of-pocket costs (premium plus out-of-pocket expenditures) by deductible choice, for a given out-of-pocket maximum and coinsurance rate , for an employee associated with medical care expenses ranging from $0 to $17,500. The figure communicates plan dominance in that the cost schedules for certain plans are below the schedules for other plans for the entire range of medical care expenses, as is the case for the $1,000 deductible in all Panels with the exception of Panel A. While the plan schedules above assume no office visits, the inclusion of copayments should shift all plans in a panel equivalently and therefore does not affect depictions of dominance. Similarly, the truncation of medical expenses to the displayed range also does not impact dominance.

Figure 2. Distribution of Plan Choices

A. Distribution of Deductible Choice



Note: Dominance for Panel A is defined as cases in which the difference in tax-adjusted price (adjusted by each individual's implied marginal tax rate given his/her salary band) for the chosen deductible and the equivalent plan with the $1,000 deductible by more than the deductible difference.

B. Distribution of Plan Choice

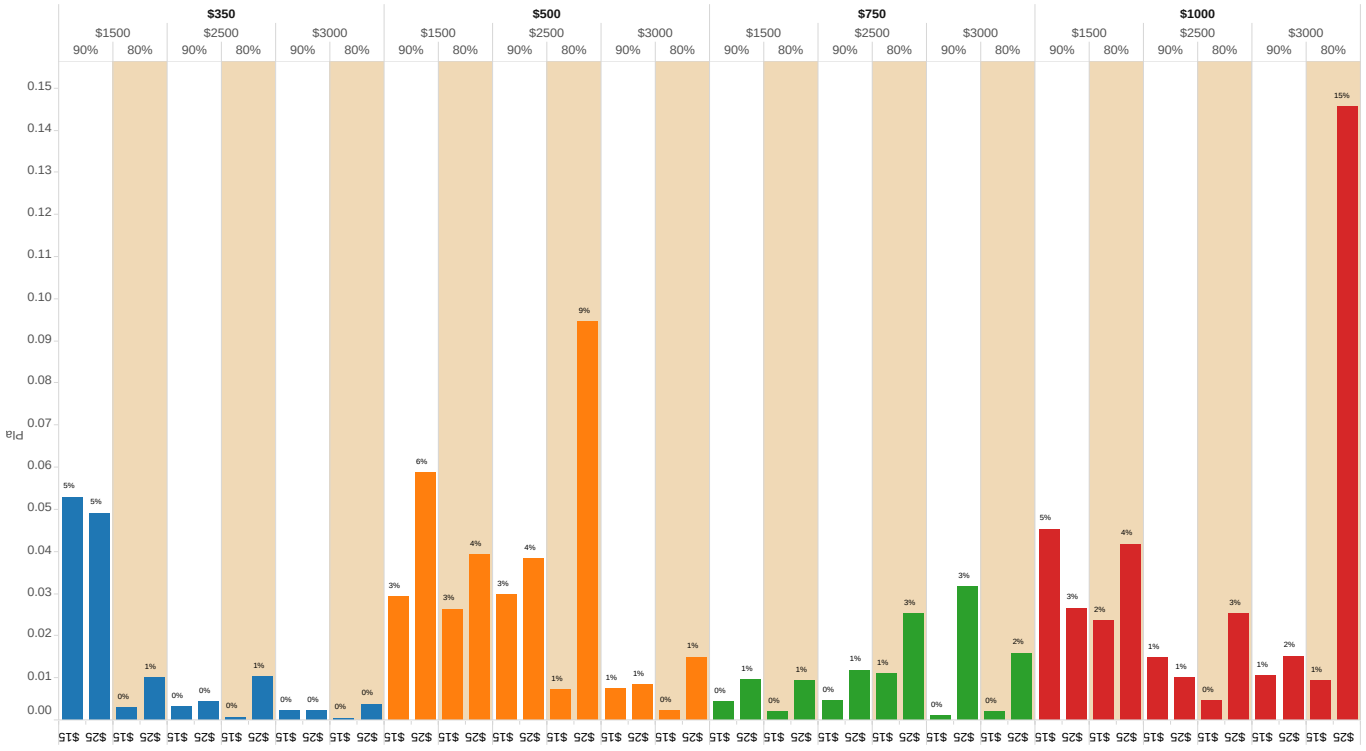
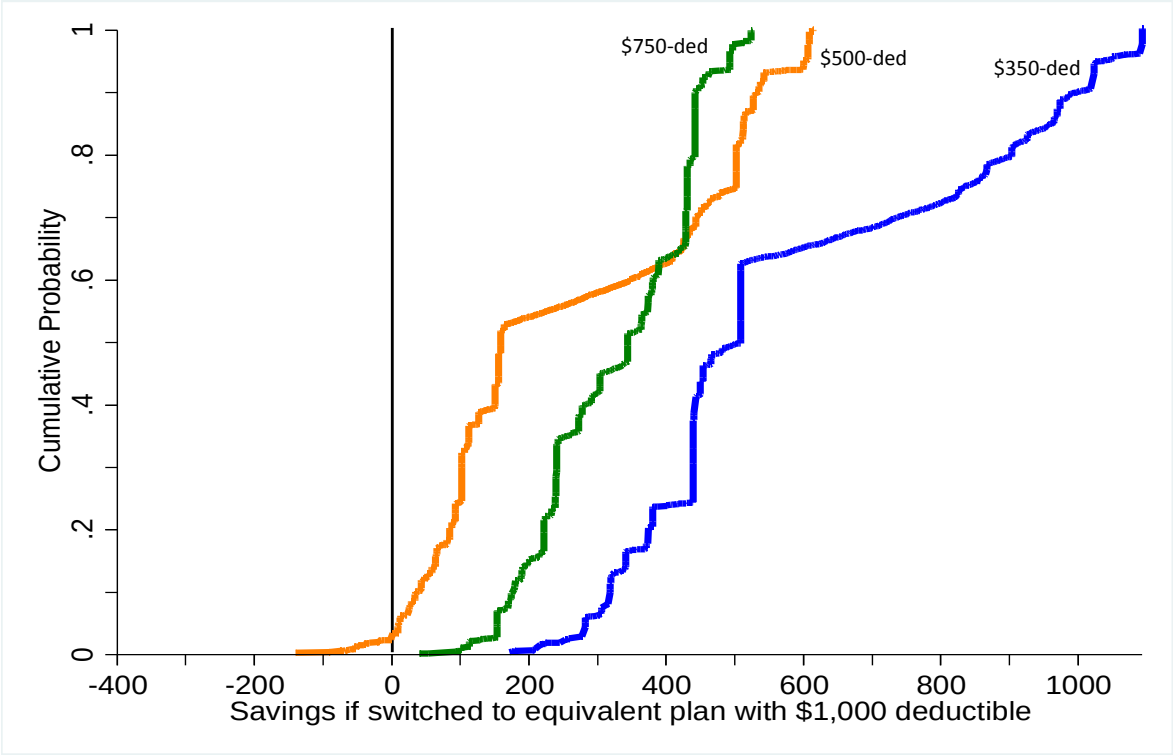
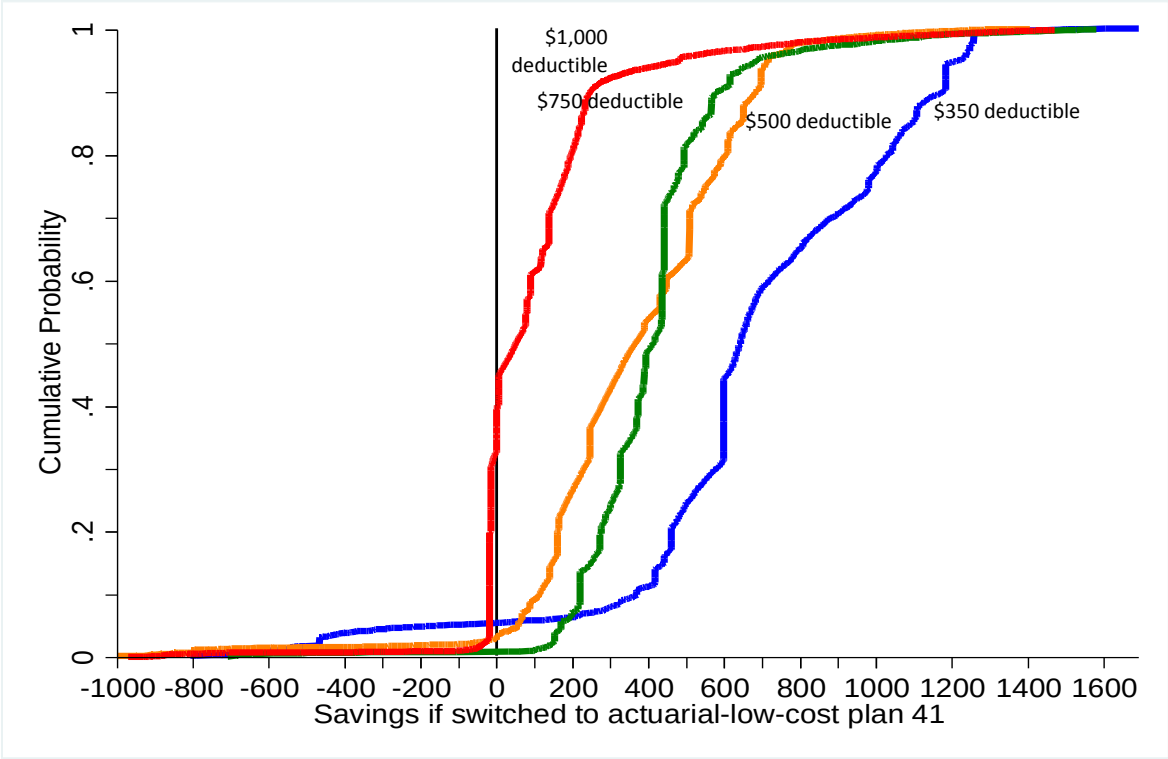


Figure 3. Distribution of Counterfactual Savings with Alternative Plans by Chosen Deductible

Panel A. Switch to equivalent plan with the $1,000 deductible



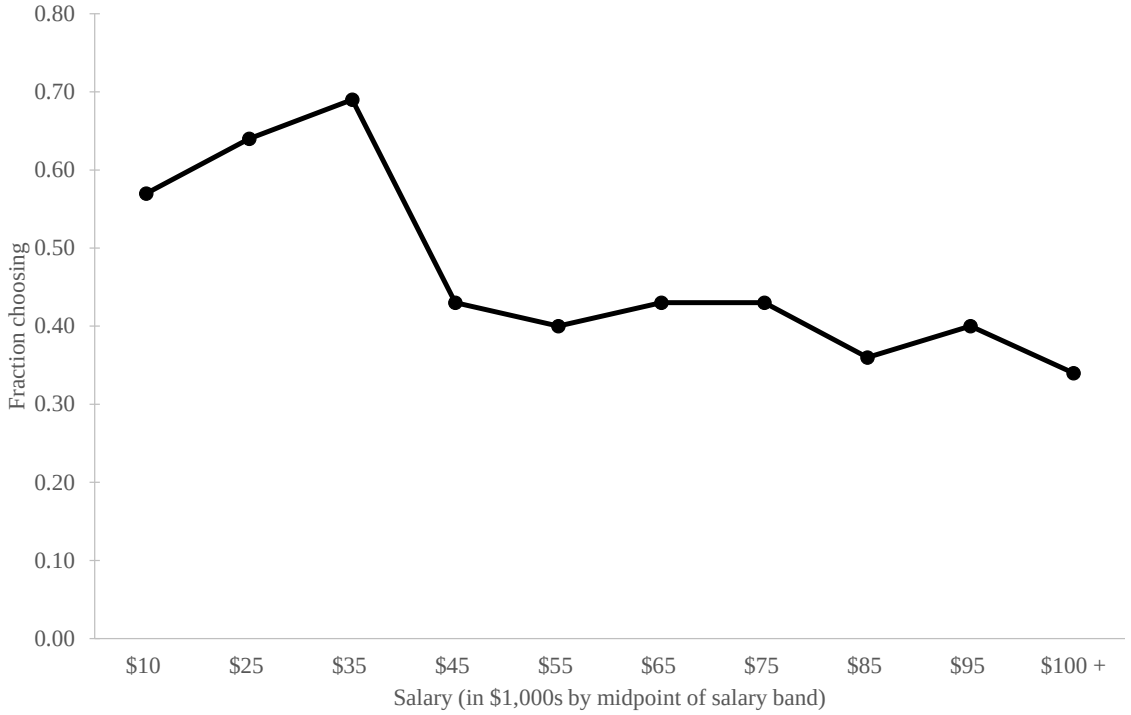
Panel B. Switch to actuarial-low-cost plan 41



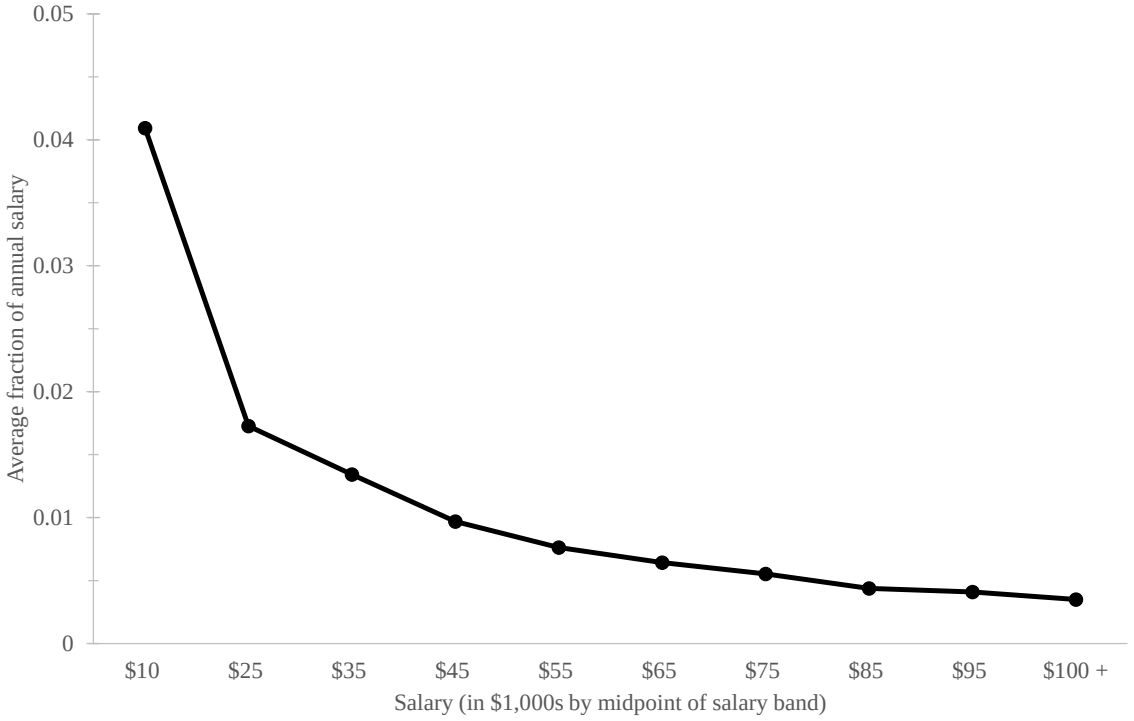
Note: These plots shows the cumulative distribution of potential counterfactual after-tax savings if the employees who chose a plane with the indicated deductible had instead switched to the alternative specified in the Panel. The counterfactual savings are calculated as the individuals tax-adjusted premium savings (calculated using the federal marginal tax rate implied by the employee's salary range) less the increase in out-of-pocket spending for health care the individual would have experienced with the switch given the individual's observed health spending under the chosen plan.

Figure 4. Patterns of Dominated-plan Choice and Potential Savings by Salary

Panel A. Fraction Selecting a Plan Dominated by Equivalent Plan with $1,000 Deductible

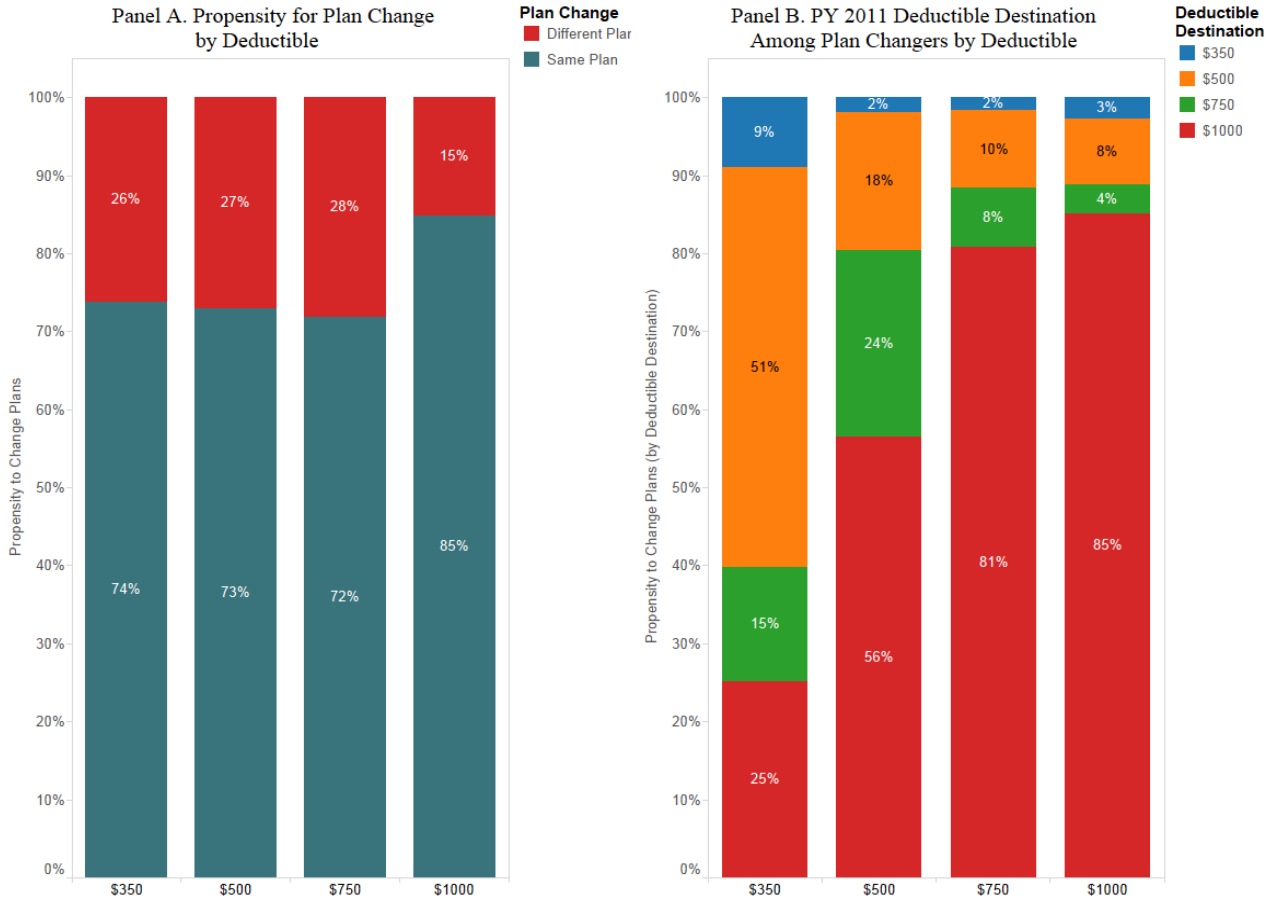


Panel B. Average Counterfactual Savings with Switch to Actuarial-low-cost Plan 41



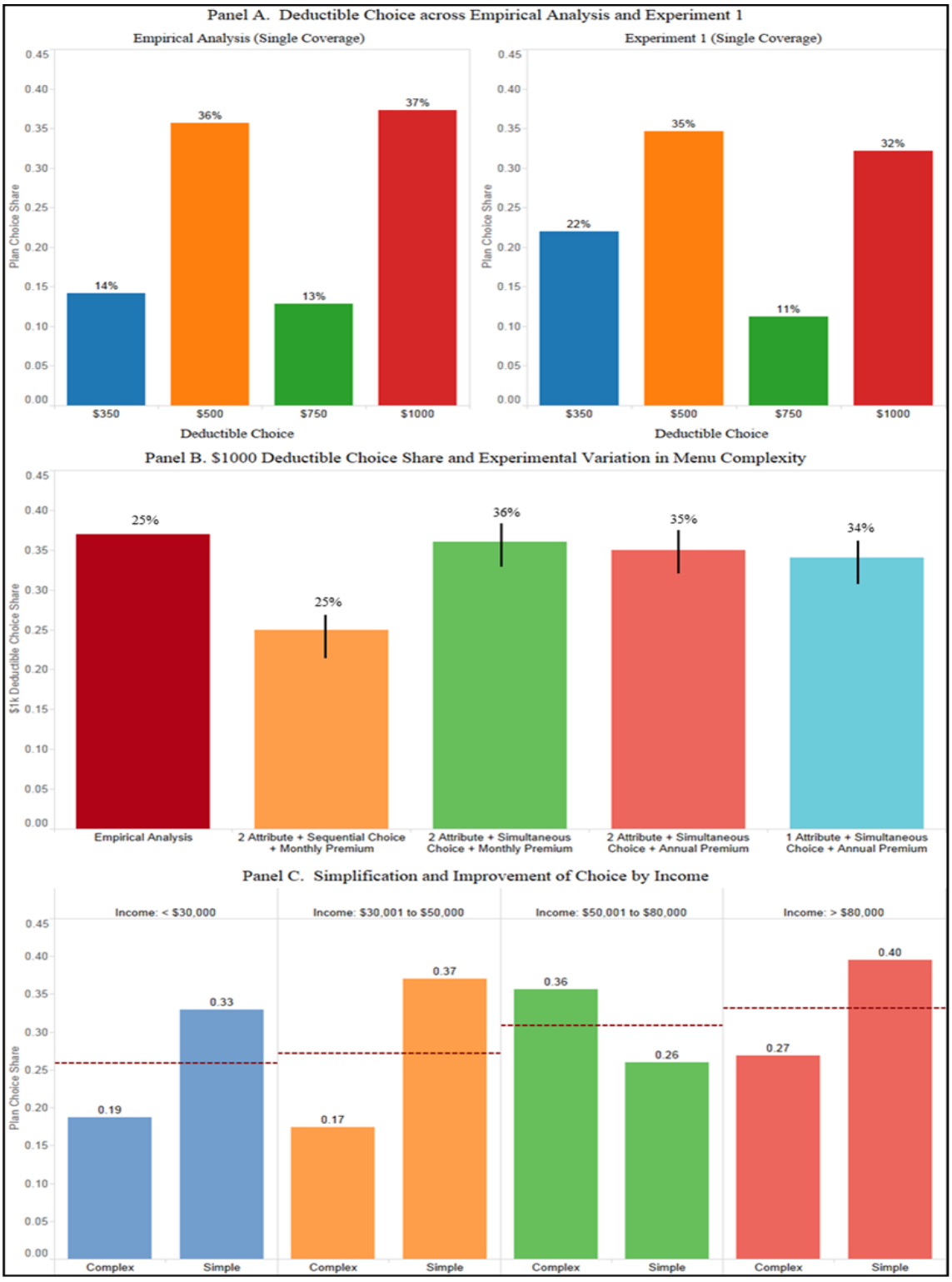
Notes: Panel A shows the fraction of employees at each salary band who chose a plan with a lower deductible that was dominated by the equivalent plan with the $1,000-deductible alternative after adjusting the premium costs to reflect the individual employee's federal marginal tax rate implied by the salary band. Panel B shows the average counterfactual savings across all employees in the salary band as a fraction of annual salary if all the employees had instead had the actuarial-low-cost plan 41. This counterfactual is calculated across all employees, including those who did not choose a dominated deductible and those who were already in plan 41 (for whom the counterfactual savings is $0 by construction).

Figure 5. Propensity to Change Plans and PY 2011 Destination



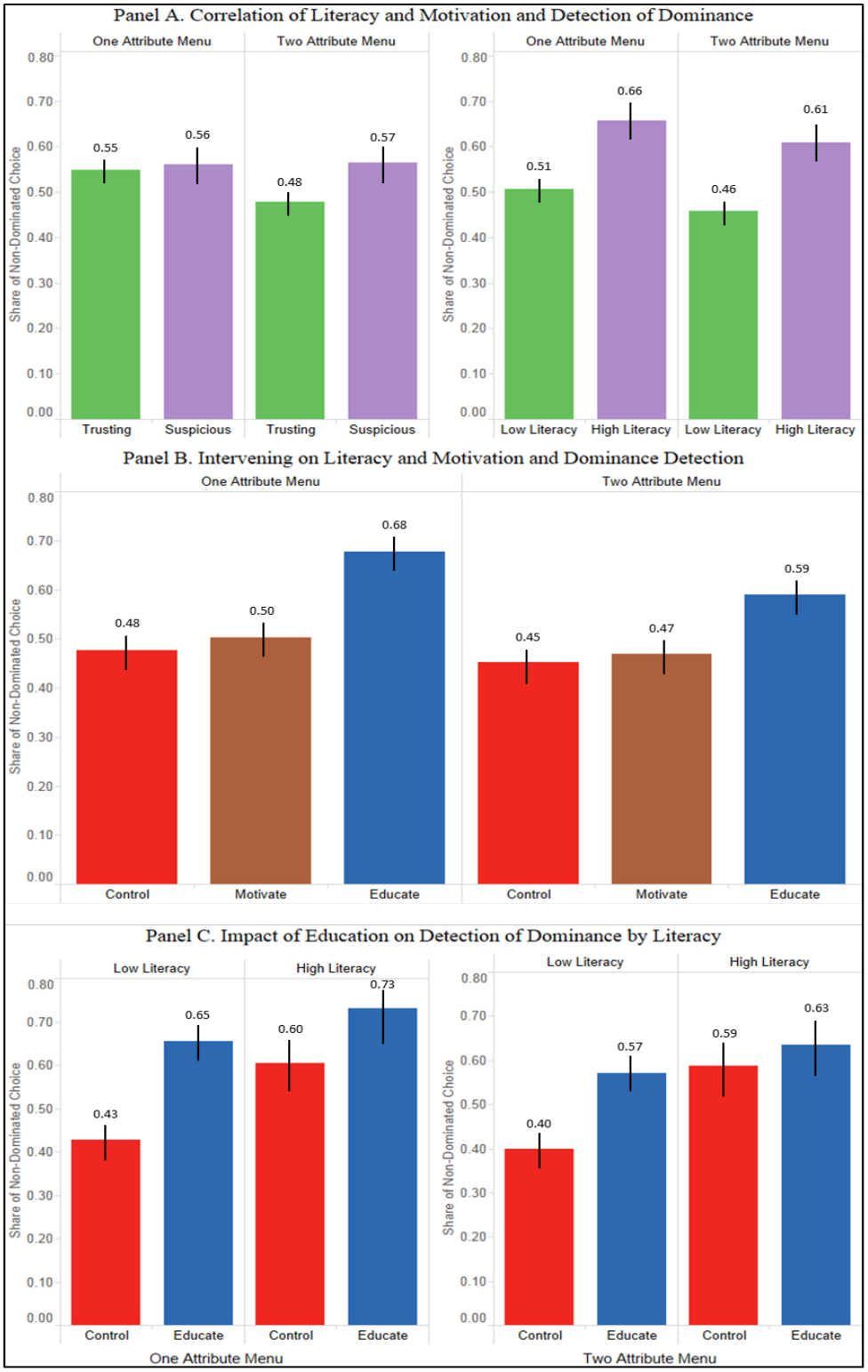
Notes: The figure summarizes the employee propensity to change health plans for PY2011 as well plan destination by chosen deductible. The figure is restricted to the set of employees with single coverage included in the primary analysis and who also did not exit the firm in PY2011. Panel A describes plan change behavior by PY 2010 deductible, and Panel B describes the distribution of new plan deductibles by prior year deductible for those who changed their plan. Note that employees can change plans both within and across deductible levels. Plan menu was unchanged from PY 2010 to PY 2010 apart from small changes to plan premiums.

Figure 6. Menu Complexity and Choice Quality (Experiment 1)



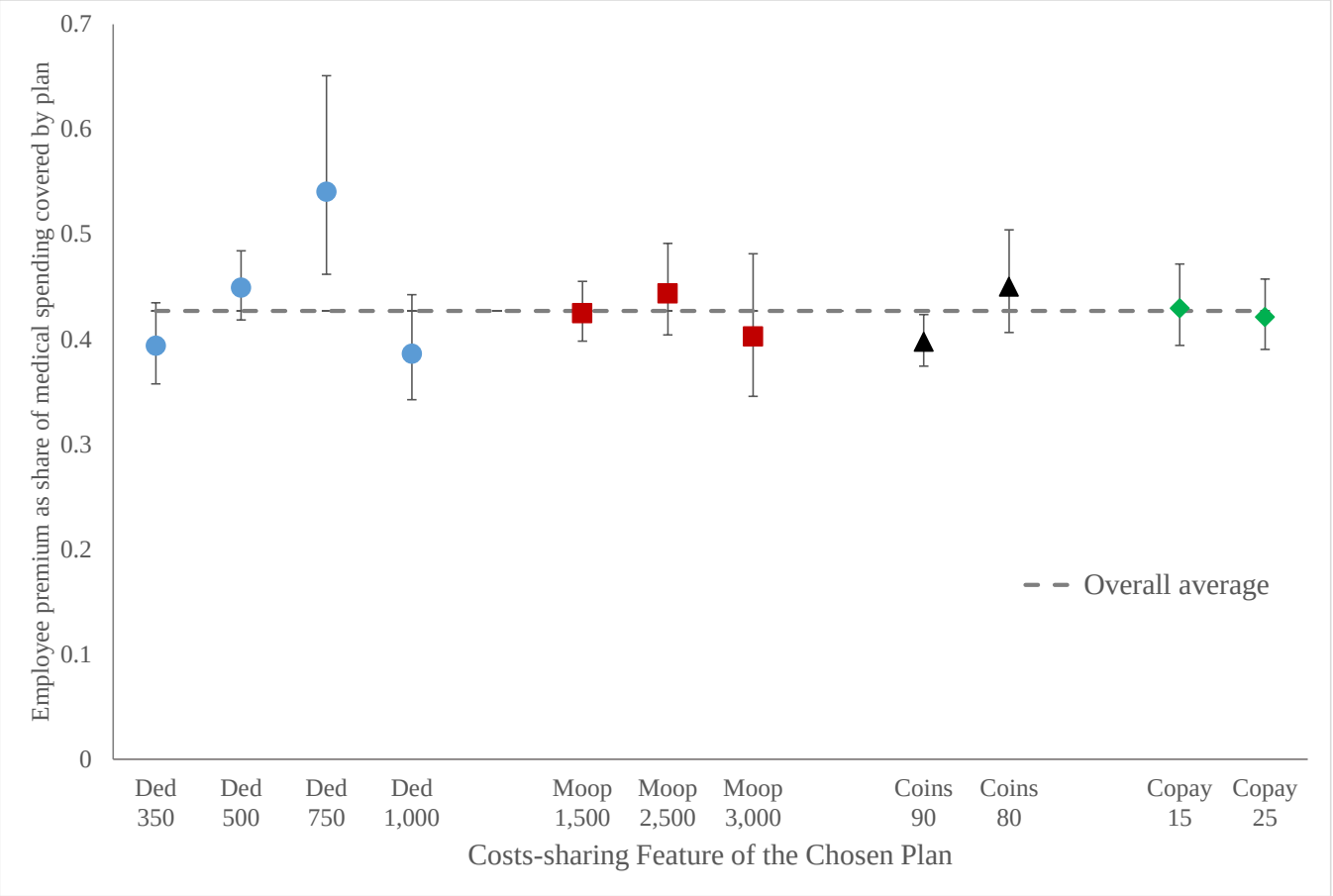
Notes: Panel A compares the distribution of deductible choice of firm employees from the main empirical analysis to the analogous distribution of deductible choice for participants in Experiment 1 (across all conditions). Panel B compares the share of $1,000 deductible choice from the empirical analysis and a range of experimental conditions which vary the complexity of plan menus and the difficulty of search. Bars indicate +1 / -1 standard errors. Panel C reports choice quality for the highly complex (i.e., 2 Attribute + Sequential Choice + Monthly Premium) and highly simple menus (1 Attribute + Simultaneous Choice + Annual Premium) by income category.

Figure 7. Health-Insurance Literacy, Search Motivation and Choice Quality (Experiment 2)



Notes: Panel A documents the correlation between health literacy, beliefs regarding the likelihood of encountering financially unattractive plans, and plan choice quality for both the one and two attribute choice conditions (across all conditions). "Trusting" includes participants who indicated that they were unsure of their beliefs (18% of sample). Panel B documents plan choice quality across the three experimental conditions (control, motivation, and education conditions). Panel C reports choice quality for the control and education conditions for low and high literacy groups. Bars indicate +1/-1 standard error intervals.

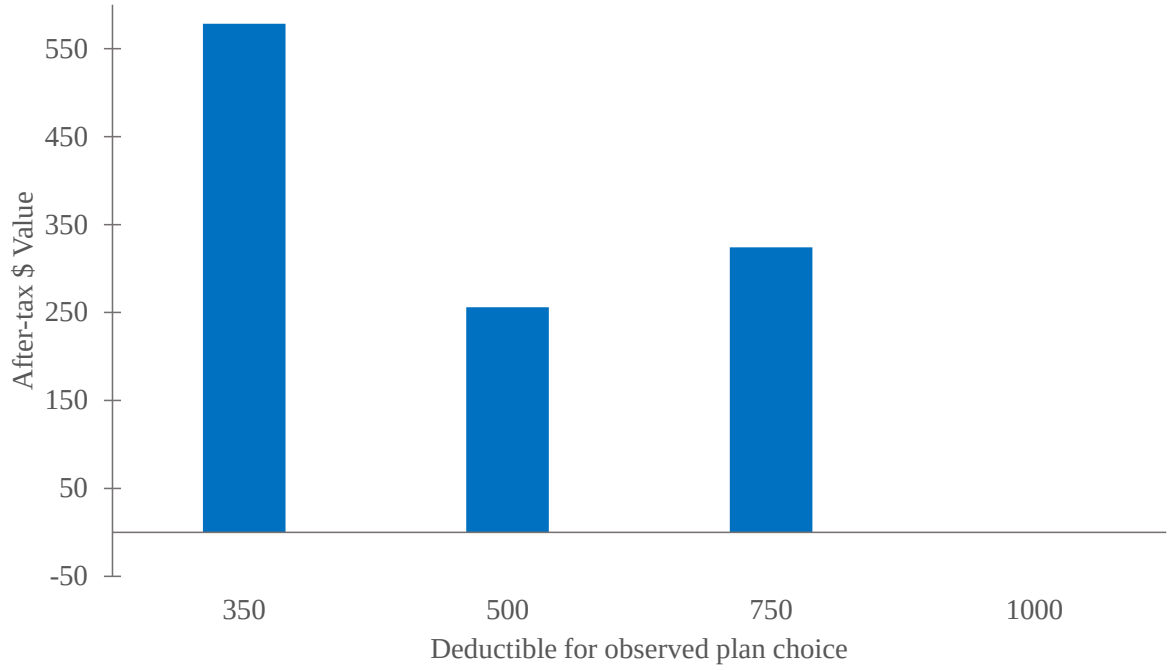
Figure 8. Consistency of Premiums with Proportional Average-Cost Pricing



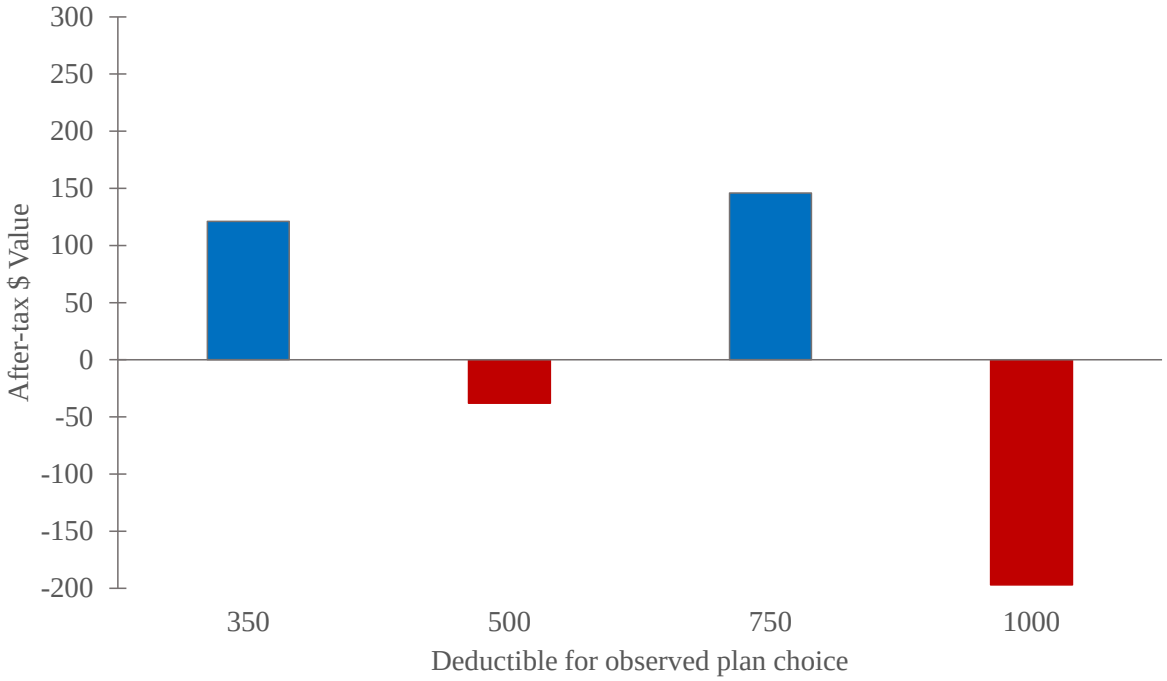
Note: This figure shows the average ratio of an employee's paid premium to the total spending for the employee's health-care incrurred by the plan (i.e., paid by the employer). Each dot averages across individuals who chose plans with that cost-sharing feature. 95% confidence intervals on the ratio are given by the error bars.

Figure 9. Welfare Effects of Switching All Employees to Equivalent $1k-deductible Plan

Panel A. Switch Under Current Menu Prices



Panel B. Switch with Prices Adjusted to Keep 40% Employee-Premium Share



Notes: For Panel A we calculate the amount of money members of each chosen plan would need to be given in order to equate their expected utility under the current plan with the expected utility of the counterfactual in which they switch to the equivalent plan with the $1k-deductible. The calculation assumes CARA utility with r = 0.0001 and are described in detail in Section 6. These calculations result in a single welfare value applied to all the members of a chosen plan. The figure graphs the average of these welfare values across plans with the denoted deductible, weighting by the number of individuals who chose the plan. Panel B presents the analagous exercise, but for the case where after the switch the premiums charged on the $1k plans would adjust to keep the observed ratio of employee premium contribution to total covered health spending at 40%, consistent with Figure 8.

Table 1
Summary Statistics for Single-Coverage (Employee Only) Data for Plan Year 2010

Variable	Mean	Standard Deviation	Variable	Mean
Demographics			**Cost sharing-features of chosen plan for plan year 2010**	
Male	0.29	--	Deductible $350	0.14
Approximate salary (based on salary bands)	$41,464	$31,158	Deductible $500	0.36
Approximate age (based on age ranges)	39.6	13.7	Deductible $750	0.13
Years with firm	7.8	5.1	Deductible $1,000	0.37
Enrolled in company plan prior to 2010	0.93	--	Max-out-of-pocket after deductible $1,500	0.43
Chronic condition	0.28	--	Max-out-of-pocket after deductible $2,500	0.30
Health-care usage in plan year 2010			Max-out-of-pocket after deductible $3,000	0.27
Preventative-care visits	0.43	0.57	Percent covered by plan after deductible (Coins) 90%	0.47
Primary care physician visits	3.1	3.8	Percent covered by plan after deductible (Coins) 80%	0.53
Specialits visits	3.8	7.4	Copay $15 primary care/ $40 specialist	0.30
ER visits	0.26	0.76	Copay $25 primary care/ $35 specialist	0.70
Health-care spending in plan year 2010				
Total medical spending (plan and employee cost-share)	$3,567	$11,751	Prior enrollees in Plan 48 (the default option)	0.15
Employee out-of-pocket medical spending	$742	$690	New enrollees in Plan 48 (no default option)	0.15
Plan medical spending (non-employee portion)	$2,826	$11,384		
Annual premium paid by employee	$1,205	$454		
After-tax value of annual premium paid by employee	$979	$378		
Employee total medical spending (premium + out-of-pocket)	$1,947	$812		
Plan spending net of employee premium	$1,620	$11,348		
Number of employees with single coverage (employee only)	23,894			

Table 2

PLAN MENU DETAILS & PRICE DOMINATION

Plan Name	Deductible	Coinsurance	Out-of-Pocket Max	Copay	Percent who chose	Premium	Premium diff from $1k-ded alternative	Premium diff adjusted for average marginal tax rate (.19)
Plan 1	$350	90%	$1,500	$15/$40	5.3%	$2,134	$1,204	$975
Plan 2	$350	90%	$2,500	$15/$40	0.3%	$1,983	$1,235	$1,000
Plan 3	$350	90%	$3,000	$15/$40	0.2%	$1,912	$1,255	$1,017
Plan 4	$350	90%	$1,500	$25/$35	4.9%	$2,047	$1,286	$1,042
Plan 5	$350	90%	$2,500	$25/$35	0.4%	$1,862	$1,206	$977
Plan 6	$350	90%	$3,000	$25/$35	0.2%	$1,778	$1,124	$910
Plan 7	$350	80%	$1,500	$15/$40	0.3%	$2,037	$1,160	$940
Plan 8	$350	80%	$2,500	$15/$40	0.1%	$1,889	$1,176	$952
Plan 9	$350	80%	$3,000	$15/$40	0.1%	$1,608	$967	$783
Plan 10	$350	80%	$1,500	$25/$35	1.0%	$1,957	$1,140	$924
Plan 11	$350	80%	$2,500	$25/$35	1.0%	$1,808	$1,146	$928
Plan 12	$350	80%	$3,000	$25/$35	0.4%	$1,605	$971	$786
Plan 13	$500	90%	$1,500	$15/$40	2.9%	$1,568	$638	$517
Plan 14	$500	90%	$2,500	$15/$40	3.0%	$1,455	$707	$572
Plan 15	$500	90%	$3,000	$15/$40	0.7%	$1,378	$722	$585
Plan 16	$500	90%	$1,500	$25/$35	5.9%	$1,474	$713	$577
Plan 17	$500	90%	$2,500	$25/$35	3.8%	$1,372	$716	$580
Plan 18	$500	90%	$3,000	$25/$35	0.8%	$1,252	$598	$484
Plan 19	$500	80%	$1,500	$15/$40	2.6%	$1,497	$620	$502
Plan 20	$500	80%	$2,500	$15/$40	0.7%	$1,315	$602	$487
Plan 21	$500	80%	$3,000	$15/$40	0.2%	$1,152	$511	$414
Plan 22	$500	80%	$1,500	$25/$35	3.9%	$1,419	$602	$488
Plan 23	$500	80%	$2,500	$25/$35	9.5%	$1,252	$590	$478
Plan 24	$500	80%	$3,000	$25/$35	1.5%	$1,114	$480	$389
Plan 25	$750	90%	$1,500	$15/$40	0.4%	$1,463	$533	$432
Plan 26	$750	90%	$2,500	$15/$40	0.5%	$1,333	$585	$474
Plan 27	$750	90%	$3,000	$15/$40	0.1%	$1,260	$603	$489
Plan 28	$750	90%	$1,500	$25/$35	1.0%	$1,377	$616	$499
Plan 29	$750	90%	$2,500	$25/$35	1.2%	$1,235	$579	$469
Plan 30	$750	90%	$3,000	$25/$35	3.2%	$1,173	$519	$421
Plan 31	$750	80%	$1,500	$15/$40	0.2%	$1,408	$531	$430
Plan 32	$750	80%	$2,500	$15/$40	1.1%	$1,217	$505	$409
Plan 33	$750	80%	$3,000	$15/$40	0.2%	$1,089	$448	$363
Plan 34	$750	80%	$1,500	$25/$35	0.9%	$1,321	$504	$408
Plan 35	$750	80%	$2,500	$25/$35	2.5%	$1,168	$506	$410
Plan 36	$750	80%	$3,000	$25/$35	1.6%	$1,038	$404	$327
Plan 37	$1,000	90%	$1,500	$15/$40	4.5%	$930	--	--
Plan 38	$1,000	90%	$2,500	$15/$40	1.5%	$748	--	--
Plan 39	$1,000	90%	$3,000	$15/$40	1.0%	$657	--	--
Plan 40	$1,000	90%	$1,500	$25/$35	2.7%	$761	--	--
Plan 41	$1,000	90%	$2,500	$25/$35	1.0%	$656	--	--
Plan 42	$1,000	90%	$3,000	$25/$35	1.5%	$654	--	--
Plan 43	$1,000	80%	$1,500	$15/$40	2.4%	$877	--	--
Plan 44	$1,000	80%	$2,500	$15/$40	0.5%	$713	--	--
Plan 45	$1,000	80%	$3,000	$15/$40	0.9%	$641	--	--
Plan 46	$1,000	80%	$1,500	$25/$35	4.2%	$817	--	--
Plan 47	$1,000	80%	$2,500	$25/$35	2.5%	$662	--	--
Plan 48	$1,000	80%	$3,000	$25/$35	14.6%	$634	--	--

Notes: This table shows the annual premiums faced for each of the 48 plan combinations for the 23,894 employees with single (emloyee-only) coverage in 2010. The eighth column gives a comparison of the annual premium for that plan combination with the premium for the plan with the $1,000 deductible, holding other features constant. For example, the value $1,204 in the first row is calculated by taking the difference between the premium for Plan 1 and for Plan 37. Shaded rows denote plans that are dominated in the sense that the difference in premium between the plan and it's $1,000-deductible alternative exceeds the deductible difference. In order to fascilitate comparisons based on pre-tax premiums, the last column adjusts the premium differences for the 19% average marginal tax rate faced by employees based on their income band. Again shaded cells denote dominated plans at each marginal tax rate.

Table 3
Predictors of Choosing a Dominated Plan and Savings with Counterfactual Alternatives

Dependent variable:	Chose dominated plan	Net save: switch to $1k-ded	Net save: switch to Plan 41
Mean of the dependent variable:	0.55	$221	$320
Salary band ($100k + omitted)			
< 20k	0.24***	81.59***	109.62***
	(0.01)	(5.55)	(7.17)
20k - 30k	0.28***	91.64***	111.36***
	(0.01)	(4.88)	(6.25)
30k - 40k	0.30***	112.03***	124.41***
	(0.01)	(5.99)	(7.56)
40k - 50k	0.07***	46.88***	48.16***
	(0.01)	(6.62)	(8.39)
50k - 60k	0.03*	30.97***	34.99***
	(0.02)	(8.67)	(11.08)
60k - 70k	0.06**	35.54***	23.24
	(0.02)	(11.42)	(15.12)
70k - 80k	0.04	13.86	12.34
	(0.03)	(13.13)	(17.89)
80k - 90k	-0.02	-23.42**	-18.84
	(0.03)	(11.56)	(16.29)
90k - 100k	0.02	-17.69	-10.67
	(0.03)	(12.06)	(15.63)
Age band (less than 29 omitted)			
30-39	0.04***	26.26***	34.97***
	(0.01)	(4.63)	(5.73)
40-49	0.08***	40.38***	52.72***
	(0.01)	(5.11)	(6.52)
50-59	0.13***	64.61***	72.93***
	(0.01)	(5.13)	(6.57)
60-69	0.18***	76.12***	81.34***
	(0.01)	(7.11)	(9.66)
70+	0.21***	110.17***	142.76***
	(0.03)	(19.58)	(27.04)
Female	0.06***	-5.92	8.95*
	(0.01)	(3.73)	(4.62)
Chronic condition	0.08***	-32.98***	-17.64***
	(0.01)	(3.66)	(5.05)
Tenure with company (years)	0.05***	26.88***	24.35***
	(0.01)	(3.58)	(4.76)
New enrolle in company plan	-0.05***	-15.54**	-8.75
	(0.01)	(6.71)	(8.27)
N	23,881	23,881	23,881
R-squared	0.10	0.04	0.03

Note: Heteroskedasticity-robust standard errors in parentheses. Significance at p-value < 0.01 denoted by ***, p-value < 0.05 by **, p-value < 0.10 by *. A dominated plan is indicated when the difference in premium the individual paid for the chosen plan versus the equivalent plan with the $1,000 deductible (adjusted for tax-deductiblity of premiums using the individual's implied federal marginal tax rate) exceeds the difference between the chosen deductible and $1,000. For Column 2 the counterfactual is a switch to the equivalent plan with the $1,000 deductible and is $0 by construction for those who chose plans with $1,000 deductibles. In Column 3 the counterfactual is a switch to plan 41, which we estimate to be the plan with lowest average employee spending (combining premium and out-of-pocket costs) and is $0 by construction for those who chose plan 41.

Table 4

Understanding the Menu Pricing: Regressions of Price and Costs for Plan Features

Description:	**Marginal price to employees**	**Marginal cost to employer (marginal benefit to employee) for avg employee**	**Average cost to employer for employees selecting that coverage**
Dependent Variable:	Annual Employee Premium	Avg. counterfactual medical spending covered by insurance across all employees	Medical spending covered by insurance for chosen plan
Mean of Dep. Var for Plan 48:	$634	$2,535	$1,821
Deductible (1,000 omitted)			
750	$528	$101	$326
	(19.9)	(6.1)	(483)
500	$625	$226	$1,100
	(19.9)	(6.1)	(301)
350	$1,156	$311	$2,865
	(19.9)	(6.1)	(377)
MOOP (3,000 omitted)			
2,500	$108	$19	$75
	(17.2)	(5.3)	(357)
1,500	$259	$73	$325
	(17.2)	(5.3)	(344)
Coinsurance (80% omitted)			
90%	$93	$137	$765
	(14.0)	(4.3)	(255)
Copay (25/40 omitted)			
15/35	$76	$10	$35
	(14.0)	(4.3)	(256)
N	48	48	23,894
Clusters	--	--	48
R-squared	0.99	0.99	0.01

Notes: Plan 48 has the highest cost-sharing provisions on all dimensions and would be represented with the omitted categories for all variables in these regressions. Standard errors in parentheses (adjusted for clustering at the plan level in columns 3). For Column 1 we attempt to summarize the pricing menu by regressing premium on plan features for the 48 different plan options. Column 1 can thus be interpreted as the average effect on employee premium for different cost-sharing provisions holding other cost-sharing features fixed. For Column 2 we start by calculating for each plan the average spending the plan would have across all 23,894 single-coverage employees using the counterfactual spending data for each employee. We then regress that average at the plan level on cost-sharing features of the plan. In this way, Column 2 shows how the cost sharing features affect plan spending at the margin for the average employee. For Columns 3, in constrast, each observation is for an individual employee and the dependent variable is the spending for that employee in his/her chosen plan. Columns 3 allows for selection effects by employees and hence differences in these columns relative to Column 2 reflects the effects of adverse selection and moral hazard.