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More Intelligent Designs: Comparing the Effectiveness of Choice Architectures in US
Health Insurance Marketplaces

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Abstract

We examine the effectiveness of alternate choice architectures for health plan choice in US marketplaces under the Affordable Care Act (ACA) using three experiments based on the Health Reform Monitoring Survey: two experiments tested how choice architectures used in presenting information on health plans influenced plan choices and how existing designs could be improved; the third experiment checked the robustness of the choice architecture effects to more naturalistic choice scenarios in which consumers select plans when future medical spending is uncertain. More vulnerable consumers (e.g., worse health, lower literacy) experienced the largest relative improvements when ACA marketplace plans were displayed and sorted by total expected costs for the year rather than premiums (Experiment 1). The benefits of sorting plans by total expected costs was not improved further by making the importance of total expected costs more salient or by providing just-in-time education about such costs (Experiment 2). However, just-in-time education increased the likelihood consumers did not choose a plan, suggesting they may be in the process of updating their plan selection strategy given the new information. Broadly, these results were consistent across alternative scenarios where total expected costs were subject to uncertainty and consistent with expected patterns of consumer behavior under risk aversion (Experiment 3). Thus, a policy-feasible mechanism—sorting health plan options by and highlighting total expected costs—may improve health plan choices, saving money for consumers and the government.

Key words: health insurance; health reform; behavioral economics; consumer choice.

1. Introduction

With the implementation of the main provisions of the Affordable Care Act (ACA) in 2014, the long-dormant market for individual health insurance reemerged as a key component of the U.S. health care system. Indeed, following the inception of the ACA, millions of Americans have purchased health insurance for the first time in their lives through new health insurance marketplaces.¹ While having insurance has provided access to care and financial risk protection for many, choosing a health plan has proven to be a daunting task. The typical American seeking coverage from the ACA marketplaces for 2019 (also called “exchanges”) had 26 plans from which to choose (ASPE 2018)—far more than individuals in the employer-sponsored market (Claxton et al., 2018). Moreover, the decision environment is complex: choices vary on many dimensions, including the particular benefits covered, cost-sharing requirements (such as deductibles, coinsurance, and copayments), and the providers available in each plan’s network.

The marketplaces not only present a complex decision environment, but many consumers often lack the experience, knowledge, and ability to evaluate information and make effective health plan choices. Interviews with stakeholders about the marketplaces reveal, for example, that consumers feel anxious about making the wrong choices, and are not confident that they can make the necessary complex calculations about costs (Housten et al., 2016). First-time shoppers on the marketplaces report difficulties specifically with determining whether doctors were in a health plan’s network, understanding differences in health plans and costs under the health plans, and knowing whom to contact with questions about their health plans options (Sinaiko, Kingsdale, & Galbraith, 2017). Others have reported that consumers enrolled in health plans

¹ There is one federal marketplace that covers people living in 28 states, and about a dozen state-based marketplaces and another dozen hybrid models.

through the marketplace often do not understand basic insurance terminology (Barcellos et al., 2014; Blumberg et al., 2013), and many consumers have poor comprehension of health plans as presented on the healthcare.gov website (Wang, Scherr, Wong, & Ubel, 2017) and low health literacy (Politi et al., 2014). Furthermore, studies have found that even individuals who possess insurance via their employer lack knowledge about their health plan (Loewenstein et al., 2013). There is, in addition, evidence that employees sometimes opt for dominated health plans (defined as plans that are inferior in every attribute, including, for example, premiums, risk protection, and quality, compared to other plans available in the choice set), a tendency that is especially pronounced among older and lower wage employees (Bhargava, Loewenstein & Sydnor, 2015; Sinaiko & Hirth, 2011). Indeed, this phenomenon could also be seen in the much simpler market for prescription drug coverage (Medicare Part D). Although benefits and costs of alternative choices for stand-alone drug plans are easier to assess and compare, mounting evidence indicates that many people are not choosing cost-effective plans. One of the most frequent mistakes in choosing drug coverage is focusing too much on a low deductible (Abaluck & Gruber 2009; Zhou & Zhang, 2012).

When the marketplaces began in 2014, purchasers generally had at their disposal only rudimentary choice architecture tools to facilitate effective plan choices. In nearly all cases, marketplace websites arrayed health plans from lowest to highest premiums. No marketplace allowed consumers to calculate how much they would expect to spend during the year in total under alternate plans: that is, on premiums as well as cost-sharing requirements (Wong et al., 2016). This often resulted in the consumer putting too much emphasis on low premiums, and not enough on other differences across their health plan options, such as deductibles, co-payments

and co-insurance, and out-of-pocket spending maximums, as well as ratings of health plan quality.

Since then, many of the marketplaces have become more sophisticated. Influenced by the emerging area of behavioral economics, researchers have offered a range of options on how to improve consumers' choices in the marketplaces. Politi and colleagues (2016), for example, developed a decision aid to help consumers make better health plan decisions. Johnson et al. (2012) reviewed a range of tools that can be utilized to improve the choice architecture for comparing health plans, and in another study (Johnson et al., 2013) evaluated the merit of introducing default health plan options. Finally, some states have decided to reduce the number of plans being offered as a way to simplify the decision environment (Monahan et al., 2013).

In 2016–2017, just seven of the 13 marketplaces surveyed by Wong and colleagues (2018) provided an online total-cost calculator, although notably this included the federal marketplace. One feature of these calculators is that they are based, to some degree, on either the person's assessment of their own health status or actual data on their prior use of care. This is critical because the most cost-effective plan for a healthy person, who will probably use few or no services, is likely not the most cost-effective plan for a very sick person who frequently uses care. The former will tend to spend less in total by purchasing a low-premium plan, while the latter is likely to find plans with low cost-sharing requirements but higher premiums to be more cost-effective.²

² Of course, selecting a health plan based upon the lowest total expected costs is not the only criteria for choosing a plan. A very sick person might well choose the plan that has the providers they want even if it costs more since they place a high value on who their provider is. And someone who cannot afford the plan with the lowest total expected costs might pick another plan that he/she can afford and hope they can avoid needing care (e.g., going without needed care, getting care from free clinics, etc.).

But even if consumers have total expected costs for each plan available to them, this information may not be displayed prominently. As noted by Wong *et al.*, (2016), “To nudge consumers towards plans that may be better choices, Marketplaces could consider presenting plans in more sophisticated default orders, such as in order of total estimated out-of-pocket spending or best fit, using a ‘smart default’ (that is, a preselected cost-effective option based on the consumer’s estimated usage, preferences, or both)” (p. 686). It is noteworthy that on the federal marketplace, which is the one used by most Americans who purchase coverage through the marketplace, even when the website calculates total expected costs, plans are still arrayed from lowest to highest premium. (Some of the state-based websites, such as California and the District of Columbia, do array from lowest to highest total expected costs.)

In a recent study, Barnes *et al.*, (2017) conducted an experiment with a sample of over 7,600 survey participants, half of whom received information about their total expected costs under three health plans, and half of whom did not. Instead, the latter group was provided only information on premiums, deductibles, copayments, and maximum annual out-of-pocket costs. Controlling for an array of socioeconomic and health status factors, it was found that providing total expected cost information improved the probability of choosing the most cost-effective plan between 3.0 and 10.6 percentage points. Importantly, more vulnerable groups were helped most by the information on total expected cost, including adults with less education, non-white adults, and adults with lower family income, as well as adults reporting any unmet health care needs in the past year due to costs.

While the aforementioned study provides encouraging results, it did not fully take advantage of available choice architecture tools currently in use in the ACA marketplaces. Participants in the experimental group did receive information about their total expected costs, but it was not

highlighted. Rather, it was listed in the last row of information provided about the plan. And, such tools were not paired with efforts to educate consumers about total costs to see whether plan choices could be improved further by combining choice architecture and education. Further, the experimental designs were an abstraction of marketplace choices in naturalistic settings. Studies that incorporate consumer behavior under uncertainty are needed to better simulate the influences of choice architecture tools on health plan decision-making.

1.1 New Contribution

In this paper, we present three experiments that focus on several choice architecture innovations currently employed in ACA marketplaces and assess whether the results withstand sensitivity tests that incorporate uncertainty into the decision environment. Experiment 1 examines the effect of adding information on the total costs a consumer will be expected to pay during the year under each health plan given their health care needs, and assesses the impact of making that information more prominent in the plan description and sorting plans by total expected costs. Experiment 2 tests whether nudging consumers about the importance of considering total expected costs in their plan decisions and educating consumers about the meaning of total expected costs can improve plan decisions further, under the assumption that being better informed will allow consumers to make better choices. By making the most important information more accessible and more salient, we hypothesize that consumers will be more successful in choosing cost-effective health plans. We further hypothesize that the additional information will be most beneficial to the most vulnerable population groups.

Experiment 3 tests whether choice architecture influences health plan decisions as hypothesized above when medical spending and, thus, total expected costs, is uncertain and when consumer attitudes toward risk are taken into account. We hypothesize that influences on

plan choices by choice architecture tested in Experiments 1 and 2, when total expected costs were certain, will be robust to choice scenarios when medical spending is uncertain. Finally, we hypothesize that the pattern of plan choices observed will be consistent with the notion that consumers who are risk averse are more likely to opt for more generous coverage as medical spending becomes more uncertain, further validating the ability of hypothetical plan choice scenarios to simulate real-world choices. These experiments are among the first to test how combinations of choice architecture elements affect the likelihood of cost-effective plan choices in marketplaces, to test the robustness of how these stated preference plan choice experiments perform under uncertainty, and to examine the benefits to vulnerable population groups targeted by the ACA's coverage expansion efforts.

1.2 A Conceptual Model of the Influence of Choice Architecture on Health Plan Decisions

In the experiments that follow, we conceptualize the determinants of the cost-effective health plan choices (Figure 1, adapted from Barnes et al., 2017).³ Again, a cost-effective health plan choice is defined as one that minimizes total costs for the year (premiums and out-of-pocket health care spending) after taking into account expected health care needs. The main direct determinant of choosing a cost-effective health plan is health insurance literacy, which we posit as being determined by both choice architecture and numeracy. Choice architecture elements can influence consumers' health plan choices directly by making identifying more cost-effective choices more straightforward, in part by reducing reliance on numeracy for plan comparisons, or

³ Much of the theoretical underpinnings for Figure 1 are given extensive treatment in Barnes et al. (2015). In that paper, three mediation models were assessed to ascertain that, indeed, numeracy predicted health insurance literacy, which predicted alignment of self-reported motivations for plan choices and actual plan choices and, ultimately, the likelihood individuals choose the most cost-effective plan. Further, Barnes et al. (2015) provide evidence suggesting the effects of choice architecture on choosing the plan with the lowest total expected costs can also be mediated by health insurance literacy, as suggested in Figure 1.

indirectly through improving consumers' understanding of health insurance terminology to allow them to more easily evaluate differences between health plans (e.g., out-of-pocket maximums). Numeracy may influence cost-effective plan choices both directly by facilitating the calculations needed to compare health plans and indirectly through improved health insurance literacy.

The bullet points under choice architecture in the figure reflect the specific elements that are tested in our experiments: showing total expected costs, sorting plans in different ways, nudging consumers to focus on their total expected costs, and providing “just-in-time” education about total expected costs. Each of these concepts is discussed in greater detail below, but some preliminary comments about sorting may be helpful here. Evidence from the marketing literature suggests that the order of available options affects the decisions made in online purchase environments (Haubl & Trifts, 1999; Sharkey, Acton, & Conboy, 2009). For example, consumers may select more expensive products when the available options are sorted from highest to lowest price (Suk, Lee, & Lichtenstein, 2012). Importantly, the specific attribute by which products are sorted tends to increase the weight that consumers place on that attribute (Quaschnig, Pandelaere, & Vermeir, 2014). Thus, consumers rate quality as an important product attribute when products are sorted from highest to lowest quality, although sorting products from lowest to highest quality increases the perceived importance of price but not of quality (Cai & Xu, 2008). By extension, this literature suggests sorting health plan choices by a particular attribute may nudge consumers to place more decision weight on it, which could be used to assist ACA marketplace shoppers.

When Medicare began providing comparative information about drug plans on its website in 2006 after passage of the Medicare Modernization Act in 2003, it chose to sort plans to help inform consumer decision-making. It did so by ordering the plans from lowest to highest

premiums and later by allowing consumers to enter the drugs they plan to have covered and to sort by total expected costs. Sorting was essential because consumers in most Medicare drug plan markets had more than 50 plans from which to choose. The ACA marketplaces followed suit in the initial 2014 open enrollment period. Since that time, some state marketplaces have become more sophisticated. In a study of the 2017 marketplaces, six of 12 state marketplaces sorted plans not by premiums, but by total expected costs (Clear Choices, 2017). Significantly, however, the federal marketplace, which is used in 38 states, continues to sort by premiums, and sorting health plan choices by premiums does appear to influence the plans that consumers choose (Wang et al., 2017). The experiments presented below are aimed, in part, to test whether a more sophisticated sorting method is helpful to consumers.

2. Experiment 1: Increasing the Salience of Total Costs

2.1 Methods

Participants

Data for Experiment 1 are from 8,253 respondents ages 18-64 to the September 2016 Health Reform Monitoring Survey (HRMS), an internet-based survey tracking implementation of the ACA. The HRMS, which is based on KnowledgePanel, an internet panel that has been used for the National Science Foundation-funded Time-sharing Experiments for the Social Sciences (TESS) to support experiments similar to that conducted here.⁴ The KnowledgePanel is a probability-based internet panel of approximately 55,000 people recruited primarily from an address-based sampling frame covering 97 percent of US households. Additional information on the HRMS and KnowledgePanel is provided in the Appendix.

⁴ KnowledgePanel was owned by GfK Research through mid-2018, at which time it was purchased by Ipsos.

Measures and Procedures

For Experiment 1, all participants were given a health care utilization scenario for the upcoming plan year. The scenario asked them to imagine they were buying coverage only for themselves and decide which of three health plans would best meet their needs if they expected their “use of medical services next year to be high, with several doctor visits and a hospital stay costing a total of \$20,000.” Participants were randomly assigned to one of three marketplaces that were based on the choice architectures that have been used most commonly in the “window-shopping” features of the federal and state-based marketplaces following the 2015-2016 open enrollment period. The marketplaces were simplified in that many of the design elements such as color, font size and filtering options were not replicated; instead, the hypothetical choice environments compared isolated specific choice architecture elements that vary across marketplaces. Consumer choice was tested across the following three marketplaces:

- **Premium Sort, No Total Costs:** Plans were sorted by premium from lowest to highest with total expected costs not shown (Figure 2). This choice architecture shares similar design features as the state-based marketplaces in Colorado, Idaho, Massachusetts, New York, and Washington in 2015-16.
- **Premium Sort, Total Costs Shown:** Plans were sorted by premium from lowest to highest with total expected costs shown elsewhere in the plan description. Monthly premium was again displayed in the upper left side of the plan description. This choice architecture was designed to replicate the 2015-16 design features from healthcare.gov, the federal marketplace.
- **Total Costs Sort:** Plans were sorted by total expected costs from lowest to highest with premium shown elsewhere. Total expected costs were displayed in the upper left side of the

plan description. This choice architecture shares similar design features as the state-based marketplaces in the District of Columbia, Minnesota, and Vermont in 2015-16.

Respondents were asked to choose from three health plans, which were the same across each marketplace: a bronze plan with the lowest monthly premium and highest deductible and out-of-pocket maximum, a silver plan with a higher premium and a lower deductible and out-of-pocket maximum, and a gold plan with the highest monthly premium and lowest deductible and out-of-pocket maximum. Plan cost structures were based on actual health plans sold through healthcare.gov in July 2016.⁵ Under the health care scenario presented, the gold plan was the most cost-effective choice, followed by the silver plan.

After making health plan choice, participants were asked which plan features were most important in their decision: the monthly premium or total premiums for the year; annual deductible; annual out-of-pocket maximum; type of plan (i.e., bronze, silver, or gold); copayments or coinsurance; or total expected costs. The order of these response categories was randomized for all respondents to prevent primacy effects. While participants were able to go back and change their plan choice in the survey after answering this question, none did.

The HRMS provides a rich array of participant characteristics including: gender (male, female), age (18-30, 31-49, 50-64), health status (excellent/very good, good, fair/poor), race/ethnicity (white non-Hispanic, non-white non-Hispanic, Hispanic), educational attainment

⁵We used the website's window-shopping tool to browse single plans available in Chicago for a 40-year-old nonsmoker with an annual income of \$25,000 (below the premium tax credit eligibility threshold). The location was chosen based on the availability of a wide selection of plans and insurers and the relatively moderate premiums compared with other major metropolitan areas. The scenario is consistent with the profile of adults in our sample in terms of average age and tobacco use. Approximately 40% of adults in our sample reported incomes in the subsidy eligibility range, 36% had incomes above this range, and 24% had incomes below it. This search yielded 51 plans sold by 7 insurers. Drawing on elements of the lowest-premium bronze plan, second lowest-premium silver plan, and gold plan with the lowest estimated total yearly costs based on high expected use of medical care, we created 3 hypothetical plans for the experiment. Premiums, deductibles, and out-of-pocket maximums were modified to simplify the calculation of estimated total yearly costs.

(less than high school, high school or some college, college graduate or higher), marital status (married, not married), family income (at or below 138% Federal Poverty Level (FPL), 139-399% FPL, 400% FPL or higher), homeownership status (owns home, does not own home), citizenship status (reported being a citizen, did not report being a citizen), primary language (English, bilingual, Spanish), urban/rural status (lives in a metropolitan statistical area, does not live in a metropolitan statistical area).

Self-reported health insurance literacy, numeracy, health care access, and affordability were also collected. Numeracy was based on respondents' rating of their ability to work with numbers, such as working with fractions or percentages, a variation of a component of the Subjective Numeracy Scale (Fagerlin et al., 2007). Numeracy responses were categorized as excellent/very good, good, fair/poor. Health insurance literacy was based on reported confidence understanding seven basic health insurance terms (premium, deductible, copayments, coinsurance, maximum annual out-of-pocket spending, provider network, and covered services). Health insurance literacy responses were collapsed into two categories: confident understanding all 7 insurance terms, not confident understanding all 7 insurance terms. Health care access was assessed based on reports of having one or more usual sources of care at the time of the survey. Affordability was assessed based on reports of having had an unmet need for care due to costs in the past 12 months; having had problems paying family medical bills in the past 12 months; having family medical bills that are being paid off over time (i.e., medical debt); and having an annual per-person deductible of \$1,500 or more at the time of the survey. The measures of usual source of care, unmet care needs, medical debt, and problems paying family medical bills are based on questions that have been used in the National Health Interview Survey. Descriptive statistics of participant characteristics for Experiment 1 are provided in Table 1. As would be

expected in a large randomized experiment, participant characteristics were generally balanced across conditions, with some variation in health status ($p < 0.10$), education ($p < 0.05$) and income ($p < 0.10$) across marketplace assignment.

Predictive margins from linear probability models controlling for the demographic and socioeconomic characteristics listed above were used to estimate the adjusted share of adults in each marketplace who chose the most cost-effective plans, some other plan, or were unsure or did not choose a plan. We also estimated adjusted differences in the most important reasons for choosing a plan, among all adults who chose a plan and among those who chose the most cost-effective plan. In addition, we estimated the share of adults in each marketplace choosing the most cost-effective plan across various subgroups based on their demographic and socioeconomic characteristics, health insurance literacy and numeracy, and health care access and affordability experiences to understand differences across more and less vulnerable consumers. Additionally, we report whether our main results are robust among a subsample of respondents with family incomes of 139-399% FPL, those most likely to purchase plans in ACA marketplaces ($n=3,266$). All analyses were conducted in Stata.

2.2 Results

Choice of Health Plans by Marketplace Environment

Across the three marketplace environments, 36.7% of participants chose the plan with the lowest total expected costs, 27.0% chose some other plan, and 36.3% did not chose a plan after adjustment for demographic and socioeconomic characteristics (see Table 2). The probability of choosing the plan with the lowest total expected costs increased as marketplace environments employed more choice architecture to assist consumer decision-making (32.5% in Premium Sort, No Total Costs vs. 36.1% in Premium Sort, Total Costs Shown vs. 41.3% in Total Costs Sort;

$p < 0.05$ each).⁶ Among the subsample of participants who were likely eligible for ACA subsidies in the marketplace (family income 139%-399% of FPL) the adjusted results were similar in that 30.8% of subsidy-eligible respondents chose the plan with the lowest total expected costs in the Premium Sort, No Total Costs marketplace, 36.0% in the Premium Sort, Total Costs Shown marketplace, and 38.7% in the Total Costs Sort marketplace ($p < 0.05$ each).

The health plan selections observed also suggest that choice architecture may be shifting participants away from other plan choices to the most cost-effective plan on the one hand and, on the other, towards not selecting a plan. For example, participants in the Total Costs Sort marketplace were more likely than those in the Premiums Sort, No Total Costs marketplace (38.4% vs. 35.5%, $p < 0.05$) and those in the Premium Sort, Total Costs Shown marketplace (38.4% vs. 34.7%, $p < 0.01$) to select “did not choose a plan.” One likely explanation for this observation is that the Total Costs Sort choice environment may be providing new information to consumers, stimulating some of them to update their plan selection strategy (e.g., weight total expected costs more heavily than premiums) and requiring further consideration or additional education or information before choosing.

Self-reported Importance of Plan Attributes in Choosing the Health Plan with the Lowest Total Expected Costs

To understand whether choice architecture influenced how participants choosing the most cost-effective health plan were comparing their options, we examined whether the health plan attributes participants reported as important factors in their plan choice varied across the three experimental marketplaces after adjustment for participant characteristics (Appendix Table B).

⁶ These choices translated into average adjusted excess spending of \$275 for those who made health plan choices in the Premium Sort, No Total Costs relative to those choosing in the Total Cost Sort marketplace ($p < 0.01$) and \$93 in excess spending among those choosing health plans in the Premium Sort, No Total Costs compared to the Premium Sort, Total Costs Shown marketplace ($p < 0.01$, Appendix Table A).

Participants selecting the plan with the lowest total expected costs in the Premium Sort, No Total Costs marketplace were more likely to rate out-of-pocket maximum as most important compared to those in Premium Sort, Total Costs Shown (33.7% vs. 25.7%, $p<0.05$) and those in Total Costs Sort marketplaces (33.7% vs. 29.4%, $p<0.05$). Thus, participants in Premium Sort, No Total Costs who correctly calculated total costs on their own and chose the plan with the lowest total expected costs may have been more cognizant of the importance of the out-of-pocket maximums in contributing to cost differences between the three plans. Respondents in the Premium Sort, Total Costs Shown marketplace were more likely to rate total expected costs as most important compared to those choosing in Premium Sort, No Total Costs (45.5% vs. 34.7%, $p<0.01$) and those choosing in Total Costs Sort marketplaces (34.0%, $p<0.01$).

Similarly, among the subsample of respondents eligible for ACA subsidies who chose the most cost-effective plan, those choosing in the Premium Sort, Total Costs Shown marketplace were more likely to report total expected costs as most important compared to those choosing plans in the Premium Sort, No Total Costs marketplace (43.3% vs. 29.1%, $p<0.01$) and those choosing in the Total Costs Sort (35.6% vs. 29.1%, $p<0.05$, Appendix Table C). These findings may suggest that, compared to sorting by total expected costs and featuring them at the top, actually “showing the math” for total costs by summing the premiums and out-of-pocket costs for consumers, even when premiums were sorted lowest to highest, provided a more salient signal to consumers than where total expected costs were placed on the screen. Interestingly, the Premium Sort, Total Costs Shown marketplace relied more on educating participants about how to calculate total costs for each plan while the Total Costs Sort marketplace was more of a traditional “nudge” by sorting plans for consumers by lowest total expected costs. This suggestive evidence informed the design of the marketplaces tested in Experiment 2.

Variation in Choice Architecture Effects across Participant Demographic Characteristics

To better understand whether choice architecture in marketplace design benefits some consumers more than others, we examined whether differences in the likelihood of choosing the plan with the lowest total expected costs across marketplaces varied by participant characteristics. Reducing the cognitive burden of health plan choices through choice architecture improved decision-making for more and less vulnerable subgroups of participants by similar magnitudes (see Table 3). However, these improvements generally represented larger relative increases among more vulnerable populations given their lower probability of choosing the health plan with the lowest total expected costs in the Premium Sort, No Total Costs marketplace. For example, participants with excellent, very good, or good self-reported numeracy were 8.3 percentage points more likely to choose the most cost-effective plan in the Total Costs Sort marketplace compared to the Premiums Sort, No Total Costs marketplace, a 22% relative increase (46.0% vs. 37.6%, $p < 0.01$). Similarly, those reporting fair or poor numeracy were 7.8 percentage points more likely to choose the plan that minimized total expected costs, a 43% relative increase (25.9% Total Costs Sort vs. 18.1% Premium Sort, No Total Costs; $p < 0.01$). Both participants with high confidence in understanding all insurance terms presented and those who were not as confident were roughly 8 percentage points more likely to choose the most cost-effective plan in the Total Costs Sort marketplace compared to the Premium Sort, No Total Costs marketplace ($p < 0.01$ each); however, the magnitude of this effect represented a larger relative increase among participants with lower confidence in understanding insurance terminology (33%) compared to those with higher confidence (20%). A similar pattern was observed in Table 3 among those reporting attending high school or less vs. some college or more, fair or poor vs. excellent, very good, or good self-rated health status, those covered vs. not

currently covered by health insurance, and those reporting family income of 138% FPL or less vs. those at 139-399% FPL vs. those at 400% or above. Finally, relatively larger gains were also experienced among participants experiencing difficulty accessing and affording health care compared to those without access and affordability issues (Appendix Table D).

2.3 Discussion

Mounting evidence has revealed that consumers are facing difficulties in making cost-effective choices when choosing health plans. In Experiment 1, we altered the choice environment consumers faced in the ACAs marketplaces by including and highlighting one of the key facets involved in choosing a health plan, total expected costs. This rather simple change, the results show, improved the quality of consumers' decisions across the board, and especially among those with lower education, lower income and more limited health insurance literacy. It also significantly increased the share who did not make a decision because they weren't sure of the best option, which might lead to more efforts to obtain help in plan choice so that there could be additional gains over time in an actual market. At the same time, less than 40% of the sample chose the plan with the lowest total expected costs. Further, despite the larger relative gains among more vulnerable populations between the Premium Sort, No Total Costs and the Total Costs Sort marketplaces, the least vs. the most supportive choice environments, large gaps in the ability to choose the most cost-effective plan persist between these participants and those who were less vulnerable. This evidence suggests there are limitations to the immediate gains that can be achieved through modest choice architecture. Even when plan comparisons are simplified for participants, many consumers continue to have difficulty making a cost-effective health plan choice. To try to improve health plan choices even further, a second experiment was conducted to test adding two choice environment manipulations—making total expected cost information

more salient and just-in-time-education aimed to improve understanding of the importance of total expected costs—to the Total Costs Sort marketplace, the most supportive choice environment in the previous experiment. We hypothesized that providing additional education about total expected costs at the time the decision is made will lead consumers to focus more on these costs and hence choose the most cost-effective health plan more often.

3. Experiment 2: Added Value of Increased Salience and Just-in-Time Education

3.1. Methods

Participants

A follow-up choice experiment was conducted with 9,532 respondents ages 18-64 in the March 2017 HRMS.

Measures and procedure

Building on Experiment 1 and following results surfaced by Johnson et al. (2013) suggesting that including just-in-time-education could boost the likelihood that consumers choose the most cost-effective plan, we added two manipulations to the Total Costs Sort marketplace: increasing the salience of total expected costs through a prompt to think about them when making a decision, and providing just-in-time education on total expected costs.

Participants in Experiment 2 were randomly assigned to one of three variations of the Total Costs Sort marketplace from Experiment 1 and then asked to select a plan.

- Total Costs Sort: Same prompt as Total Costs Sort in Experiment 1.
- Total Costs Sort, Plus Salience: Same as Total Costs Sort, plus the following stimulus:
“When choosing a health plan it’s important to think about **total yearly costs**, not just the premium you would have to pay every month.”

- Total Costs Sort, Plus Salience and Education: Same as Total Costs Sort, Plus Salience, with the additional following just-in-time education: “Total yearly costs include your premiums for the year and your expected out-of-pocket spending on covered services under the plan. Out-of-pocket spending will include your spending under the yearly deductible plus any copayments and coinsurance for care after you reach the deductible up to the annual out-of-pocket maximum under the plan, which is the most you have to pay for covered services in a year.”

As with Experiment 1, characteristics were similar across experiment samples (Appendix Table E). Nonetheless, linear probability models of health plan choices across marketplaces controlled for participant characteristics. We report also whether our main results in Experiment 2 are robust among a subsample of respondents with family incomes of 139-399% FPL, those most likely to purchase plans in ACA marketplaces (n=3,555).

3.2 Results

Health Plan Choices Across Marketplaces Sorted by Total Costs

Overall, 47.0% of adults chose the plan with the lowest total expected costs (Table 4). Those in the Total Costs Sort, Plus Salience marketplace chose this plan more often (48.9%) than those who received the increased salience stimulus and just-in-time education on total expected costs (45.6%, $p < 0.05$), but we found only weak evidence of improved choice between the Total Costs Sort and Total Costs Sort, Plus Salience marketplaces (46.5% vs. 48.9%, $p < 0.10$).⁷ Similar differences were observed among participants who were likely eligible for ACA marketplace

⁷ The probability of choosing most cost effective health plan in the Total Costs Sort marketplace in Experiment 2 (46.5%) was significantly higher than in Experiment 1’s equivalent marketplace (41.3%, $p < 0.01$) and the probability of not choosing a plan was significantly lower (29.8% vs. 38.4%, $p < 0.01$). Subsequent regression-adjusted analyses confirmed these differences were not due to sample overlap between the two rounds (i.e., some March 2017 HRMS respondents also responded to the September 2016 HRMS) or differences in the characteristics of respondents in each sample.

subsidies, with those in the Total Costs Sort, Plus Salience marketplace more likely to choose the most cost-effective plan than those who received the increased salience stimulus and just-in-time education (47.4% vs. 42.0%, $p<0.01$). There were no differences in choosing the most cost-effective plan between those in the Total Costs Sort and Total Costs Sort, Plus Salience and Education marketplaces for either the overall sample or those with income between 139 and 399% FPL. However, among this latter group potentially eligible for ACA marketplace subsidies, we found weak evidence that participants choosing in the Total Costs Sort, Plus Salience and Education marketplace were more likely to not choose a plan than those in the Total Costs Sort, Plus Salience group (30.6% vs. 26.7%, $p<0.10$).

Self-reported Importance of Plan Attributes in Choosing the Health Plan with the Lowest Total Expected Costs

Among those who chose the health plan with the lowest total expected costs, the most important factor in choosing this plan was total expected costs (Appendix Table F), but this varied by condition: those in the Total Costs Sort, Plus Salience and Education were more likely to report that total expected costs were the most important factor (43.4%) than those in the Total Costs Sort (36.6%, $p<0.01$) or those in the Total Costs Sort, Plus Salience marketplaces (37.0%, $p<0.01$). Those in the Total Costs Sort, Plus Salience and Education marketplace were also least likely to report that premiums were the most important factor in choosing a plan (6.7%) compared to those without the additional education information in the Total Costs Sort (8.7%, $p<0.10$) or those in the Total Costs Sort, Plus Salience marketplace (8.4%, $p<0.10$). Together these results suggest that providing consumers with education on how total expected costs are calculated when they are shopping for plans may help consumers focus on this attribute instead

of premiums, even if this marketplace design did not result in as many of them actually choosing the correct plan.

Variation in Choice Architecture Effects across Participant Demographics

As in Experiment 1, we assessed demographic differences among those who chose the most cost-effective plan (Appendix Table G). Unlike Experiment 1, where more and less vulnerable consumers benefited from sorting plans by total expected costs, with more vulnerable consumers experiencing similar increases in magnitude in the likelihood of choosing the most cost-effective plan but larger relative increases, the same trends did not hold in Experiment 2. Overall there was little evidence that adding a prompt to increase the salience of total expected costs or just-in-time education to choice environments that sort and prominently display total expected costs reduced disparities in choosing the most cost-effective health plan.

3.3 Discussion

Counter our prediction, adding just-in-time education material did little to augment the likelihood consumers chose the most cost-effective plan. However, a simpler stimulus that reminded participants to think about total annual costs did lead to better choices. As suggested earlier in Experiment 1, choice architecture, in this case just-in-time education, may provide new information to consumers that stimulates them to re-evaluate their choice strategy (e.g., considering lowest total expected costs instead of lowest premiums), though this requires further investigation. Subsequent studies could examine whether consumers, after being provided just-in-time education, seek additional information or help to make their decision. Our data, thus, indicate that including an intervention similar to the just-in-time educational material we tested might not offer additional benefits beyond offering a simpler reminder to incorporate total expected costs in the decision-making process, and may in fact be confusing to more vulnerable

consumers without also providing additional education resources or assistance in choosing a health plan.

4. Experiment 3: Does Choice Architecture Improve Consumer Health Plan Choices when Expected Spending is Uncertain?

4.1. Methods

Participants

Building upon the findings from Experiments 1 and 2, a follow-up choice experiment was conducted with 1,805 respondents ages 18-64 to the September 2018 HRMS. The experiment was limited to adults who had medium or high expected use of health care services in the coming year, where medium or high expected use was self-reported by asking participants, “(w)hich of the following best describes the use of medical care you expect for the next year? 1) Low use: few or no doctor visits or medical tests, occasional or no prescription drugs, no hospital visit expected, 2) Medium use: regular doctor visits or medical tests, regular prescription drugs, hospital visit possible but unlikely, or 3) High use: frequent doctor visits, frequent prescription drugs, frequent medical tests, or at least one hospital visit likely.” Descriptions of medium or high expected use of health care services over the coming year were based upon those used on healthcare.gov. Participants with low expected use were not included in the experiment as their lowest-cost plan would be the same as the lowest-premium plan.

Measures and Procedure

HRMS participants with self-reported medium or high expected use of health care were randomly assigned to the following three marketplaces:⁸

- Premium Sort, No Total Costs from Experiment 1 (n=605).
- Premium Sort, Total Costs Shown, Plus Salience, combining choice architecture from Experiments 1 and 2 (n=600).
- Total Costs Sort, Plus Salience from Experiment 2 (n=600).

Similar to Experiment 2, the total cost salience statement included in the Experiment 3 prompt for the latter two conditions was the following: “When choosing a health plan it’s important to think about the **total yearly costs** that you would expect to have to pay under the health plan, not just the premium you would have to pay every month.” After making an initial plan choice based on a known amount of expected costs (medical bills of \$10,000), participants were assigned to one of two scenarios where medical spending over the coming year was uncertain. Half of the participants were randomized to a condition where they were asked to choose a plan imagining an 80% vs. 20% chance of having medical bills of \$1,000 vs. \$10,000 and half were randomized to a condition with an 80% vs. 20% chance of having medical bills of \$10,000 vs. \$1,000. In each condition, participants were given estimated total costs for each of the two possible medical spending scenarios for each health plan (e.g., for Plan A: 80% chance of \$8,200 in total expected costs and a 20% chance of \$2,200 in total expected costs; Figure 3) .

After each plan choice, participants were asked “Can you tell us why you chose plan (A, B, C)?” with the following response options available: 1) It was the plan that was the cheapest in terms of estimated total yearly costs, 2) It was the plan that was the cheapest in terms of

⁸ Compared to the previous experiments, the plan list to choose from in Experiment 3 was simplified by omitting information about copayments/coinsurance for each plan and providing all of the remaining plan information in a single row (instead of two rows as in Experiments 1 and 2).

premiums, 3) It was the plan that was most affordable for me, 4) I wanted to be sure I had enough coverage, 5) I guessed, or 6) Don't know. Participants could only select one of the motivations for plan choice listed above.

In addition to collecting information described above on the demographic and socioeconomic characteristics of participants, a risk aversion measure from the MEPS self-administered questionnaire was included in the September 2018 HRMS (see Appendix Tables H and I). Specifically, respondents were asked, "Please indicate how strongly you agree or disagree with the following statement: I'm more likely to take risks than the average person," where response options range from strongly agree (1) to strongly disagree (5)" (AHRQ, 2016). Responses were collapsed into three categories – risk taking (1 or 2), risk neutral (3), or risk averse (4 or 5) to proxy for the curvature of participants' utility function with respect to wealth, an important factor in health insurance decision-making under uncertainty (Rice & Unruh, 2015). Linear probability models were used to test for differences in plan choices and reasons for plan choices across conditions and expected vs. uncertain medical spending scenarios after adjustment for the same set of participant demographics and socioeconomic characteristics controlled for in the previous experiments and risk aversion.

4.2. Results

Does the Influence of Choice Architecture Differ with the Uncertainty of Medical Spending?

The first objective of Experiment 3 was to test whether choice architecture influenced health plan decisions when total expected costs were uncertain. To make that assessment, we first sought to replicate the effects of choice architecture on choosing the most cost-effective health plan when medical spending was known in the current sample and then introduce uncertainty of medical spending into the decision environment. Aligning with expectations on consumer

performance from the previous experiments when expected medical spending was known, respondents randomized to the Premium Sort, Total Costs Shown, Plus Salience marketplace were more likely than those in the Premium Sort, No Total Costs marketplace to choose the plan with the lowest total expected costs after adjustment (48.9% vs. 43.0%, $p < 0.10$). No significant differences were found in the probability of choosing the most cost-effective plan between those randomized to the Total Costs Sort, Plus Salience marketplace and participants choosing in either the Premium Sort, No Total Costs or Premium Sort, Total Costs Shown, Plus Salience marketplaces.

There were also no differences in choice of the plan with the lowest total expected costs between choice architecture conditions when expected medical spending was uncertain but low (80% vs. 20% chance of having medical bills of \$1,000 vs. \$10,000). However, when respondents faced health plan choices where spending was uncertain but high (80% vs. 20% chance of having medical bills of \$10,000 vs. \$1,000), those in the Total Costs Sort, Plus Salience marketplace were more likely than those in the Premium Sort, No Total Costs marketplace to choose the most cost-effective plan (43.5% vs. 37.0%, $p < 0.10$).

Consistency of Plan Choices across Certain and Uncertain Medical Spending Scenarios

A second objective of Experiment 3 was to assess whether choice architecture affects the ability to consistently choose the most cost-effective plan across certain and uncertain spending scenarios. Overall, respondents were 14.6 percentage points ($p < 0.01$) more likely to choose the most cost-effective plan when total costs were uncertain but expected to be high compared to when they were uncertain but expected to be low. In regard to the choice architecture and the consistency of choosing the most cost-effective plan under certain and uncertain medical spending scenarios, our results suggest participants in the Total Costs Sort, Plus Salience group

were more likely than those in the Premium Sort, No Total Costs group to consistently choose the most cost-effective health plan under the known cost scenario and when medical spending was uncertain but expected to be low (13.6% vs. 8.2%, $p < 0.05$ before adjustment; Appendix Table J). However, respondents in the Total Costs Sort, Plus Salience group were not more likely than those in Premium Sort, No Total Costs group to consistently choose the plan with the lowest total expected costs across the known cost scenario and when medical spending was uncertain but expected to be high. These result suggests that the choice architecture is helping participants consistently choose the most cost-effective plan choices when spending is certain (Gold plan) and when the medical spending is uncertain but low (Bronze plan) but not when it is uncertain but high (Gold plan). Overall, most participants were not able to consistently choose the plan with the lowest total costs: 11.3% of participants consistently chose the most cost-effective plan both when costs were certain and uncertain but low, whereas 33.4% consistently chose the most cost-effective plan when costs were certain and uncertain but high.

Does Choice Architecture Affect the Motivations for Plan Choices when Medical Spending is Uncertain?

A third objective of Experiment 3 was to test whether choice architecture may be operating on consumer health plan decisions by influencing the reasons participants reported choosing the plan they did when medical spending was uncertain. Participants in the Premium Sort, Total Costs Shown, Plus Salience marketplace were more likely than those in the Total Costs Sort, Plus Salience marketplace to report choosing a plan because it was “cheapest in terms of total yearly costs” (43.3% vs. 33.2, $p < 0.01$; see Appendix Table K). When medical spending was uncertain but expected to be low, those in the Premium Sort, Total Costs Shown, Plus Salience marketplace were more likely than those in either the Total Costs Sort, Plus Salience

(46.8% vs. 30.4%, $p < 0.01$) or Premium Sort, No Total Costs marketplaces (36.4%, $p < 0.01$) to report choosing their plan because it was the lowest in total costs and less likely to report choosing it because it was “cheapest in terms of premiums” (2.8% Premium Sort, Total Costs Shown, Plus Salience vs. 14.2% Total Costs Sort, Plus Salience vs. 11.0% Premium Sort, No Total Costs, $p < 0.01$).

These findings may suggest that participants in the Premium Sort, Total Costs Shown Plus Salience marketplace had to search for the plan with the lowest total costs so, among those choosing this plan, actively comparing plans based on total costs may reinforce the reported motivation for making plan choices based on this attribute. Regardless of condition assignment, participants who consistently chose the most cost-effective plan across both the known and uncertain insurance choice scenarios were more likely than those who did not to report choosing the cheapest plan in terms of total yearly costs as a reason for their choice (51.4% vs. 31.6%; $p < 0.01$), and less likely to report they “guessed or did not know” why they chose the plan they did (3.2% vs. 8.3%, $p < 0.01$; see Appendix Table L). These effects were consistent across those randomized to the uncertain but low expected medical spending and those in the uncertain but high expected spending conditions.

Are Hypothetical Health Plan Choices Consistent with Consumer Risk Aversion?

A final objective of Experiment 3 was to examine whether consumer choice in the experimental marketplaces was consistent with predictions of how more versus less risk averse consumers should behave and whether the effects of choice architecture varied by consumer risk aversion. Broadly, we find that choices in the experimental insurance marketplaces were consistent with curvature of utility with respect to wealth, with people who report higher risk aversion more willing to purchase more generous coverage overall and especially as

the uncertainty of wealth increases. First, risk averters were more likely to choose the plan with the lowest total costs when costs were certain than respondents who were risk neutral (49.8% vs. 42.6%, $p < 0.05$) and were less likely not to choose a plan at all (26.2% vs. 37.0%, $p < 0.05$, Appendix Table M). Further, when medical spending was uncertain but low, participants who were risk averse were less likely than those who were risk taking to choose the plan with the lowest total costs (Bronze plan; $p < 0.01$). Conversely, risk averters were more likely than those who were risk neutral to choose the most cost-effective plan when medical spending was uncertain but expected to be high (Gold, $p < 0.10$).

4.3. Discussion

In Experiment 3, we tested the sensitivity of the results of the first two experiments to more natural choice scenarios in which consumers select plans when future medical spending is uncertain. We first found that the marketplaces that increased the salience of total costs increased the likelihood of choosing the plan with the lowest total costs when expected medical spending was uncertain but likely to be high, as was found in the previous experiments when total expected costs were known with certainty. Second, when medical spending was uncertain but expected to be high, we found that respondents were more likely to choose the most cost-effective health plan compared to when medical spending was uncertain but likely to be low. Further, compared to the Premium Sort, No Total Costs environment, the Total Costs Sort, Plus Salience environment may have helped participants understand the cost structure of the plans and update their plan choices as expected medical spending changed. Importantly, although choice architecture improved decision-making, regardless of condition assignment, most participants were not able to consistently choose the plan with the lowest total costs.

Interestingly, we found that participants shopping in the Premium Sort, Total Costs Shown, Plus Salience marketplace were more likely than those in the Total Costs Sort, Plus Salience or those in the Premium Sort, No Total Costs marketplaces to report choosing a plan because it was the cheapest in terms of lowest total costs and less likely to report choosing a plan based on it being the cheapest in terms of premiums. One possible explanation is that these individuals had the total costs information available and were prompted to consider total costs but had to search for the plan with the lowest total costs, potentially reinforcing their reported motivation for making plan choices based on total costs. Additionally, across conditions, participants who consistently chose the plan with the lowest total costs in known and uncertain choice scenarios were more likely to report total yearly costs as a reason for their choice and less likely to report that they guessed or were not sure. Finally, results were consistent with the assumption that utility with respect to wealth is a concave function for risk averse consumers, such that participants in Experiment 3 who reported higher risk aversion were also more likely to choose more generous coverage as medical spending became more uncertain.

5. General Discussion

Health insurance is one the most significant financial and health-related decisions that consumers in the US make. Yet, lack of knowledge about health insurance as well as the complex nature of this decision renders this task extremely difficult. Under the Affordable Care Act, US states and the federal government have varied the decision environments consumers face when choosing which insurance to purchase. The current three studies examined how different choice architectures influence consumers' decision-making ability and how robust the principal

findings are to manipulation checks testing assumptions about consumer behavior when medical spending is uncertain.

Among the key findings of Experiment 1 was evidence of a gradient in improving choice quality with increasing choice architecture. Specifically, comparing the Premium Sort, Total Costs Shown marketplace to the Premium Sort, No Total Costs marketplace indicates that sorting by premium and showing total expected costs increases the likelihood that adults make the cost-effective choice by 3.6 percentage points relative to sorting by premium and not displaying total costs. These estimates were consistent with a previous study finding a 3.0 percentage point increase in choosing the most cost-effective plan when total costs were presented (Barnes et al., 2017). But, when plan choices were sorted by total expected costs, as they were in the Total Costs Sort marketplace, consumers were an additional 5.2 percentage points more likely to choose the most cost-effective plan compared to the Premium Sort, Total Costs Shown marketplace, for a total improvement of 8.8 percentage points compared to the Premium Sort, No Total Costs marketplace.

However, even in the most supportive decision environment and when given a simple insurance choice task, more than one-third of participants were unsure which of the three plans was best for them. Interestingly, this uncertainty in plan choice increased between the Total Costs Sort and Premium Sort, Total Costs Shown marketplaces. These results could suggest that the choice architectures tested were moving some participants along a choice continuum by shifting people away from choosing higher cost plans and towards being unsure about what decision is best for their health care needs and ultimately, we would expect, shifting them towards choosing lower cost plans.

The inclusion of total expected costs in the choice environment improved plan choice quality for adults of all demographic and socioeconomic backgrounds, including for adults with high and low numeracy and high and low health insurance literacy, and for adults with and without access and affordability barriers to receiving care. More vulnerable subgroups of respondents tended to experience larger relative benefits between the Premium Sort, No Total Costs and Total Costs Sort marketplaces compared to less vulnerable participants. This is in large part due to more vulnerable participants having a lower “floor” and performing worse in the Premium Sort, No Total Costs marketplace. Despite the relatively larger improvements in choice quality among more vulnerable participants, large gaps in the probability of choosing the plan with the lowest total costs persisted between more and less advantaged subgroups.

Even though improvements in plan choice were observed as total cost information was made more salient in Experiment 1, the choice architecture does not appear to be influencing the plan attributes participants report they find most important when making a decision. Thus, choice architecture may improve plan choice in ways that are not directly apparent to consumers. This is perhaps an indication of the power of “nudges” in that they may operate on choice by leveraging the biases and heuristics consumers face rather than relying on consumers’ deliberative or evaluative decision-making processes. However, the results raise an interesting counterpoint where consumers in the Premium Sort, Total Costs Shown marketplace were more likely to rate total expected costs as most important compared to those choosing the other marketplaces. Recall that the Premium Sort, Total Costs Shown marketplace had relied more on educating participants about how to calculate total costs for each plan while the Total Costs Sort marketplace was more of a traditional “nudge” by sorting plans for consumers based on lowest total expected costs. As earlier work has argued that educating consumers might aid in their

decision-making process (Johnson et al., 2013), Experiment 2 combined the most effective choice architecture introduced in Experiment 1 with two different potential additional improvements to the decision environment.

When taken broadly, the results from Experiment 2 suggest the benefits of nudging consumers to choose plans that minimize total expected costs by sorting plans by total costs rather than premiums could not be improved further by making the importance of total costs more salient or by also providing just-in-time education about them. In contrast to our expectations, participants who received educational information about total costs plus a prompt about the importance of these costs performed worse than those who received only the prompt to consider the importance of total costs. In other words, adding an educational component when making an insurance decision did not enhance performance achieved when sorting by total costs. However, more participants chose the second-lowest total cost plan when choosing in a marketplace that sorted by total costs and included the additional salience message and the just-in-time education compared to the other two marketplaces tested in Experiment 2.

Interestingly, participants who received the just-in-time educational material were more likely to indicate that total annual cost was the most important factor in their decisions. Thus, while it seems that our manipulation helped participants focus on the most important factor, it somehow failed to translate into implementing the choice that minimized those costs. Overall, while policy makers and marketplaces might be tempted to include more extensive information about each health plan attribute, our data indicate that this might not be the best strategy. Furthermore, in both Experiments 1 and 2 participants indicated that premiums served as a key ingredient in their decision-making process regardless of the structure of the information (Experiment 1) or the additional information provided (Experiment 2). As premiums act as very

salient factors, but convey rather limited and potentially misleading information, one possibility to improve health plan choices is to simply remove information about premiums from the initial plan comparison pages on marketplace websites (but have them easily accessible by selecting an additional page) and present total expected annual costs prominently along with other attributes such as provider networks and plan quality.

Experiments 1 and 2 prompted participants to consider their health insurance choices if their annual medical expenditures were high but known. However, expected health care use is unpredictable and consumers differ in their distaste for risk. Experiment 3 examined how consumers respond to the choice architecture employed in Experiments 1 and 2 when medical expenditures are uncertain. Similar to Experiments 1 and 2, sorting by total costs and increasing their salience appeared to help consumers choose plans with the lowest total expected costs even when costs were uncertain. Importantly, decision-making under uncertainty aligned with theory-based predictions about risk aversion and health insurance choices. These findings underscore the potential value of sorting plans by attributes that choice architects aim to focus consumers' decision weighting on and of salience cues in health insurance marketplaces. Even careful marketplace design, however, may not help all consumers make optimal choices. In Experiment 3, as with the previous experiments, most participants still did not choose the plan with the lowest expected costs.

Our study was specifically designed to test choice architecture mechanisms relevant to the ACA marketplaces. Devising novel ways to help millions of consumers make better decisions is of clear importance. At the same time, one might wonder if the present work could be applied to other cases. While this is somewhat speculative, as we do not have empirical data to support our intuition, the present work could benefit other health-related programs. Medicare

part D, with over 40 million beneficiaries (many of which could be classified as vulnerable consumers), is one prominent example, given the large corpus of data showing that beneficiaries often do not choose the best plan (e.g., Abaluck & Gruber, 2009; Abaluck & Gruber, 2016; Zhou & Zhang, 2012). Extending our findings to Medicare part D, in fact, could be the next logical step, as it could allow consumers to compare between the plans and make a better decision. The financial domains, where consumers often face challenges in choosing retirement plans, credit cards, and loans, could also serve as other contexts where our ideas and work could be informative. This might be especially helpful for individuals who have low numeracy skills, as our design reduces (or even eliminates) the need to perform any calculation. Needless to say, these conjunctions will need to be empirically tested.

Several limitations should be noted. The study was hypothetical by nature and may not capture the complexity of real life health insurance decision-making. Nonetheless, empirical evidence, such as that provided by our three studies, is necessary to inform policy makers on how to optimize designs of health insurance markets for consumers. These experiments did not include incentives, which could have led to smaller differences in choice quality across marketplaces by rewarding consumers for placing more effort in their shopping experience during the two experiments. However, experimental evidence from prior hypothetical insurance experiments suggests that incentives do little to improve decision-making (Johnson et al. 2013). Also, evidence from the employer-sponsored markets suggest that one-third to one-half of employees choose plans that place them at greater financial risk compared to other plans available to them (Bhargava, Loewenstein, and Sydnor 2015; Sinaiko and Hirth 2011). This suggests that decision errors due to consumer difficulties understanding and choosing insurance are common even when consumers have incentives to choose wisely. Additionally, our

experiments suggest that consumers are choosing in hypothetical marketplaces in a way that is consistent with their reported level of risk aversion.

Shopping experiences in the experiments we tested were not tailored to ACA marketplace subsidy eligibility, largely due to survey and programming constraints to present each participant in a national probability sample with a likely subsidy they would face. Furthermore, our studies focused on one important and simplified dimension of insurance choice, the amount of financial risk protection a plan confers given a certain high-cost health event will occur. Other attributes of plan options, including plan quality and provider networks, are important in consumer decision-making and our results are unable to account for the tradeoffs between risk protection and other attributes of coverage consumers weigh when choosing plans. Regarding participant comprehension of plan attributes and the plan selections they were asked to make, the evidence suggests many consumers have difficulty understanding and comparing the various dimensions of health plans. Even though the experiments provided definitions of terms to participants and pilot-tested decision prompts, participants may have been challenged to understand the objectives of the choice tasks. Further, participants may have conflated their own experiences or health status with the decision prompt, though this is mitigated in Experiment 3 where the tasks were only given to respondents reporting medium or high expected medical use. Finally, a logical extension of this study would be to investigate the welfare implications of choice architecture that is or could feasibly be employed in the ACA marketplaces.

In conclusion, millions of Americans face the difficult task of choosing health insurance in the ACA marketplaces. How these markets are designed has a crucial impact on consumers' ability to compare and choose health plans that provide adequate risk protection and are affordable. Our results indicate that a simple, cheap, and policy feasible mechanism—namely,

sorting by and highlighting the total estimated cost in a prominent place—could help improve the quality of health insurance choices, saving money for consumers and the government alike. Our data also reveal that including additional educational material does little to improve consumers' choices, suggesting the need for other strategies to make further improvements in consumer decision-making. Such findings can be extended to improving insurance choices for consumers shopping in Medicare managed care markets, stand-alone Medicare drug plan markets, and employer-sponsored markets as well.

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Figure 1. Conceptual Model of Choice Architecture and Health Plan Decisions

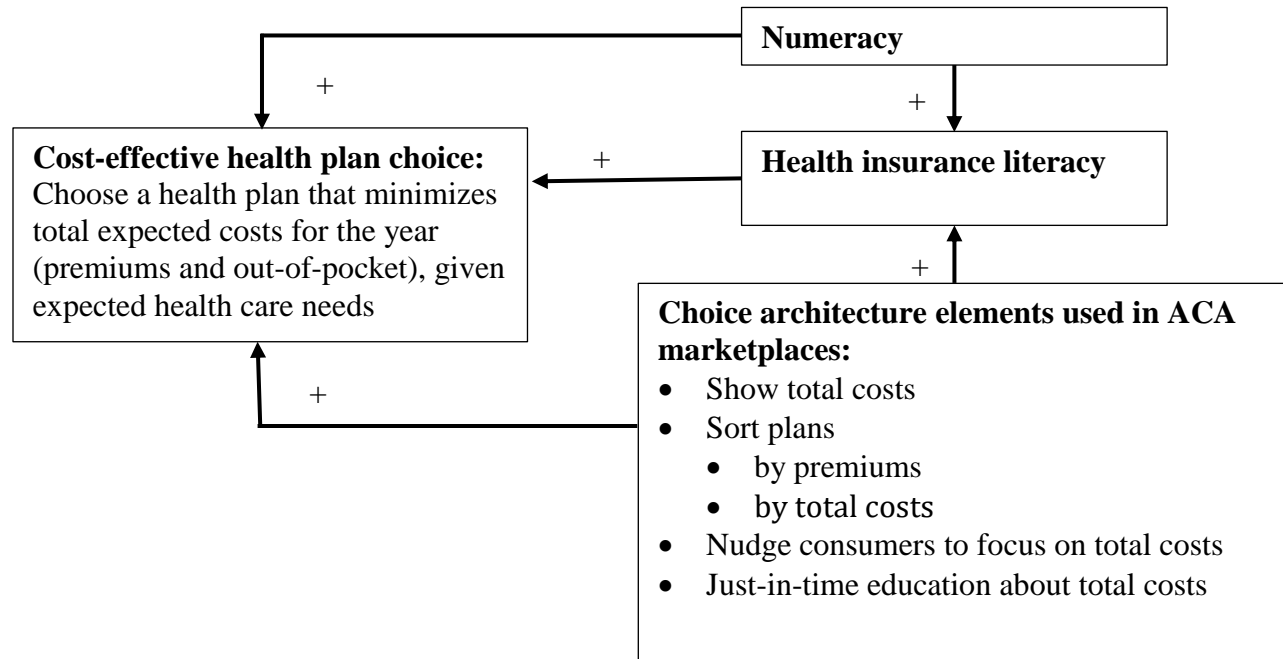


Figure 2. Experiment 1: Marketplace Plans Sorted by Premium (with or without Total Costs Shown) or Sorted by Total Costs

For this question, we would like you to consider a hypothetical situation. **Imagine** that you are buying health insurance coverage only for yourself for next year. **Imagine** that you have a choice of three health insurance plans that are all offered by the same company and that the doctors and other health care providers you use are included in the networks for all three plans.

IF you expected your use of medical services next year to be high, **with several doctor visits and a hospital stay costing a total of \$20,000**, which of the three health insurance plans shown in the table below do you think would best meet your health insurance needs?

Premium Sort, No Total Costs (Plans Sorted by Premiums, Total Costs Not Shown)		
<i>Plan A -- Bronze</i>		
Monthly premium \$100	Annual deductible \$6,800	Annual out-of-pocket maximum \$6,800
Total premiums for the year \$1,200		Copayments / Coinsurance Doctor visits: \$0 copayment No coinsurance after deductible
<i>Plan B -- Silver</i>		
Monthly premium \$150	Annual deductible \$4,000	Annual out-of-pocket maximum \$5,000
Total premiums for the year \$1,800		Copayments / Coinsurance Doctor visits: \$0 copayment 10% coinsurance after deductible
<i>Plan C -- Gold</i>		
Monthly premium \$300	Annual deductible \$1,500	Annual out-of-pocket maximum \$2,500
Total premiums for the year \$3,600		Copayments / Coinsurance Doctor visits: \$0 copayment 10% coinsurance after deductible

Premium Sort, Total Costs Shown (Plans Sorted by Premiums, Total Costs Shown)		
Plan A		Bronze
Monthly premium \$100	Annual deductible \$6,800	Annual out-of-pocket maximum \$6,800
Total premiums for the year \$1,200	Estimated deductible, copayments, coinsurance, and other costs \$6,800	Copayments / Coinsurance
Estimated deductible, copayments, coinsurance, and other costs \$6,800		Doctor visits: \$0 copayment No coinsurance after deductible
Total yearly costs \$8,000		
Plan B		Silver
Monthly premium \$150	Annual deductible \$4,000	Annual out-of-pocket maximum \$5,000
Total premiums for the year \$1,800	Estimated deductible, copayments, coinsurance, and other costs \$5,000	Copayments / Coinsurance
Estimated deductible, copayments, coinsurance, and other costs \$5,000		Doctor visits: \$0 copayment 10% coinsurance after deductible
Total yearly costs \$6,800		
Plan C		Gold
Monthly premium \$300	Annual deductible \$1,500	Annual out-of-pocket maximum \$2,500
Total premiums for the year \$3,600	Estimated deductible, copayments, coinsurance, and other costs \$2,500	Copayments / Coinsurance
Estimated deductible, copayments, coinsurance, and other costs \$2,500		Doctor visits: \$0 copayment 10% coinsurance after deductible
Total yearly costs \$6,100		

Total Costs Sort (Plans Sorted by Total Costs)		
<i>Plan A</i> <i>Gold</i>		
Total yearly costs \$6,100	Annual deductible \$1,500	Annual out-of-pocket maximum \$2,500
Monthly premium \$300 Total premiums for the year \$3,600 Estimated deductible, copayments, coinsurance, and other costs \$2,500		Copayments / Coinsurance Doctor visits: \$0 copayment 10% coinsurance after deductible
<i>Plan B</i> <i>Silver</i>		
Total yearly costs \$6,800	Annual deductible \$4,000	Annual out-of-pocket maximum \$5,000
Monthly premium \$150 Total premiums for the year \$1,800 Estimated deductible, copayments, coinsurance, and other costs \$5,000		Copayments / Coinsurance Doctor visits: \$0 copayment 10% coinsurance after deductible
<i>Plan C</i> <i>Bronze</i>		
Total yearly costs \$8,000	Annual deductible \$6,800	Annual out-of-pocket maximum \$6,800
Monthly premium \$100 Total premiums for the year \$1,200 Estimated deductible, copayments, coinsurance, and other costs \$6,800		Copayments / Coinsurance Doctor visits: \$0 copayment No coinsurance after deductible

Table 1. Characteristics of Adults Ages 18 to 64, Overall and by Marketplace Choice Environment in Experiment 1

Participant characteristic	All adults	Premium Sort, No Total Costs	Premium Sort, Total Costs Shown	Total Costs Sort
<u>Gender</u>				
Male	49.0%	49.0%	48.2%	49.8%
Female	51.0%	51.0%	51.8%	50.2%
<u>Age</u>				
18-30	28.7%	28.2%	28.3%	29.6%
31-49	38.3%	38.8%	38.6%	37.5%
50-64	33.0%	33.0%	33.1%	32.9%
<u>Health Status</u>				
Excellent/very good	51.0%	49.9%	51.1%	51.9%
Good	34.7%	36.2%	34.2%	33.9% *
Fair/poor	14.2%	13.8%	14.7%	14.1%
<u>Race/ethnicity</u>				
White, non-Hispanic	62.0%	61.2%	62.6%	62.1%
Nonwhite, non-Hispanic	20.7%	20.8%	20.5%	20.9%
Hispanic	17.3%	18.0%	16.9%	17.0%
<u>Educational attainment</u>				
High school less	39.8%	38.8%	39.1%	58.3% ^^
Some college or more	60.2%	61.2%	60.9%	29.6% ^^
<u>Self-reported health insurance literacy</u>				
Confident in understanding of insurance terms	51.1%	50.5%	51.0%	51.7%
Not confident understanding of insurance terms	48.9%	49.5%	49.0%	48.3%
<u>Self-reported numeracy</u>				
Excellent/very good	49.2%	49.1%	49.0%	49.5%
Good	26.5%	26.4%	26.6%	26.4%
Fair/poor	23.7%	24.0%	23.7%	23.5%
<u>Marital status</u>				
Married	51.8%	52.3%	51.6%	51.4%
Not married	48.2%	47.7%	48.4%	48.6%
<u>Family income</u>				

Participant characteristic	All adults	Premium Sort, No Total Costs	Premium Sort, Total Costs Shown	Total Costs Sort
At or below 138% Federal Poverty Level (FPL)	28.1%	26.7%	28.9% *	28.7%
139-399% FPL	36.0%	36.5%	35.8%	35.8%
400% FPL or higher	35.8%	36.8%	35.3%	35.4%
<u>Homeownership status</u>				
Owns home	63.0%	62.6%	62.4%	63.9%
Does not own home	37.0%	37.4%	37.6%	36.1%
<u>Citizenship status</u>				
Reported being a citizen	87.6%	87.3%	88.2%	87.4%
Did not report being a citizen	12.4%	12.7%	11.8%	12.6%
<u>Primary language</u>				
English	86.7%	86.2%	87.2%	86.8%
Bilingual	9.4%	9.9%	8.7%	9.4%
Spanish	3.9%	4.0%	4.1%	3.7%
<u>Urban/rural status</u>				
Lives in metropolitan statistical area	85.7%	85.8%	85.3%	85.9%
Does not live in metropolitan statistical area	14.3%	14.2%	14.7%	14.1%
Sample Size	8,253	2,686	2,731	2,836

Source: Health Reform Monitoring Survey, quarter 3 2016.

*/**/*** Estimate differs significantly from Premium Sort, No Total Costs marketplace at the .10/.05/.01 level, using two-tailed tests.

^/^^/^^^ Estimate differs significantly from Total Costs Sort marketplace at the .10/.05/.01 level, using two-tailed tests.

Table 2. Choice of Plans among Adults Ages 18 to 64, by Marketplace Choice Environment in Experiment 1

	Overall	Premium Sort, No Total Costs	Premium Sort, Total Costs Shown		Total Costs Sort		
<u>All Adults</u>							
Chose plan with lowest total expected costs	36.7%	32.5%	36.1%	***	41.3%	***	^^^
Chose some other plan	27.0%	32.0%	29.2%	**	20.3%	***	^^^
Did not choose a plan	36.3%	35.5%	34.7%		38.4%	**	^^^
Sample size	8,253	2,686	2,731		2,836		
<u>Adults with Family Income 139%-399% FPL</u>							
Chose plan with lowest total expected costs	35.2%	30.8%	36.0%	**	38.7%	***	
Chose some other plan	30.0%	34.6%	32.4%		23.2%	***	^^^
Did not choose a plan	34.8%	34.6%	31.6%		38.1%		^^^
Sample size	3,266	1,072	1,077		1,117		

Source: Health Reform Monitoring Survey, quarter 3 2016.

Notes: Estimates are adjusted for the demographic and socioeconomic characteristics listed in Table 1. Nearly all of those who did not choose a plan reported that they were not sure which plan met their needs.

*/**/** Estimate differs significantly from Premium Sort, No Total Costs marketplace at the .10/.05/.01 level, using two-tailed tests.

^/^^/^^^ Estimate differs significantly from Premium Sort, Total Costs Shown marketplace at the .10/.05/.01 level, using two-tailed tests.

Table 3. Variation in Choice Architecture Effects on Percent Choosing Plan with Lowest Total Expected Costs in Experiment 1, by Participant Characteristics

	By Self-Reported Numeracy			
	<i>Excellent/very good/good</i>		<i>Fair/poor</i>	
	Sample size	% Choosing Plan with Lowest Total Costs	Sample size	% Choosing Plan with Lowest Total Costs
Premium Sort, No Total Costs	2,044	37.6%	629	18.1%
Premium Sort, Total Costs Shown	2,061	40.1%	658	23.4% **
Total Costs Sort	2,161	46.0% *** ^^^	660	25.9% ***
	By Self-Reported Health Insurance Literacy			
	<i>Confident understanding all health insurance terms</i>		<i>Not confident understanding all health insurance terms</i>	
	Sample size	% Choosing Plan with Lowest Total Costs	Sample size	% Choosing Plan with Lowest Total Costs
Premium Sort, No Total Costs	1,429	40.2%	1,257	25.2%
Premium Sort, Total Costs Shown	1,456	42.6%	1,275	29.2% **
Total Costs Sort	1,538	48.2% *** ^^	1,298	33.4% *** ^
	By Education			
	<i>Some college or more</i>		<i>High school or less</i>	
	Sample size	% Choosing Plan with Lowest Total Costs	Sample size	% Choosing Plan with Lowest Total Costs
Premium Sort, No Total Costs	1,713	39.9%	973	21.5%
Premium Sort, Total Costs Shown	1,760	43.6% **	971	24.3% *
Total Costs Sort	1,792	50.5% *** ^^^	1,044	27.8% ***
	By Age			
	<i>18-44 years old</i>		<i>45-64 years old</i>	
	Sample size	% Choosing Plan with Lowest Total Costs	Sample size	% Choosing Plan with Lowest Total Costs
Premium Sort, No Total Costs	1,244	29.5%	1,442	37.1%
Premium Sort, Total Costs Shown	1,294	34.1% **	1,437	38.6%
Total Costs Sort	1,331	37.8% *** ^	1,505	45.6% *** ^^^

	By Gender				
	Male			Female	
	Sample size	% Choosing Plan with Lowest Total Costs		Sample size	% Choosing Plan with Lowest Total Costs
Premium Sort, No Total Costs	1,275	34.7%		1,411	31.0%
Premium Sort, Total Costs Shown	1,288	38.9% ***		1,443	33.3%
Total Costs Sort	1,370	43.4% *** ^		1,466	38.8% *** ^^
	By Health Status				
	Excellent/very good/good			Fair/poor	
	Sample size	% Choosing Plan with Lowest Total Costs		Sample size	% Choosing Plan with Lowest Total Costs
Premium Sort, No Total Costs	2,283	34.5%		401	21.9%
Premium Sort, Total Costs Shown	2,294	37.8% **		434	25.6%
Total Costs Sort	2,394	42.6% *** ^^^		439	31.5% ** ^
	By Health Insurance Coverage				
	Insured all year			Not insured all year	
	Sample size	% Choosing Plan with Lowest Total Costs		Sample size	% Choosing Plan with Lowest Total Costs
Premium Sort, No Total Costs	2,244	36.4%		438	16.4%
Premium Sort, Total Costs Shown	2,291	38.8% *		433	22.5% **
Total Costs Sort	2,350	44.8% *** ^^^		476	25.3% ***
	By Family Income				
	400% FPL or higher			139-399% FPL	
	Sample size	% Choosing Plan with Lowest Total Costs		Sample size	% Choosing Plan with Lowest Total Costs
Premium Sort, No Total Costs	963	48.6%		1,072	30.9%
Premium Sort, Total Costs Shown	939	49.7%		1,077	36.3% **
Total Costs Sort	983	57.2% *** ^^^		1,117	38.4% ***
	At or below 138% FPL				
	Sample size	% Choosing Plan with Lowest Total Costs			

Premium Sort, No Total Costs	651	13.6%		
Premium Sort, Total Costs Shown	715	19.0%	*	
Total Costs Sort	736	24.6%	***	^^

Source: Health Reform Monitoring Survey, quarter 3 2016.

Notes: Estimates are unadjusted.

*/**/** Estimate differs significantly from Premium Sort, No Total Costs marketplace at the .10/.05/.01 level, using two-tailed tests.

^/^^/^^^ Estimate differs significantly from Premium Sort, Total Costs Shown marketplace at the .10/.05/.01 level, using two-tailed tests.

Table 4. Choice of Plans among Adults Ages 18 to 64, by Marketplace Choice Environment in Experiment 2

	Overall	Total Costs Sort	Total Costs Sort, Plus Salience	Total Costs Sort, Plus Salience and Education	
<u>All Adults</u>					
Chose plan with lowest total expected costs	47.0%	46.5% ###	48.9%	45.6%	^^
Chose some other plan	23.2%	23.6% ###	22.1%	24.0%	
Did not choose a plan	29.8%	29.8% ###	29.0%	30.4%	
Sample size	9,532	3,182	3,128	3,222	
<u>Adults with Family Income 139%-399% FPL</u>					
Chose plan with lowest total expected costs	44.9%	45.2%	47.4%	42.0%	^^^
Chose some other plan	26.9%	27.6%	25.9%	27.4%	
Did not choose a plan	28.1%	27.2%	26.7%	30.6%	^
Sample size	3,555	1,208	1,189	1,158	

Source: Health Reform Monitoring Survey, quarter 1 2017.

Notes: Estimates are adjusted for the demographic and socioeconomic characteristics listed in Table 1.

###/### Estimate in Experiment 2 Total Costs Sort marketplace differs significantly from estimate in Experiment 1 Total Costs Sort marketplace at the .10/.05/.01 level, using two-tailed tests.

^/^^/^^^ Estimate differs significantly from Total Costs Sort Plus Salience marketplace at the .10/.05/.01 level, using two-tailed tests.

Figure 3. Experiment 3 Marketplace Example: Plans Sorted by Premiums, Total Costs Shown, Plus Salience. Medical Spending was Uncertain but Expected to be High.

Now **imagine** there is an **80% chance** your use of medical care next year will result in medical bills of **\$10,000**, and a **20% chance** your use of medical care next year will result in medical bills of **\$1,000**.

Which of the three health insurance plans shown in the table below do you think would best meet your health insurance needs?

Plan A

Bronze

Monthly premium \$100	Annual deductible	Annual out-of-pocket maximum	Estimated total yearly costs
Annual premium \$1,200	\$7,000	\$7,000	\$8,200 (80% chance) \$2,200 (20% chance)

Plan B

Silver

Monthly premium \$200	Annual deductible	Annual out-of-pocket maximum	Estimated total yearly costs
Annual premium \$2,400	\$5,000	\$5,000	\$7,400 (80% chance) \$3,400 (20% chance)

Plan C

Gold

Monthly premium \$300	Annual deductible	Annual out-of-pocket maximum	Estimated total yearly costs
Annual premium \$3,600	\$2,000	\$2,000	\$5,600 (80% chance) \$4,600 (20% chance)

1. Plan A
2. Plan B
3. Plan C
4. Not sure

Table 5. Choice of Plans among Adults Ages 18 to 64, by Marketplace Choice Environment in Experiment 3

	Overall	Premium Sort, No Total Costs	Premium Sort, Total Costs Shown, Plus Salience	Total Costs Sort, Plus Salience
<i>Known cost scenario – expected bills of \$10,000</i>				
Chose plan with lowest total expected costs	46.9%	43.0%	48.9%*	48.5%
Chose some other plan	23.4%	25.0%	24.8%	20.5%
Did not choose a plan	29.7%	32.0%	26.3%*	30.9% [^]
Sample Size	1,805	605	600	600
<i>Variable cost scenario #1 - 80% chance of bills of \$1,000, 20% chance of bills of \$10,000</i>				
Chose plan with lowest total expected costs	23.8%	23.6%	24.6%	23.3%
Chose some other plan	46.1%	47.9%	46.4%	44.1%
Did not choose a plan	30.1%	28.5%	29.0%	32.6%
Sample Size	904	304	297	303
<i>Variable cost scenario #2 - 80% chance of bills of \$10,000, 20% chance of bills of \$1,000</i>				
Chose plan with lowest total expected costs	40.1%	37.0%	39.9%	43.5%*
Chose some other plan	28.2%	27.1%	35.3%**	22.4% ^{^^^}
Did not choose a plan	31.7%	35.9%	24.8%***	34.2% ^{^^}
Sample Size	901	301	303	297

Source: Health Reform Monitoring Survey, quarter 3 2018.

Notes: Estimates are adjusted for the demographic and socioeconomic characteristics listed in Table 1 and risk aversion.

*/**/** Estimate differs significantly from Premium Sort, No Total Costs at the .10/.05/.01 level, using two-tailed tests.

[^]/^{^^}/^{^^^} Estimate differs significantly from Premium Sort, Total Costs Shown, Plus Salience at the .10/.05/.01 level, using two-tailed tests.