Consumers, Health Insurance and Dominated Choices

Anna D. Sinaiko
Harvard University

Richard A. Hirth
University of Michigan

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1. Introduction

The notion that consumers make good choices is a cornerstone of economic theory and health policy. Standard utility theory is premised on the principle of rationality – simply put, that when faced with a set of choices individuals choose the option that is in their own best interest (Hurley 2000). Health reform efforts throughout the last two decades have relied on competition and choice to improve the efficiency of the health care system. For example, the passage of the Medicare Prescription Drug, Improvement and Modernization Act (MMA) in 2003 – the largest public expansion of health insurance since the introduction of Medicare and Medicaid - made beneficiary choice among prescription drug plans a central feature of the program. Many of the current health reform proposals under debate in Congress include a health insurance exchange, which would allow consumers to purchase health insurance from among a standardized menu of health plans. These exchanges would function well when consumers are well informed, cost-conscious, and make choices that reward high-quality, low-cost health plans.

More recently, social science research has questioned rationality as an accurate description of how consumers make choices. Beginning in psychology and expanding to include economics, law, sociology and political science, a series of studies have developed theoretical models and empirical evidence to suggest that decision-making is more accurately described by systematic errors due to use of simplifying heuristics and biases than by a model of rational choice where individuals maximize expected utility over a set of possible outcomes (Gilovich et al 2002). Because health insurance choices are complex and involve uncertainty and have consequences for future health and well-

being, these so-called "behavioral" economic models may apply well to consumer health insurance choices (Frank 2007; Leibman and Zeckhauser 2008).

Since consumers' preferences and objectives are not observed, it may be hard to distinguish a "mistake" from unusual preferences. In the health insurance context, a person might choose to forgo health insurance subsidized by an employer, for example. Is this person irrational or is she risk-loving? There are some circumstances, however, in which mistakes can be clearly identified. One example would be a health plan that is "dominated" by other choices, i.e. a plan that is the same or worse than another available plan on all dimensions for all possible health states. Choosing a dominated health plan from a set of available plans represents a clear error with a welfare cost for the consumers choosing it.

This paper uses employment records from the University of Michigan (UM) in 2002-03 when employees were offered a choice of a dominated plan to study consumer behavior in the presence of a dominated plan. We find that a substantial number of employees made a mistake and chose to enroll in the dominated plan. This evidence supports alternative economic models than that of the rational consumer, and suggests that health reform that relies heavily on consumer choice may result in unintended and inefficient outcomes.

This paper proceeds as follows. Section 2 introduces our study context and reviews the relevant literature on health insurance choice and decision-making. Section 3 describes the data. Section 4 discusses the methods and Section 5 presents results. We conclude in Section 6.

2. Background

2.1 Study Context

This paper analyzes the choices made by employees when the set of health plans offered by their employer includes a dominated plan. In 2002-03, UM offered a choice of six plans: two indemnity plans, three Health Maintenance Organizations (HMOs) and one Point-of-Service (POS) plan (Table 1). Each plan was offered by a different vendor, except for one vendor ("Vendor M") which offered two plans: one of the HMO plans ("HMO A") and the POS plan. In general, except for the two Vendor M plans, the plans offered distinct differences in coverage. Vendor M's plans offered access to the same network of providers (one of the two major provider networks in the local area), with the POS providing more generous coverage than HMO A. HMO B provided access to the second major provider network in the area. Indemnity A provided traditional, generous fee-for-service coverage without any network restrictions. Indemnity B also did not have a restricted provider network, but was a much less generous plan offering only major medical coverage. HMO C was a small plan that offered a third provider network geographically removed from the employer's main operations (the Ann Arbor campus) but close to one of the firm's smaller locations (the Dearborn campus).

Some employees faced a dominated choice. Regardless of their choice of plan, employees who selected single coverage in 2002 or in 2003 were not charged a health insurance premium. For single subscribers, HMO A was dominated by the POS plan because for the same price (zero out of pocket premium), the POS plan offered the same benefits as HMO A with access to the same network of physicians and hospitals, plus the ability to self-refer to specialists in-network, and partial coverage for care out-of-

network.[1] Self-referral to a specialist saved a patient the travel and time costs of visiting their primary care physician to get a referral, and any time cost associated with a delay in making an appointment with the specialist. The patient did not save money because the plan required a higher co-payment for a self-referral office visit ($30), which was the same amount the patient would have paid to first see their PCP for a referral and then see the referral physician ($15 each) unless multiple referrals were obtained at a single PCP visit.[2] POS enrollees who received care from an out-of-network provider paid 20% coinsurance plus any balance billing; in contrast, enrollees in HMO A received no coverage for out-of-network care.[3] The value of partial coverage for out-of-network care varied across employees because the size and breadth of Vendor M's network varied with geography. Some employees live in areas where the network coverage is good, though not comprehensive, while for others the network was much more limited.

Employees selected their health plan when they were first hired and then could switch plans during the annual open enrollment period. Information on the enrollment process and plan options was available to employees through the University Benefits Office website, an informational telephone line administered by the Benefits Office, a newsletter, and several Benefits Office publications including the *Your Benefits* booklet. *Your Benefits* was published annually and presented detailed information about the differences in insurance coverage across plans (in a side-by-side chart) and the employee portion of the premium that was required for each plan.

[1] In contrast, the POS plan did not dominate HMO plan A for employees choosing to enroll in family coverage in 2002 and 2003. Employees who enrolled in family coverage were charged differential out-of-pocket premiums across plans, and paid a higher premium to enroll in the POS than in HMO plan A.
[2] Obtaining a referral from PCP and paying the $15 specialist co-payment, as required under the HMO, remains an option for the POS enrollees. That is, at worst they could use the POS benefit exactly as they would use the HMO benefit.
[3] For surgery, the patient was responsible for 50% coinsurance if the procedure was not authorized by the health plan.

The consequences of missing the health insurance enrollment deadline when newly employed (i.e. the default) varied for workers in different jobs. For the majority of employees in this sample (89.5%), the default was enrollment in Indemnity B, the indemnity plan that provided major medical coverage. Research fellows, who represent 5.2% of workers electing individual coverage, defaulted into Indemnity A, and members of one bargaining unit (5.4% of workers with individual coverage) defaulted into HMO A.[4] Once a plan was selected, the default for existing employees each year was to remain in their current plan.

In 2004 UM began charging its employees a premium for individual coverage. In 2004, the employee portion of the premium for individual coverage in the POS was $17.86 per month, which was slightly higher than that for HMO A ($16.02 per month) (Table 1). Thus, HMO A was no longer strictly dominated by the POS plan because some employees may not have valued the additional benefits provided through the POS as much as the monthly incremental $1.84 POS premium. Employee-paid premiums changed further in 2005; the higher cost of individual coverage through the POS versus HMO A became $57.18 per month vs $8.62 per month. In addition, two preferred provider organizations (PPO) plans were added to the choice set in 2005, including one offered by Vendor M.[5]

2.2 Relevant Literature

Choice of health plan is a common feature of employer-sponsored health insurance in the United States with approximately 53% of covered workers employed at a

[4] Numbers do not sum to 100% due to rounding.
[5] For analysis of enrollment patterns following the change in plan offerings in 2005 see Hirth et al (2007)

firm that offers a choice among health plans (Kaiser Family Foundation / Health Research and Educational Trust 2009). Consumers value choice, as high rates of dissatisfaction with managed care plans in the 1990s were found to stem, in part, from a lack of choice (Davis et al 1995; Gawande et al 1998; Enthoven et al 2001). Optimal, cost-conscious consumer choice in a structured and managed market has the potential to improve equity and efficiency in the health care delivery system (Enthoven 1988). Moreover, the decision by employers to offer a choice among health plans may be a response to heterogeneous preferences among their employees for health insurance that stem from differences in health status, income and taste for insurance (Goldstein and Pauly 1976; Moran et al 2001; Bundorf 2002; Miller 2005), and employer offering a choice of plans can increase welfare (Bundorf et al 2008).

But are consumers good choosers? The substantial literature on adverse selection in health insurance markets presents evidence that consumers with greater health risk, whose expected benefit of insurance coverage is higher than others, are able to sort themselves into more generous plans, as economic theory would predict (see for example Cutler and Reber 1988, Cutler and Zeckhauser 2000). However, loss aversion, a preference for avoiding losses rather than acquiring gains, can have an impact on decision-making (Tversky and Kahneman 1991). For example, newer employees have been found to disproportionately select newer (and different types of) health plans (Samuelson and Zeckhauser 1998), or be more sensitive to price (Strombom, Buchmueller et al 2002) than incumbent employees who are more likely to stay with their current plan. The authors attribute these findings to support for status quo bias. However, because search and transaction costs may increase the expense of switching

health plans, for some incumbent employees this behavior is not necessarily evidence of sub-optimal choices.

Anticipation of feelings of regret and the complexity of the decision context also can inhibit health plan choices. Currently the average Medicare Part D market area features 50 stand-alone prescription drug plans (Neuman and Cubanski, 2009). Partly as a result of the large number of choices, a large majority of respondents to a survey considered the Part D program too complicated, resulting in significant inertia in plan choices (enrollees not changing plans even when a change would appear to be financially beneficial) (Cummings et al 2009). Frank and Lamiraud (2009) find a negative relationship and Elbel and Schlesinger (2006) find a non-linear relationship between the number of health plan choices available and whether a consumer decides to switch plans, suggesting that increased complexity, here due to "choice overload," can produce results contrary to predictions of standard economic models.

Succumbing to passive choice, i.e. accepting a default, as opposed to actively choosing from among a set of options, can also result in decisions that are misaligned with a consumer's normative preferences (Beshears et al 2008). There is little work studying default effects and health plan choice; evidence from financial services has shown that consumer savings decisions are susceptible to defaults, which may improve or worsen savings outcomes, depending on the circumstances (Beshears et al 2006). Because health plan choice is similar to savings and retirement choices in that they are high-stakes, complex and uncertain decisions, it is possible that defaults have similar effects on health plan choice.

Few papers analyze consumer experience with dominated choices in insurance markets. Standard utility maximization models predict that no one would select a dominated health plan because the expected utility in all health states from enrolling in a non-dominated plan is higher. However, insurance markets are complicated.

Two recent papers have considered sub-optimal choice of health plans in the context of Medicare Part D. McFadden (2006) conducted a survey of elderly Americans about Part D, and found that on the question of whether to enroll, 29% of respondents did not make a decision that was in their best interest, and only 36% of respondents chose the plan that minimized the expected value of their out-of-pocket costs. However, in order to determine "optimal" enrollment decisions and plans, assumptions were required about each person's future pharmaceutical utilization and discount rate. Moreover, respondent choices are hypothetical and may not reflect actual choice behavior. In their paper using data on actual pharmaceutical utilization and plan choices, Abaluck and Gruber (2009) find that over 70% of beneficiaries selected sub-optimal plans, defined as plans that require higher out-of-pocket costs from the enrollee than another plan that offers an equivalent level of risk protection. Although the authors performed several sensitivity analyses around the methods used in their analyses, identification of the set of "efficient" or optimal plans relies on assumptions about an individual's expected pharmaceutical utilization, knowledge of that utilization during the plan enrollment period, and degree of risk aversion, which must be inferred. Moreover, both of these studies of sub-optimal choice among Part D plans focused on a population whose decision-making capabilities are diminished because of age and health status (Hanoch and Rice 2006) and look at choices made in a setting with many options (almost 50 plans available to each person).

In our study setting, employees faced a moderate choice set (6 plans) where one plan is clearly dominated. The POS is a newer and more complex plan design than either traditional fee-for-service (FFS) plans or HMOs, and, therefore, may be less well-understood by potential enrollees. In addition, employees face a default option if they miss the health insurance enrollment deadline, and for a small portion of the workforce, the default is the dominated plan. Little is known about the choices that a younger, privately insured population would make in this setting; in this paper we analyze data from the UM to answer this question.

3. Data and Methods

3.1 Data

This study uses data on health plan choices made by active employees at UM in the years 2002-2005. Along with information about health plan choice and coverage level (individual or family), the data include information on employee age, gender, annual salary, job-type (academic or not), union status, residence zip code, and number of years working for the employer. In 2004 the pharmaceutical benefit was carved out and standardized across employees. This change allowed us to obtain data on total pharmaceutical expenditures for each employee in 2004.

3.2 Methods

To understand enrollment into the dominated plan, we analyzed both initial plan choice and switching. The sample used in our analysis (hereafter called our "analysis sample") includes 8,899 employees who selected individual coverage in 2002 and an additional 1,859 employees who first selected individual coverage in 2003 (because they

were not yet employed or waived coverage in 2002), for a total of 10,758 unique observations.[6] Table 2 presents descriptive statistics for this sample.

Employees enrolled in one of five of the health plans (HMO A, HMO B, POS, Indemnity A, or Indemnity B) in 2002 or 2003. Only 2.8% of employees enrolled in individual coverage selected HMO C; because our data gave limited information about what determines choice of this plan, we dropped these 307 observations from our analysis. The employer's policy regarding changing coverage levels following major life events (i.e. births, marriage) allowed for adding dependents to the employee's current plan at the time of the event but did not allow switching health plans (switching plans is only permitted during annual open enrollment.) For these employees, the POS may not have been dominant due to the higher out-of-pocket premiums that would have to be paid once the dependant was added. Thus, to avoid including employees who may have selected a plan because they anticipate adding a dependent to their coverage mid-year, we excluded employees who chose family coverage at any point during 2002-05.

To avoid violating the independent of irrelevant alternatives (IIA) assumption in our analysis of choice of the dominated plan we restricted our analysis to individuals who selected either HMO A or its close substitutes. The IIA requires that the odds of choosing any alternative over another not depend on the other choices available in the choice set. In our study context we suspect that the IIA property is violated, because although most of the health plans available to workers are distinct alternatives, that is not the case for the two Vendor M plans. More specifically, if the employer were to stop offering the

[6] We also have data on the choice of plan in 2003 made by those employees who were employed, did not change job types or residence locations and selected individual coverage in both 2002 and 2003 (7,111 of the 8,999 above), however, because of low rates of switching across plans the choices made by these employees in 2003 are very correlated with the choices made in 2002 (corr=.9170), and we exclude their second year of data from our analysis of plan choice.

POS, we'd expect the majority of POS enrollees to switch into HMO A as opposed to spreading out equally into the remaining four plans. Previous work suggests that a nested logit is more empirically appropriate for identifying plans that are substitutes (Feldman 1989).

We ran a nested logit model to test whether employees first decide whether they want to be in the Vendor M provider network, and then to either select the Vendor M HMO A or POS (if they choose the "Vendor M nest") or select among the Indemnity plans and HMO B (if they choose to be in the "other nest," and not in the Vendor M network) (see Figure 1). The dependent variable is choice of health plan and independent variables include the plan's employer-paid premium, the provider network, and the gender, age, residence location, job-type, union status, and years of experience of the employee. A likelihood ratio test for the IIA assumption based on the results of this model reject the hypothesis that the odds of choosing one plan over another is independent of the other plans available in the choice set.[7] We conducted a Hausman test which confirmed this result.[8]

Thus, our analysis of plan choice is limited to employees who enrolled in a plan within the Vendor M nest -- those employees who chose either HMO A or its close substitute the POS. This sample consists of 7,944 unique individuals from our analysis sample who enrolled in either HMO A or the POS. Descriptive statistics for this sample are presented in the second column of Table 2.

[7] Nested logit results not shown – available from authors upon request.
[8] In the Hausman test, we modeled choice of plan using a conditional logit model and then test whether omitting one of the alternatives from a conditioinal logit mode (in this case HMO A) leads to inconsistent estimates.

Pearson χ^2 tests compared enrollment in the dominated plan across characteristics of employees; these findings were confirmed with logistic regression models that control for gender, age, salary, job type (academic or not), residential location and union status. To test whether information about the impending increase in premiums that was about to be implemented in 2004 affected plan choice in 2003, we included year fixed effects in the models. To test whether choice of the dominated plan is due (in part) to inertia, we compared choice of the dominated plan by workers who had been employed at the firm for many years, versus new employees. We ran two different logistic regression models, first including only a dummy variable that indicates whether the employee was working at the firm before HMO A was dominated (before the POS was offered in the choice set), and then including a series of dummies indicating how long an employee has worked at this firm. Positive and significant coefficients on these variables would indicate the existence of inertia. We tested an interaction term between job-type and length of employment; marginal effects for the interaction terms were calculated using the method of Ai and Norton (2003). We also tested for the presence of default effects by analyzing whether enrollment in the dominated plan was higher among workers for whom the default plan was HMO A versus other workers. We describe all comparisons across groups that were significant in both the χ^2 tests and regression models at the 5% level or better in the Results section below.

We conducted sensitivity analyses using data on choices made by our analysis sample in 2004. The 2004 data allowed us to control for total pharmaceutical spending by each employee that year, a crude proxy for health status. Pharmaceutical spending is among the most persistent categories of health care spending, reflecting ongoing care for

chronic conditions, and as such is a good candidate for an index of health care demand (Pauly and Zeng, Berkeley Electronic Press, 2004). In 2004 the POS no longer strictly dominated HMO A, but the employee portion of the premium difference between plans is small ($1.84/month). Although a significantly higher proportion of workers switched plans in 2004 than in 2003, it is still only a small percentage of our analysis sample (6.66%) who switched plans in 2004. Data on total drug expenditures were used to assign each employee to one of four spending categories: no spending, low spending, medium spending or high spending, where the latter three categories are even tertiles of workers with any positive drug costs. We wanted to focus on workers who did not have material changes that might effect their choice of health plan, so we excluded workers who changed health insurance coverage level, residence zip code group, or job-type.

Our final set of models analyzed decisions by employees to switch health plans in order to understand whether enrollees in the dominated plan learn from their mistake in plan choice through their experience in the plan and correct their error by switching out of it. We conducted Pearson's χ^2 tests and logistic regression models to assess patterns and differences in rates of switching among single subscribers across plans to determine the characteristics of employees who switch health plans between 2002 and 2003. The dependent variable is a binary variable measuring whether an employee switched health plan between 2002 and 2003, and independent variables include gender, age salary, job type, experience and residence location. We also tested interactions between being in the dominated plan and gender, and between being in the dominated plan and how long someone has been employed. Marginal effects for the interaction terms were calculated using the method of Ai and Norton (2003).

Because this last set of models simply analyzed an employee's decision to switch plans and did not consider the enrollment choices made by switchers, we did not restrict sample for this analysis to employees in the Vendor M nest. Rather, the appropriate sample for the analysis is all employees in our analysis sample with individual coverage who selected a health plan in 2002 and either re-enrolled in a plan with individual coverage or waived coverage in 2003 (n=7,111). We excluded employees who changed job-types or residence locations between 2002 and 2003.

4. Results

Table 1 presents enrollment data for our sample of single subscribers. Despite the fact that the POS dominated HMO A for individual coverage, approximately one-third of these workers enrolled in HMO A in both 2002 (35.2%) and in 2003 (35.3%). This enrollment is only slightly lower than that in the POS, in which 39% of workers with individual coverage enrolled in 2002 and 38% in 2003.

We identified three types of possible mistakes involving choice of the dominated plan. The first is enrolling in HMO A before it is dominated but then not switching out of it once it becomes dominated; the second is enrolling in HMO A when it is dominated by the POS (i.e. selecting a sub-optimal plan); and the third is by staying in the dominated plan over time (i.e. failing to correct the mistake once it was made).

We found evidence suggesting that some employees selected HMO A before it was dominated and then failed to switch out of it once it became dominated (the first type of mistake). Nearly one out of every two employees (47.8%) who began working at UM before the POS was offered and who selected a Vendor M plan were enrolled in HMO A.

Although we do not know for certain when these workers selected HMO A, there is evidence of low rates of plan switching in our data and in other private health insurance settings.[9] Thus, it is likely that at least a portion of these workers selected HMO A before it was dominated (when it would have been a rational and potentially optimal choice), and due to inertia, stayed enrolled in it when the POS was introduced and it became dominated.

Inertia is not the only explanation for mistakes in our data. A second type of mistake occurs when employees actively make the wrong choice. The proportion of workers who started their employment in the period when HMO A is dominated and selected HMO A continued to be high (49.4% of employees in a Vendor M plan). This enrollment level is not significantly different than observed among workers who have been at UM since before HMO A was dominated. Of workers who began their employment in 2002 or later, for whom our data allows us to observe the first plan they select, almost 41% chose the dominated plan (Table 4).

However, enrollment in the dominated plan was greater among workers who had been employed longer. Table 3 presents results from logit models of choice of the dominated plan. Model (1) includes a dummy variable indicating whether a worker started employment before the POS dominated HMO A; the coefficient on this variable is 0.227 (OR=1.25), significant at the 1% level. Thus, in comparison to all workers who began their employment after HMO A was dominated, workers who had been with the firm since before HMO A was dominated had 25% higher odds of enrolling in the dominated plan. Model (2) includes a series of dummy variables indicating how long an

[9] In their survey of workers with employer-sponsored insurance, Davis et al (1995) found that the majority of workers who switched plans in the past three years did so "involuntarily," due to their employer changing plan options or due to a change of jobs.

employee has worked at the firm. Relative to workers with tenures of one year or less, workers who started with the firm before the POS dominated HMO A have 53% higher odds of selecting HMO A (coefficient = 0.423, OR=1.53). Workers who have been at the firm for between six and eleven years also are significantly more likely to be in HMO A than are the newest workers. Specifically, in comparison to workers who have been with the firm for one year or less, workers with tenures of 6-7 years have 55% higher odds of being in HMO A (coefficient = 0.441, OR=1.55), workers with tenures of 8-9 years have 73% higher odds of selecting HMO A (coefficient = 0.548, OR=1.73) and workers with tenures of 10-11 years have 78% higher odds of being in HMO A (coefficient = 0.574, OR=1.78). These results provide evidence that a substantial number of consumers make mistakes in plan choice.

We also found an effect of job type, years of experience with the firm and choice of dominated plan. Employees with an academic job-classification who have been working at UM since before HMO A was dominated were significantly less likely than other employees who have worked at UM since before HMO A was dominated to be in HMO A (23.7% vs 53.6%, $p<0.001$). This finding was confirmed by in Model (3) in Table 3 where the coefficient on the interaction term between the dummy variable indicating whether one has an academic job-classification and the dummy variable indicating employees who have been at UM for the longest period is negative and significant. Although in cross-tabulations it appears that academics who have worked at UM for a shorter period were also less likely to be in the dominated plan, this result did not hold in the regression models (coefficient = -0.108, $p=0.24$).

Those living outside the main urban area also were more likely to be enrolled in the dominated plan. The coefficient on the variable indicating residence outside the urban center of Washtenaw county is 0.20, implying that these workers have 22% higher odds of selecting HMO A. This finding is surprising because these individuals are more likely to be living in an area where the plan network isn't as comprehensive, perhaps increasing the likelihood of needing out-of-network care.

Workers who selected individual coverage for the first time in 2003, either because they were newly employed or because they waived coverage in 2002, were more likely to be in HMO A than in the POS. Other main findings are that women are less likely to be enrolled in the dominated plan, while younger workers and workers with lower salaries are more likely to be in the dominated plan (Table 3). Defaults or passive choice does not explain enrollment in the dominated plan. The proportion of workers whose default was HMO A and who were enrolled in HMO A is not significantly different than that of workers whose default was Indemnity B (32.7% vs. 35.9%, p=0.12).

Individuals with greater likelihood of using out-of-network care have more at stake in choosing poorly. A limitation of this analysis is that we are unable to control for health status in these models. Health status is likely to be associated with selection of the dominated plan, because theoretical models predict and empirical studies provide evidence of adverse selection, where sicker individuals are more likely to enroll in more generous coverage (here the POS) because their expected use of the additional coverage provided by the plan is higher. If health status is also correlated with age in our sample (i.e. older workers have worse health) then our estimated coefficients on the age variables will be biased upward.

To test the extent of potential bias due to omitting health status measures, we ran our models using data on the plan choices made by our sample in 2004, when the POS plan is only nominally more expensive than HMO A, and then we added a crude measure of health status – indicators for the tertile of a person's total pharmaceutical expenditures for the year among those who have any positive drug expenditure. The reference group is workers with no drug expenditures in 2004. Logit coefficients are presented in Table 5. The coefficients on the middle and high groups of pharmaceutical spending in Models (3) and (4) are negative and significant, indicating that, as expected, those workers have a lower likelihood of selecting HMO A. Controlling for pharmaceutical spending does not significantly change the coefficients on the majority of other variables in the model. Controlling for drug spending slightly reduced the magnitude of the coefficient on female.

Switchers. Do enrollees in the dominated plan make the third type of mistake, and fail to switch out of the dominated plan? The cost of switching health plans in this study setting was low: information about plan choices was readily available to employees during the open enrollment period and switching plans required completing and submitting a form or making benefit elections using an automated telephone system. Despite low switching costs, only a few workers with single coverage (4.9%) switched health plans between 2002 and 2003, and enrollees in the dominated plan were no more likely than other workers with single coverage to make a switch (4.6% vs 5.1%, p=0.30). There is some indication that enrollees in HMO A may have realized they made a mistake in plan choice and switched to correct it, because a higher proportion of workers switching out of HMO A moved into the POS plan than vice versa (Table 6). However, a

small percentage of workers in the POS plan switched into the dominated plan (20.7% of those who switched out of the POS and 0.4% of all POS enrollees), revealing that making a "good" choice in one period does not preclude a "bad" choice in a later period.

We ran logit models to analyze the characteristics of people who switch out of the dominated plan (Table 7). Women were more likely to switch out of the dominated plan but not to switch out of other plans, with the coefficient on the interaction variable between gender and being in the dominated plan positive and significant and the coefficient on female not significant. In fact, once we controlled for gender, enrollees in the dominated plan were less likely to switch plans than were other workers. Analysis of switching provides further evidence of inertia among this workforce, as workers who have been at UM the longest were least likely to switch plans than all other workers (3.4% vs 5.8%, $p<0.001$); this finding was confirmed by regression. We tested whether the inertia effect was greater in magnitude for those in the dominated plan and did not find an effect (results not shown).

Costs of Mistake in Plan Choice. What are the consequences of enrolling in the dominated plan? As we described earlier, the additional benefits provided by the POS over the dominated HMO are the ability to self-refer to specialists and partial coverage for care received from out-of-network physicians. While the option of having these additional benefits is positive for everyone, the POS brings higher value to enrollees who actually use them. We obtained data on office visits and specialty visits by POS enrollees in 2007; [10] 8.4% of office visits by enrollees in the POS used the in-network/self-referral option and 6.7% used out-of-network physicians. Among visits to specialists, 14.4%

[10] Data from the University of Michigan Office of Human Resources and Affirmative Action. Vendor M physician network size and breadth in 2007 was very similar to what it was during the study period.

were in-network/self-referral and 11.6% of specialist visits were out-of-network. The average and median cost of an office visit in 2004 were $155 and $72, but varied across specialties (Machlin and Carper 2007). Using these estimates, we calculated that an enrollee would save on average $124 per visit with an out-of-network physician by being enrolled in the POS as opposed to HMO A. Thus, the savings for someone who used only one out of network office visit with no other services were substantial. From a plan's perspective, the expected savings from out-of-network visits by enrollees in the dominated plan represent approximately 4% - 6% of per member per month revenue in 2003.[11]

Conclusion

When workers at a private employer were offered a choice of health plans that included a dominated plan, a significant portion chose the dominated plan. While some of this choice may be explained by inertia, i.e., individuals who may have selected the plan before it was dominated and then failed to switch out of it, a large portion selecting the dominated plan simply made a bad choice – they selected a suboptimal plan when their initial choice set included both good and bad options. Because of low rates of switching among plans within our sample, and in particular, among people in the dominated plan, the costs of choosing a dominated plan increase for individuals over time.

[11] The POS covers 80% of costs of out-of-network care while HMO A does not provide any coverage for out-of-network care. Estimated savings = average per visit cost covered by the POS but not HMO A x the rate of out-of-network visits. Per member per month revenue at Aetna, a major commercial HMO, in 2003 was $233 (Robinson 2004).

While it is unlikely that choice overload influenced these choice errors, because the number of health plan choices was moderate (six), the POS (the "dominant" plan) was a more complicated insurance product than HMO A. The finding that the newest employees were less likely to make mistake and enroll in the dominated plan may be because this group has better comprehension and more familiarity with different managed care products than other workers. Those with tenures of 6-11 years started work between 1991 – 1996 – just as managed care was becoming more prevalent. Understanding of managed care and HMOs was low during the mid-1990s; a 1997 Kaiser poll found that 38% of the public had never heard of or did not know what the term Health Maintenance Organization (HMO) meant (Kaiser/Harvard 1997). Poorer understanding of health plan options may lead to more errors in plan selection during these years. Lower enrollment in the dominated plan among newer workers may also reflect the general trend of increasing enrollment in POS plans by workers enrolled in employer-sponsored health insurance plans; in 1993 7% of covered workers were enrolled in a POS and by 2001 this proportion had increased to 22% (Kaiser Family Foundation 2002). Both of these explanations rely on the assumption of inertia – people are likely to stay with the health plan they chose when they were new employees, for which there is some evidence in our data.

We found that women are less likely to be in the dominated plan and more likely to switch out of it. Previous work finds that women use the health care system more frequently then men (Ezzati-Rice and Rohde 2008), and perhaps learning through this increased experience (both about the need for out-of-network coverage and the additional benefits provided through the POS) can explain this finding. There is also evidence that

women have different preferences then men, and in particular, are more risk-averse in most contexts (Croson and Gneezy 2009). Greater risk-aversion would be consistent with enrolling in the POS which provides more insurance, though differences in preferences for health insurance across gender have not explicitly been studied.

Older workers and workers earning higher salaries also are least likely to be in the dominated plan. It is possible that men and younger workers have lower expected health care utilization and therefore place lower value on the additional benefits offered through the POS. Lower income workers might be the least willing to pay for and use out-of-network care and place less value on direct access to specialists. However, these reasons do not explain why these groups would choose HMO A, turning down what is essentially a "free upgrade" offered through the POS – more risk protection for the same price.

Employees who were new in 2003 were also more likely to be enrolled in the dominated plan. This may reflect information that was starting to become available in 2003 about the impending increased employee portion of the premium for the POS relative to HMO A. Thus, employees may have chosen to enroll in HMO A to save the switching costs associated with selecting the POS in 2003 and switching to HMO A in 2004. (Recall that the default for workers who fail to make an active benefit election is re-enrollment in the prior year's health plan).

Despite findings of different rates of enrollment in the dominated plan across demographic characteristics, no category of individuals was exempt from selection of the dominated plan. A significant percentage of workers with individual coverage chose the dominated plan, including a large portion of the newest employees. Although the welfare

loss associated with choice of the dominated plan in this context may be small, it applies to a large number of people.

Thus far this paper hasn't addressed the role of UM – the intermediary responsible for selecting the menu of health plans offered to employees, setting employee out-of-pocket premium contributions, and running the plan enrollment process. What is the employer's role in this context? Currently, there is disagreement about the function of health insurance exchanges (Frank and Zeckhauser 2009). If the overseer of an exchange should screen and select high-quality and efficient health plans for its workforce, then UM made a mistake by allowing a dominated plan in the choice set. If its employees need further assistance in their learning about their different health plan options, it seems that in this case the information available about the POS and HMO A did not communicate the differences in the plans effectively. If however, the employer's role is a less active one, then achieving efficient outcomes will depend much more heavily on consumer ability to choose optimally. The evidence presented here suggests that consumers may not be up to this task.

External Validity. Are these findings on plan choice generalizable to other single subscribers in the privately-insured population? A limitation of this work is that our data consist of workers at one employer, and it is unknown whether this group responds to information and incentives differently from other workers. As a test we looked at how employees in our sample responded to increases in the employee portion of the premiums that were implemented in the two years following our study period. Economic theory predicts that changing from a regime where all plans have the same price (in this case, no employee-paid premium) to one where more generous plans require higher premium

contributions will result in people who do not value the additional coverage as much as the incremental price increase switching to a lower cost plan.

Table 1 shows the out-of-pocket premiums required for individual coverage in each plan in 2002-05 and the enrollment choices made by our analysis sample.[12] Changes in enrollment were small in 2004 when the differences in premiums across plans were also small, while enrollment shifted more dramatically in response to greater variation in employee premiums across plans in 2005.[13] Moreover, of the 1374 people with individual coverage who switched plans in 2005, 90.8% paid a lower out-of-pocket premium in their new plan than they would have paid had they stayed in their original plan. Thus, significant percentage of this population responds to financial incentives as theory would predict though because studies of demand response in employer-sponsored insurance markets are context specific, we are unable to compare these figures directly with those from other studies.

In sum, due perhaps in part to inertia, in part to confusion or a poor understanding of health plan options, and for reasons that are still undefined, this study provides evidence that when a dominated choice is included as part of a set of health plans, a subset of consumers chose it. Thus, in the context of health insurance, the market on its own will not always work to eliminate sub-optimal plans or correct errors in the choice set. This improved understanding consumer decision-making in health insurance markets can inform purchasers and policymakers on how to structure and implement effective and efficient health insurance programs.

[12] For this analysis we excluded employees who changed job-type, residence location or coverage level.
[13] For a more detailed description of the plan choices and switches made by workers, see (Hirth et al 2007)

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Figure 1. Health plan choice decision tree

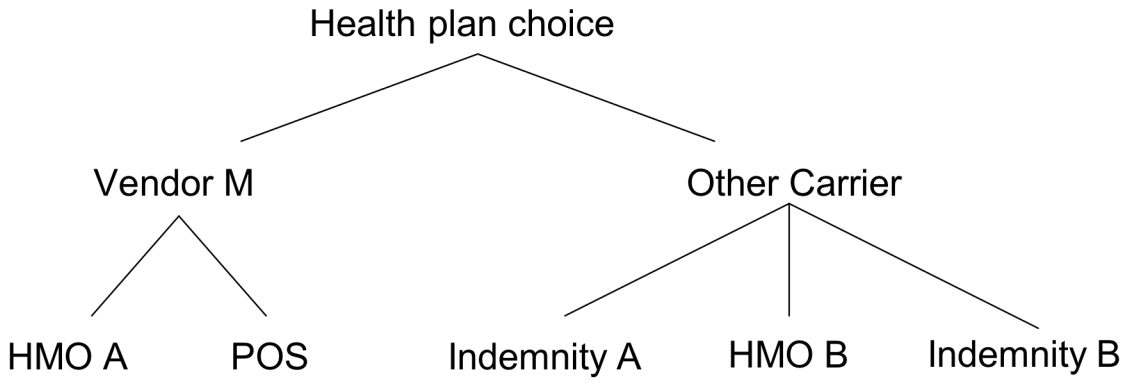

Table 1. Plan choices, out-of-pocket premiums and enrollment, enrollees with individual coverage

		2002		2003		2004		2005	
Vendor	**Plan**	**OOP**	**enrollment**	**OOP**	**enrollment**	**OOP**	**enrollment**	**OOP**	**enrollment**
Vendor M	HMO A	$0	35.2%	$0	35.3%	$16.02	35.1%	$8.62	44.6%
Vendor M	POS	$0	38.8%	$0	38.0%	$17.86	38.8%	$57.18	22.5%
Vendor M	PPO A		n/a		n/a		n/a	$26.40	7.2%
Vendor N	HMO B	$0	11.48%	$0	11.2%	$16.10	12.9%	$24.22	13.7%
Vendor O	Indemnity A	$0	10.2%	$0	10.2%	$25.24	10.6%	$193.50	5.0%
Vendor O	PPO B		n/a		n/a		n/a	$49.94	5.2%
Vendor P	Indemnity B	$0	4.3%	$0	4.1%	$15.20	2.6%	$0	1.9%
Vendor Q	HMO C	*(dropped from analysis because small enrollment)*							

Table 2. Descriptive statistics for our study sample

Sample	All enrollees with individual coverage	Enrollees in HMO A or POS
Female	64.3%	65.1%
age 18-30	28.6%	32.0%
age 30-40	28.0%	29.6%
age 40-50	21.9%	20.5%
age 50+	21.5%	18.0%
Salary $0 - $40K	61.6%	60.8%
Salary $40k - $60K	24.4%	24.9%
Salary $60K+	14.0%	14.3%
Union	14.7%	14.3%
Academic job	11.4%	11.5%
residence location		
city	51.1%	53.4%
outside city, same county	19.5%	19.1%
other	29.4%	27.5%
Tenure		
New employee		
1-2 years	27.92%	29.8%
3-4 years	14.12%	15.6%
5-6 years	6.5%	6.8%
7-8 years	5.2%	4.9%
9-11 years	5.1%	4.8%
11+ years (before HMO A was dominated)	24.1%	21.0%
n	10,758	7944

Table 3. Logit Results

Sample	workers with individual coverage in HMO A or POS		
Dep Var	In dominated plan? (1=yes, 0=no)		
	(1)	(2)	(3)
female	-0.189**	-0.200**	-0.207**
	(0.050)	(0.050)	(0.050)
age 18-29	0.113	0.237**	0.234**
	(0.080)	(0.083)	(0.083)
age 30-39	0.248**	0.302**	0.273**
	(0.076)	(0.077)	(0.078)
age 40-49	0.208**	0.217**	0.193*
	(0.076)	(0.076)	(0.077)
(ref. age 50+)			
Salary less than $40K	0.795**	0.847**	0.834**
	(0.083)	(0.084)	(0.084)
Salary $40k - $60K	0.400**	0.424**	0.404**
	(0.084)	(0.085)	(0.085)
(ref. salary $60k+)			
academic	-0.256**	-0.262**	-0.108
	(0.084)	(0.085)	(0.093)
academic*11+ yrs experience			-0.705**
			(0.188)
other Washtenaw cty	0.214**	0.205**	0.200**
	(0.063)	(0.063)	(0.064)
Other Michigan	-0.067	-0.061	-0.063
	(0.056)	(0.056)	(0.056)
(ref. ann arbor)			
union	0.124+	0.113+	0.098
	(0.068)	(0.068)	(0.068)
experience 2-3 years		0.072	0.071
		(0.072)	(0.072)
experience 4-5 years		0.009	0.007
		(0.087)	(0.087)
experience 6-7 years		0.441**	0.430**
		(0.117)	(0.117)
experience 8-9 years		0.548**	0.535**
		(0.126)	(0.125)
experience 10-11 years		0.574**	0.557**
		(0.152)	(0.151)
experience 11+ years	0.227**	0.423**	0.500**
(a start date before POS)	(0.069)	(0.087)	(0.090)
(ref. employee 1yr or less)			
y03	0.303**	0.411**	0.412**
	(0.064)	(0.075)	(0.075)
Pseudo R-square	0.025	0.029	0.030
N	7821	7821	7821

Table 4. Plan Enrollment by New Employees[+]

HMO A	40.9%
POS	32.6%
HMO B	5.2%
Indemnity A	11.6%
Indemnity B	9.7%

+An employee is new if their start date is on or after Jan 1, 2002

Table 5. Logit Results - specification check using 2004 data

Sample	workers with individual coverage in HMO A or POS			
Dep Var	In dominated plan? (1=yes, 0=no)			
	(1)	(2)	(3)	(4)
female	-0.228**	-0.239**	-0.179**	-0.190**
	(0.063)	(0.064)	(0.066)	(0.066)
age 18-29	0.348**	0.352**	0.320**	0.324**
	(0.104)	(0.104)	(0.106)	(0.106)
age 30-39	0.364**	0.334**	0.334**	0.305**
	(0.091)	(0.091)	(0.092)	(0.092)
age 40-49	0.212*	0.187*	0.200*	0.175*
	(0.085)	(0.086)	(0.085)	(0.086)
(ref. age 50+)				
Salary less than $40K	0.723**	0.718**	0.716**	0.712**
	(0.098)	(0.097)	(0.098)	(0.097)
Salary $40k - $60K	0.487**	0.470**	0.480**	0.464**
	(0.099)	(0.099)	(0.099)	(0.099)
(ref. salary $60k+)				
academic	-0.421**	-0.211+	-0.426**	-0.217+
	(0.106)	(0.121)	(0.105)	(0.120)
academic*b4pos		-0.726**		-0.722**
		(0.213)		(0.212)
other Washtenaw cty	0.195*	0.189*	0.197*	0.191*
	(0.080)	(0.080)	(0.080)	(0.080)
Other Michigan	0.012	0.011	0.025	0.024
	(0.070)	(0.070)	(0.070)	(0.070)
(ref. ann arbor)				
union	0.104	0.089	0.107	0.092
	(0.080)	(0.081)	(0.081)	(0.081)
experience 2-3 years	0.121	0.119	0.114	0.113
	(0.107)	(0.106)	(0.107)	(0.106)
experience 4-5 years	0.068	0.069	0.062	0.063
	(0.119)	(0.118)	(0.119)	(0.119)
experience 6-7 years	0.432**	0.423**	0.434**	0.425**
	(0.148)	(0.147)	(0.148)	(0.147)
experience 8-9 years	0.500**	0.492**	0.493**	0.484**
	(0.156)	(0.155)	(0.157)	(0.155)
experience 10-11 years	0.688**	0.672**	0.680**	0.664**
	(0.180)	(0.178)	(0.180)	(0.178)
experience 11+ years	0.510**	0.592**	0.502**	0.584**
(a start date before POS)	(0.111)	(0.113)	(0.111)	(0.113)
2004 pharma spending				
low			-0.069	-0.066
			(0.084)	(0.084)
medium			-0.228**	-0.226**
			(0.085)	(0.085)
high			-0.226**	-0.222*
			(0.087)	(0.087)
(ref. spending = $0)				
y03	0.495**	0.498**	0.485**	0.488**
	(0.101)	(0.100)	(0.101)	(0.100)
Pseudo R-square	0.033	0.034	0.034	0.036
N	4955	4955	4955	4955

Table 6. Which plans to individuals switch in to?

Switching from:	HMO A	POS
n	112	58
Switch into:		
HMO A		20.7%
POS	42.0%	
HMO B	5.4%	8.6%
Indemnity A	11.6%	25.9%
Indemnity B	5.4%	6.9%
Other*	35.7%	37.9%

*Other = waive coverage or HMO C

Table 7. Characteristics of Switchers - Logit results

Depvar	Did you switch (1=yes)	
	(1)	(2)
in dominated plan	-0.101	-0.729**
	(0.120)	(0.236)
female	0.136	-0.130
	(0.122)	(0.143)
dominated*female		0.036**
		(0.013)
age 18-29	-0.226	-0.249
	(0.193)	(0.193)
age 30-39	-0.072	-0.075
	(0.171)	(0.171)
age 40-49	-0.039	-0.040
	(0.161)	(0.161)
(ref. age 50+)		
Salary less than $40K	0.137	0.141
	(0.184)	(0.185)
Salary $40k - $60K	-0.076	-0.065
	(0.191)	(0.191)
(ref. salary $60k+)		
academic	0.468**	0.446*
	(0.177)	(0.178)
other Washtenaw cty	0.058	0.044
	(0.154)	(0.154)
Other Michigan	0.155	0.146
	(0.131)	(0.131)
(ref. ann arbor)		
experience 2-3 years	-0.154	-0.162
	(0.160)	(0.160)
experience 4-5 years	-0.609**	-0.612**
	(0.213)	(0.213)
experience 6-7 years	-0.333	-0.347
	(0.242)	(0.243)
experience 8-9 years	-0.488+	-0.496+
	(0.266)	(0.266)
experience 10-11 years	-0.504	-0.530+
	(0.307)	(0.308)
experience 11+ years	-0.860**	-0.878**
(a start date before POS)	(0.188)	(0.189)
(ref. experience 1 year or less)		
Pseudo R-square	0.016	0.020
N	7045	7045