

# How Much Is Choice Worth?

## The Cost of Restricting Choice in Employer-Sponsored Plans

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### Abstract

Most non-elderly Americans purchase insurance through their employers, which sponsor a limited number of plans. We quantify the costs of restricting choice in this manner. We make use of a proprietary dataset containing information on plan offerings and enrollment for 800+ large employers between 1998 and 2006; the dataset represents over 10 million Americans annually. We estimate a model of employee preferences using the set of plans they are offered. Using the estimated parameters from this model, we predict employees' choices in a hypothetical world in which all plans in a market are available to them on the same terms, i.e. tax-free and subsidized by their employers. We estimate that the median welfare gain exceeds \$1700 per effective enrollee, a large figure relative to median annual premiums of \$2,400 per enrollee (in \$2000). However, individual prices are likely to exceed group prices due to the absence of risk-pooling and higher administrative costs. Our results indicate that prices for the median employer would have to increase by roughly 70% to fully offset the gain from increased choice.

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## **1. Introduction**

Nearly 70 percent of nonelderly Americans purchase employer-sponsored health insurance (ESI). In exchange for full tax-deductibility of premiums, employees must select from among the choices offered by their employers (if insurance is offered at all). Although there are no legal impediments to offering a broad array of plans, in practice employees are offered a very limited set of choices by their employers: a 2005 survey by the Kaiser Family Foundation/Health Retirement Education Trust finds 37 percent of employees have only one option. The restriction of employee choice may prevent individuals and families from selecting the healthplan that best suits their needs, and from trading off added benefits against the associated premium increases.

With the U.S. preparing to embark on the most aggressive healthcare reform since the introduction of Medicare in 1965, the possibility of leveling the playing field between group and individual insurance (through a variety of means) has come to the fore. Although many have expressed concerns about the erosion of employment-based coverage, and the higher cost of individual plans, the benefits associated with expanded choice have never been systematically examined, let alone quantified. In this paper, we use a large panel dataset on employer offerings and employee choices to infer the gains consumers would enjoy were they able to select from the entire spectrum of plans in their local market, holding constant employers' direct subsidy per employee and the full tax-deductibility of premiums. By quantifying the gain to individuals from being able to select any plan available in their local market, we back out the amount by which prices would have to increase to fully offset this gain. In so doing, we provide policymakers with guidance regarding the implementation and design of reforms that bolster individual choice.

Our hypothetical scenario is similar to that proposed by Ron Wyden (D-Oregon) and Robert Bennett (R-Utah) in 2007, although the Wyden-Bennett plan encompasses a broader range of reforms, including provisions for those not currently eligible for ESI. However, the core design is the same, in that employees would be granted a voucher equal to their employer's present contribution to health insurance. Armed with this voucher, they could choose to purchase a plan sponsored by their employer, or another plan offered to individuals on a (regulated or unregulated) "insurance exchange." In our analysis, we also maintain the employer subsidy, the "exchange" is populated by including all plans we observe in a given market and year (i.e. any plan that is offered by any local employer in our dataset), and employees retain the option to enroll in plans currently offered by their employer.

We use a unique dataset of employer plan offerings and employee plan selections for a national sample of 800+ large U.S. employers during the period 1998-2006, representing over 10 million employed Americans in every year. Our approach consists of three distinct components. First, we estimate a discrete choice model of employee demand for healthplans, conditioning on the set of plans offered by the relevant employer in the relevant geographic market and year. The parameters from this model reflect the values placed by employees on individual plan characteristics. Second, we estimate a hedonic model of premiums that permits us to predict the premiums a given employee would face for each plan offered in her local market ignoring premium increases due to reductions in group size. Third, we use the demand estimates, together with the predicted premiums, to predict employee choices of plans and their expected utility when offered any plan currently existent in that market and year. In the counterfactuals employers continue to subsidize insurance by the same amount that they are currently subsidizing it. Thus, all gains and losses are budget-neutral. We use the results to estimate the

amount by which premiums would need to increase (relative to the levels predicted by our hedonic model, which assumes group-based pricing) to fully offset the net gain in consumer surplus.

We find choice is worth quite a bit for most individuals: the median employee would enjoy a surplus gain of roughly 75% of the median premium we observe (approximately \$1700 per “effective enrollee,” expressed in year 2000 dollars). Estimates of the “load” difference between group and individual plans are far smaller than this, implying substantial benefits could be reaped by expanding choice for employees. As an analogy, consider the employer who offers her employee a choice of heavily subsidized vehicles: the Ford Focus or the Cadillac Escalade. The employee would be willing to pay three quarters of the true value of the median vehicle simply to have the right to apply the subsidy to the car of her choice.

We caution that our results provide a conservative estimate of the value of choice (or, equivalently, a low estimate of the premium increases that would offset the benefits of choice). Our data enable us to build a very rich model of choice for a given set of employees, but we do not incorporate differences in preferences across individuals within employee groups except through a random error term. There may be substantial gains from better matching of individuals to plans. In addition, our hypothetical “exchange” does not include all plans available in a given market and year, as we only observe a sample of these plans. A census of such plans would increase the estimated value of choice.

The paper proceeds in 7 sections. Section 2 discusses the recent trends in the degree of choice in employer-sponsored plans and summarizes related research. Section 3 describes the data. Section 4 presents the estimation strategy and results for the demand and hedonic models

used as inputs into the simulations presented in Section 5. Section 6 discusses the implications of the results, and Section 7 concludes.

## 2. Background

### 2.a. Employer-Sponsored Insurance Plans: How Much Choice Is There and How is This Changing?

Most workers who receive insurance through their employers have a choice of plans but this choice can be quite limited. The Health Research and Educational Trust (HRET) and Kaiser Family Foundation's Employer Health Benefits Annual Survey studies the percentage of workers with job-based coverage, the kinds of plans employees offer and the choices made.

Approximately 2,000 randomly selected employers are surveyed covering a range of industries and both public and private firms. The survey indicates that sixty percent of firms, and ninety-eight percent of firms with over 200 workers, offered health benefits in 2005. Eighty percent of firms offered a single plan. However, Figure 1 shows that larger firms offered more choice than smaller firms: twenty-seven percent of large firms (those with 1000-4999 workers) and only seventeen percent of firms with over 5,000 workers offered a single plan. Overall, sixty-three percent of covered workers could choose from multiple healthplans.

The most common healthplan offered to workers in 2005 was a PPO plan: 82% of covered workers had access to this type of plan. Figure 2 documents that 28% of covered workers had access to a POS plan, 44% had access to an HMO and only 12% had access to a conventional indemnity plan. Conventional plans have become less widely available over time while the availability of PPO plans has increased dramatically since 1988. The patterns in the dataset we use are similar to those in the survey, although since our dataset is skewed towards

larger firms we find less limited choice. For example a smaller proportion of firms (approximately 50%) offer a single plan. The choice sets offered in the data are discussed further in Section 2.

## 2b. How Do Employees and Employers Choose Among Plans?

Several studies in the health economics and health policy literatures investigate the factors influencing employees' choice of healthplans. A much smaller set of papers examine employer decision-making, with an emphasis on whether healthplan quality affects employer choices. To our knowledge, no study combines empirical analysis of both decisions, preventing any quantitative assessment of the tradeoffs associated with allocating decision rights to one or the other party. In the review that follows, we focus exclusively on studies that pertain to the working population, as our data includes only active employees.

### *Employee Choice of Healthplans*

Most studies in this category focus on the sensitivity of employees to variations in plan price and quality, as measured by HEDIS and/or CAHPS scores. The range of price elasticities estimated in these papers is quite broad. Several studies find elasticities of demand exceeding one, including Cutler and Reber on Harvard employees (1996), Royalty and Solomon on Stanford employees (1999) and, Buchmueller and Feldstein on University of California employees (1997). However, Carlin and Town (2009), looking at University of Minnesota employees and students, find that demand is quite inelastic (a \$100 increase in the annual employee contribution translates to a less than 1% decrease in market share). Chernew, Frick, and McLaughlin (1997), using a sample of single workers in small businesses in seven metropolitan areas, find that, while participation of low-income workers in employer-sponsored plans is higher when net premiums are lower, even large subsidies will not induce all to

participate. Blumberg, Nichols, and Bantlin (2001), using the MEPS data set that contains a nationally representative sample of 6,500 workers offered insurance, find a small price elasticity of take-up (below 0.05) for families, and a very small and insignificant elasticity for single persons. Gruber and Washington (2003), using personnel records for all federal employees from 1991 through 2002, find a small elasticity of employer insurance take-up with respect to its after tax price (a value of approximately 0.02).

On the quality side, the relevant studies include Wedig and Tai-Seale on federal employees (2002), Beaulieu on Harvard employees (2002), and Scanlon et al (2002) and Chernew et al (2008) on General Motors employees. Generally speaking, these studies find modest reactions to quality information. It is possible these aggregate effects mask larger responses by populations with stronger incentives to respond, however, the evidence to date on this matter is mixed.<sup>2</sup>

### *Employer Choice of Healthplans*

Research on how employers make decisions regarding which plans to offer, and how many, is limited by comparison. We focus here on empirical analyses of plan offerings, as opposed to analyses of surveys that ask employers to report what factors affect their decisions (e.g. Rosenthal et al. 2007). The most relevant papers for our purposes include Bundorf (2002) and Chernew et al (2004). They focus on whether employers' decisions reflect the *assumed* needs of their employees. For example, Chernew et al (2004) uses data on the HMO plans offered by 17 large employers in 2000 to see whether the CAHPS scores of these plans affects

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<sup>2</sup> Scanlon et al. find new hires and plan switchers are more responsive to quality measures as well as price. Using the same study population, Chernew et al report “no significant evidence of heterogeneity” in the valuation of plan attributes based on observable or unobservable employee characteristics. Evidence from a different population – namely Medicare enrollees – is mixed as well. Using enrollment data surrounding the release of Medicare HMO report cards in 2000 and 2001, Dafny and Dranove (2008) find no differences in responses by demographic characteristics at the county level, but stronger evidence of non-report-card-related learning about quality (“market-based learning”) in counties with greater HMO penetration, more private report card data, and more stable populations.

the propensity any given plan is offered. Chernew et al. explicitly state the assumption underlying their analysis: “If employers disproportionately choose high quality plans, this suggests that employers are responding to employee preferences, although we cannot determine if they are responding optimally.” Beyond this caveat, CAHPS scores for each plan are based on a much wider sample than each employer’s set of employees, hence the measurement error for any particular subpopulation could be nontrivial. In related work, Bundorf (2002) finds employers’ offerings correlate with employee characteristics. For example, firms whose employees have greater variation in healthcare expenditures are more likely to offer a choice of plans.

Our project builds on this research by exploring the differences between the plans selected by employers and those that employees would have selected on their own.

### **3. Data**

We use a proprietary panel database on healthplans offered by a sample of large, multi-site employers from 1998-2006. The dataset was provided by a major benefits consulting firm which assists employers with designing or purchasing benefits from health insurers<sup>3</sup>. The unit of observation is the plan-year. A plan is defined as a unique combination of an employer, geographic market, insurance carrier and plan “type” (HMO, POS, PPO and indemnity), e.g. Company X’s Chicago-area Aetna HMO. The full dataset contains information from 813 employers and 139 geographic markets in the United States. The number of enrollees covered in the data averages 4.7 million per year. Given an average family size above 2, this implies roughly 10 million Americans are represented in the sample in a typical year. After excluding

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<sup>3</sup> Using a survey of 21,545 private employers, Marquis and Long (2000) find that external consultants were employed by nearly half of the smallest firms (<25 workers) and nearly two-thirds of the largest firms (>500 workers). This suggests that the results of our study will be generalizable beyond our specific sample.

observations with missing or problematic data<sup>4</sup>, the sample contains 755 employers, 139 markets and 354 carriers. There are 37,359 employer-market pairs and 111,733 employer-market-year combinations. Descriptive statistics are set out in Table 1A, Column 1.

*Premium* is the average annual charge per person-equivalent covered by a plan. It combines employer and employee contributions. The definition of premium depends on whether a plan is self-insured or fully insured. Many large employers choose to self-insure, outsourcing benefits management and claims administration but paying realized costs of care. Such employers can spread risk across large pools of enrollees, and often purchase stop-loss insurance to limit their exposure. Per ERISA (the Employee Retirement Act of 1974), these plans are also exempt from state regulations and state insurance premium taxes, enabling firms to reduce their insurance costs and/or standardize plan benefits across multiple sites. Reported self-insured plan “premiums” are actually estimates of employers’ projected healthcare expenditures, including any administrative fees and stop-loss premiums.

*Demographic factor* is a measure that converts the family size, age, and gender of enrollees in a given plan into “person equivalents.” It is reported at the unit of observation (an employer-market-year-carrier-plan type combination). *Plan design* captures the generosity of benefits for a particular plan-year, including the level of copayments required of enrollees. Both factors are calculated by the source, and the formulae were not disclosed to us.

The employers span a wide range of industries. This is an unbalanced panel: on average, 240 employers appear in the sample each year. Table 1B shows that 37% of employer-market

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<sup>4</sup> We exclude 1582 observations where the employer exists for only one year in the dataset, 4 observations where an employer-market-year had two identical market-carrier-plan-year observations that differ only on the self-insured variable (one of the two plans was dropped), 347 observations with missing industry code and 9230 observations where the employee contribution is non-positive.

pairs appear in only one of the nine years spanned by our dataset. 20% appear twice, 12% appear three times and the remainder appears more frequently.

We face one complicating issue: we do not observe the total number of employees offered insurance in a given employer-market-year, a figure that is required to calculate the market share of the “outside option.” Employees choosing this option do not enroll in any plan offered by their employer; they (and their dependents) may be uninsured or may have insurance through other family members or public insurance programs. We estimate this share by dividing employer-wide enrollment by total employment as reported in another data source, the Compustat financial database. To match the Compustat data to the main dataset we use firm name, industry, locations, and total number of covered employees. Details of the methodology are given in Dafny (2008). Compustat is limited to large, publicly-traded firms, reducing our sample size. In addition, employment figures from the Compustat dataset are noisy. For example, they may or may not represent totals for all of North American, as opposed to solely the United States. The implied mean takeup rate across employer-years (assuming all employees are offered insurance), reported in Table 1A, is 45.5%. This is much lower than the 80% takeup rate reported by the HRET Employer Health Benefits Survey for firms offering health benefits in 2005 and indicates that the measurement error in the Compustat data may be sizeable.

We therefore conduct our demand analyses and simulations twice, once ignoring the outside option and a second version including it. In the latter analyses we include only firms covered by the Compustat data; that is, we drop small, public sector, nonprofit and privately held employers. We refer to this sub-sample of the data as our *Restricted Sample*. Summary statistics for the restricted sample are given in Column 2 of Table 1A, and are very similar to those reported for the full sample.

Before moving to the empirical analysis, we present statistics on the state and evolution of choice within our sample and study period (Figure 3). As expected, choice is more common among employers in our sample than among the universe of employers, however nearly half of the employer-market-years offer access to only one plan. Over 75% offer at most two plans. Fifty percent of those offering two plans offer an HMO and a PPO; 14% offer a POS plan and a PPO. The figure also shows that the amount of choice offered has fallen over time and (consistent with the survey evidence) that PPO plans have increased in popularity while indemnity plans, in particular, have become less popular.

#### **4. Empirical strategy**

We conduct our analysis in three steps. First we use our data on consumer choices of health plans conditional on the options offered by their employers to estimate a utility equation describing employee preferences for plan characteristics. Second, we estimate a hedonic equation that describes the relationship between the premiums we observe in the data and plan, employer and market characteristics. This enables us to predict the premiums that would be charged under our counterfactual where all employers offer access to all plans that are available in the data in that market-year (or, equivalently for our purposes, employers grant employees a voucher for the purchase of health insurance). The last step is to use the results of both analyses to predict employee choices and expected utility under our counterfactual scenario in which all plans are made available on the same terms (i.e. group rates and full tax-deductibility).

Although we are interested in the effect of expanding consumers' choice sets to encompass all possible options, the structure of our utility equation (which includes a logit error term with unbounded support) implies that adding all available plans to the choice set would over-estimate

the welfare gains of choice. We therefore investigate two counterfactual scenarios. First, we assume that the plan that generates the lowest utility for a particular employer-market-year triple is switched with the plan offered by other employers in the market-year that is most attractive to this firm’s employees. We call this the “plan swapping” scenario. Second, we make all plans in the market-year available to all employees (the “all plans” scenario). The resulting changes in consumer surplus provide lower and upper bound estimates, respectively, of the increase in premiums that would be required to fully offset the benefits of expanding consumer choice.

#### 4.a. Demand Model

The first step is to estimate a model of consumer demand for healthplans. We use a logit model, including in the consumer’s choice set only the plans that are offered by the relevant employer in the relevant market and year. We denote a “plan” as a unique employer-market-carrier-plan-type-year quintuple: indeed, this is the unit of observation for our data. Consumer  $i$ ’s utility from plan  $emcjt$  in year  $t$  is modeled as:

$$u_{imcjt} = \delta_{emcjt} + \varepsilon_{imcjt} \tag{1}$$

where  $u_{imcjt} = x_{emcjt}v_{emt}\beta + p_{emcjt}v_{emt}\alpha + \xi_{emcjt}$ : a linear combination of observed characteristics of the plan (denoted  $x$ ), premium ( $p$ ), observed characteristics of the employer ( $v$ ), and an unobserved quality variable ( $\xi$ ). The term  $\varepsilon_{imcjt}$  is consumer  $i$ ’s idiosyncratic preference for carrier  $c$  and plan  $j$  in market  $m$  at time  $t$ . Berry (1994) shows this model can be estimated linearly using the following equation, which explicitly lists all covariates:

$$\begin{aligned}
\ln(s_{emcjt}) - \ln(s_{em0t}) = & \alpha + \sum_i \mu_i I(\text{industry} = i) * \text{plan design}_{emcjt} \\
& + \xi_e + \mathbf{v}_m + \boldsymbol{\psi}_c + \boldsymbol{\eta}_j + \boldsymbol{\delta}_t + \boldsymbol{\varsigma}_{em} + \omega_{mc} \\
& + \varphi_{mt} + \chi_{mj} + \sum_i \lambda_i I(\text{industry} = i) * \kappa_{jt} \\
& + \alpha_1 p_{emcjt} + \alpha_2 p_{emcjt} * \text{demographicfactor}_{emcjt} \\
& + \sum_i \alpha_{3i} I(\text{industry} = i) * p_{emcjt} + \sum_i \alpha_{4i} I(\text{industry} = i) * \text{demographicfactor}_{mcejt} * p_{emcjt} \\
& + [\pi \text{self - insured}_{emcjt}] + \xi_{emcjt}
\end{aligned} \tag{2}$$

In equation (2),  $s_{emcjt}$  is the market share of plan  $emcjt$  and  $s_{em0t}$  is the market share of the outside option in the relevant employer-market-year triple.

When we estimate the model using the restricted sample the outside option is choosing not to take up the employer's offer of insurance. In the analyses using the full sample, there is no outside option: instead we define the least generous plan in the employer-market-year triple as a baseline, normalizing its unobserved quality to zero. The market share of the least generous plan replaces  $s_{em0t}$  in equation (2) and other plans' observed characteristics are measured relative to those of this baseline plan<sup>5</sup>. This model implicitly assumes that the take-up rate remains the same when the choice set is expanded.

The covariates include employer fixed effects, market fixed effects, carrier fixed effects, plan type fixed effects, year fixed effects and plan design. We also include several second-order interaction terms. First we include employer-market interactions: these capture the “fixed utility” associated with a given employer-market population. For example they capture the fact that employees of a firm in some markets are particularly well-educated, have a particularly high income or are particularly risk averse and therefore place a high value on health insurance.

Second we include market-carrier fixed effects to capture the “fixed utility” associated with each

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<sup>5</sup> The least generous plan is defined using plan type and premium. Indemnity plans are the most generous, followed by PPOs, POS plans and HMOs in that order. Within a particular plan type, the cheaper of a pair of plans is defined as the less generous plan.

market-carrier combination. For example, Blue Cross of Pennsylvania may be an especially attractive Blue Cross carrier, if it has a very large network of hospitals. This interaction is therefore important to capture unobserved plan quality. We also include market-year and market-plan type interactions. The former pick up market-specific shocks such as a reduction in provider quality due to the failure of a hospital system. The latter capture differences across markets in the utility associated with particular plan types. For example, HMOs are more highly-valued in areas where they have a long history and this may be important for demand. Finally we include plan type-year interactions to capture fixed differences in utility associated with each plan type and year. This should capture broad changes in consumer preferences (such as the decline in popularity of HMOs in the 1990's) and in plan management (such as HMOs' decision to engage in less utilization review) over time<sup>6</sup>. We interact plan design and the plan type-year interactions with dummies for industry categories<sup>7</sup> to incorporate potentially different valuations of these characteristics by employee populations in different industries.

In some specifications, we include an indicator for whether plan  $j$  is self-insured. Nearly all employers in our data (95%) offer at least one self-insured plan to their employees. We account for the differences between self-insured and fully-insured products in two different ways. Our baseline analysis does not distinguish between these two types of insurance in the utility model; we view self-insurance as primarily affecting the way in which employers finance their plans rather than changing the utility provided to enrollees. *Ceteris paribus*, self-insurance

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<sup>6</sup> We choose not to include several other interactions between our fixed effects because of concerns about endogeneity. For example, we exclude employer-year interactions, which would capture the fixed utility associated with the set of plans offered by an employer in a given year, because this depends on choices currently on offer. We also exclude employer-carrier and employer-plan interactions because they would present a problem for the simulations: we will open the choice set to include carriers and plan types not previously used by each employer.

<sup>7</sup> The industry categories are: Chemicals, Consumer Products, Energy, Entertainment & Hospitality, Financial Services, Government & Education, Health Care, Insurance, Manufacturing, Pharmaceuticals, Printing & Publishing, Professional Services, Retail, Technology, Telecommunications, Transportation, Utilities, and Unclassified.

is the cheaper option because the employer is no longer paying a third party to take risk (other than stop-loss insurance) on its behalf. As noted earlier, self-insured plans are also exempt from state mandates and premium taxes. We therefore account for the difference between self-insured and other firms in the hedonic regression used to predict price; details are provided in the next section. As a robustness test, however, we supplement our model by including a self-insurance indicator in the utility equation to allow for the possibility that self-insured products are observably different to consumers on dimensions other than price. The results are qualitatively similar to those in the main analysis, as discussed in more detail below.

Last, all models include the employee's contribution to the annual premium, denoted  $p_{emcjt}$ . Our data includes the average employee contribution across all family sizes, hence we follow the practice of our data source and divide this contribution by demographic factor to obtain the amount "per effective enrollee." These amounts, which we henceforth call "price," are normalized to \$2000 using the CPI. We also include interactions between price and demographic factor to allow consumers with different-sized families to have different elasticities with respect to price.<sup>8</sup> That is, we estimate the utility generated by each insurance option for the average employee in a particular employer-market-year, given his expected family size, as a function of the pre-tax employee contribution per effective enrollee for that plan.<sup>9</sup> Finally we interact both price and the price-demographic factor interaction with industry category dummies. This functional form exploits the richness of the dataset, allowing, for example, Firm X's employees in Industry Y to have less price sensitivity than Firm Z's employees in Industry Y due to their larger hypothetical family size..

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<sup>8</sup> For these interactions, we use demographic factor calculated at the *employer-market-year* level, rather than the original measure which pertains to the *employer-market-plantype-carrier-year*.

<sup>9</sup> This methodology implies an assumption: that consumers do not choose their employers based on the plans they offer.

Our model takes price to be exogenous to unobserved plan quality, conditional on the many covariates included. The rich set of fixed effects and interaction terms we include should be sufficient to address most concerns about endogeneity. For example, unobserved quality of a particular carrier is absorbed in the carrier fixed effects and the market-carrier interactions. Unobserved differences in quality across types of plan are absorbed in the plan type variable, the market-plan type interactions and the market-plan type-industry category interactions. We considered several instruments, including for example the average price of plans offered by the same employer-year in different markets and different plan types, but conditional on all of the fixed effects in our model there is insufficient variation in these potential instruments to pass the first stage analysis.

Before proceeding to the results, we offer remarks on our decision to estimate a simple logit model rather than a nested logit or random coefficients model. The most intuitive nested logit model, in which the first nest is the choice of plan type and the second is the choice of plans within-type, cannot be estimated because as described above choice sets typically contain at most one of each plan type. A random coefficients model would be difficult to estimate given the number of fixed effects included in the utility equation. These fixed effects are extremely important for capturing quality differences, for example among insurance carriers within a given market. We therefore choose to include interactions between eighteen industry indicators and price, the price-demofactor interaction, plan design and the plan type-year interactions rather than estimating random coefficients. These permit the coefficients on the key explanatory variables to differ across observably different groups of consumers.

#### 4.a.ii. Demand Results

The demand estimates are summarized in Table 2. Column 1 displays results for the full data sample with no outside option, Column 2 estimates the same model using the restricted sample where firms have been matched to Compustat data and Column 3 estimates the model with an outside option using the restricted sample. Within each column, the first set of results relates to the model where the self-insured dummy is excluded from the utility equation. It is included in the second set of results. The coefficients for price, the price-demographic factor interaction and plan design differ across industries because all three are interacted with industry category dummies. We display the estimates for the manufacturing industry, the largest in the data.

The coefficient on plan design differs somewhat across models but is always positive and significant. When a dummy for self-insured plans is included in the specification it too is positive and significant implying that consumers prefer self-insured plans. The interaction of price with the demographic factor makes the price coefficients difficult to interpret from the simplest table of results. The mean demographic factor for the manufacturing industry, together with the implied price coefficient for this industry, is provided in the second panel of the table. The price coefficient is negative and significant at  $p=0.05$  for all the models considered.

Table 3 combines the price coefficient with the price-demographic factor interaction and displays the implied elasticities for the seven largest industries in the data. The price coefficients are negative and significant at  $p=0.05$  for all industries and all three models. The elasticities in the first model vary from -0.09 in the financial industry to -0.48 in the retail industry. The ranking of elasticities by industry is intuitive: in general there are higher elasticities for lower-wage industries. There is some variation in estimates across models, particularly between models

with and without the outside option, but the rankings of elasticities do not change. In all cases the elasticities are within the range estimated in the previous literature.

#### 4.b. Hedonic Equation

We use a hedonic regression model to predict the price at which each plan will be made available to the population in a particular employer-market-year in our simulations. Simply using the observed premiums for each plan is undesirable because premiums vary with the composition of the relevant employee population. It is worth noting that we do not expect our estimates to approximate the price that would prevail on an “exchange” for individually-purchased plans; the reduction in group size implied by individual shopping may lead to a substantial price increase, a subject we address in Section 6. Instead we use our predicted prices to estimate the consumer surplus increase from expanding choice, *ceteris paribus* (that is, with continued price-setting at the employer-market-year level). This model implicitly assumes that all buyers are treated similarly. For example if plan A’s HMO carries a ten percent premium relative to plan B’s HMO then all aspiring enrollees will also face a ten percent premium for this plan (they may also face a price increase or reduction due to their categorization by employer and market).

Our model takes the following form:

$$(3) \ln(\text{premium})_{emcjt} = \alpha + \sum_i \mu_i I(\text{industry} = i) * \text{plan design}_{emcjt} + \pi \text{self-insured}_{emcjt} \\ + \xi_e + \mathbf{v}_m + \boldsymbol{\psi}_c + \boldsymbol{\eta}_j + \boldsymbol{\delta}_t + \boldsymbol{\zeta}_{em} + \omega_{mc} + \varphi_{mt} + \chi_{mj} + \kappa_{jt} + \mathcal{E}_{emcjt}$$

We regress log premium per effective enrollee (combined employer and employee premium contributions, divided by the demographic factor) on plan design (interacted with industry dummies), a self-insurance fixed effect, and the same first and second-order fixed effects included in the utility equation.

The self-insurance fixed effect accounts for the fact, noted above, that self-insurance entails lower payments to insurers, *ceteris paribus*, both because employers bear the claims risk and because employers often perform many of the administrative functions that insurers perform for fully-insured plans (e.g. explaining benefit coverage to enrollees). We expect the employer-market interactions and the plan design – industry dummy interactions to be particularly important because they capture unobserved demographic information that is likely to affect health risk and therefore the cost of insurance.<sup>10</sup>

#### 4.b.ii. Hedonics Results

The results of the hedonic regression using the full data sample are summarized in Table 4. We estimate a separate regression for the restricted sample; the results are similar to those reported here. As a measure of the fit of our model, Panel A describes the distribution of the ratios of the regression residuals to the actual premiums. The fit is good: the fifth percentile of this distribution is -0.34 and the 95<sup>th</sup> percentile is 0.21. That is, the smallest residuals are roughly a third of the premiums and the largest residuals are roughly a fifth of the premiums. The adjusted R-squared of the regressions are 0.792 for the full sample and 0.745 for the restricted sample.

The discussion thus far pertains to goodness of fit within sample. However, we are interested in predicting premiums out of sample. Panels B and C illustrate how the model performs with respect to this objective. Column 1 of Panel B gives the distribution of predicted premiums for all (hypothetical and observed) employer-plan combinations. By construction, the

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<sup>10</sup> Note that, compared to the utility model, the hedonic model excludes interactions between industry dummies and the plan type\* year interactions; this omission is intended to reduce “overfitting” of the data, which could result in misleading predictions of premiums.

number of observations is very large: the average market has 28 carrier-plan type combinations, so with 111,733 employer-market-year triples the total number of observations exceeds 3 million.

The distribution of predicted premiums in column 1 compares very favorably to the distribution of observed premiums, reported in column (3). For example, the mean predicted premium is \$2320, compared to an observed mean premium of \$2338. However, to ensure that our simulations are not overly sensitive to outliers, we take the extra precaution of censoring predicted premiums at the 5 percent tails before performing our simulations. The distribution of censored premiums is given in column 2.

Our final analysis of the performance of the hedonic model is given in Panel C, which presents the distribution of a statistic we term the “span ratio.” The span ratio equals the difference between the largest and smallest predicted (or actual) premiums, divided by the mean predicted (or actual) premium, for a given set of observations. Columns 1 and 2 define this set as the employer-market-year, providing a snapshot of the range of premiums from which an employee *could* choose if all plans were made available (column 1) or *can* choose given their current set of options (column 2, which includes only employer-market-years with more than one option). The median figure is 35 percent, implying that in a market with full choice, employees would have a wide range of price points from which to choose. This compares with a median of 19 percent in the observed data, which clearly overstates the available choice of price points as only 55 percent of employer-market-years offer any choice at all. We also note that “span” is defined for combined employer and employee premiums; the span of employee contributions may certainly differ.

Columns 3 and 4 on Panel C also report span ratios for predicted and observed premiums, respectively, but here the set of underlying observations is grouped by market-carrier-plan type-year. Thus, these columns illustrate the variation in premiums for, say, the Aetna POS plan in Chicago in 2003, due to employer-specific characteristics (apart from family size, age, and gender, which are already accounted for as premiums are divided by *demographic factor*). The median span ratio for this underlying group of predicted premiums is 48 percent. The sizeable spans are not surprising: the composition of employee populations are very different, and premiums are experience-rated for large groups. The median span ratio of the predicted premiums is somewhat larger than that of premiums observed in the data. That the difference is small (48 percent compared to 40 percent) reflects the accuracy of the predicted premiums. We expect the span ratio to be larger for predicted than observed premiums even within the same market-carrier-plan type and year, as we have expanded the range of employee groups for which each product is available.

In the interest of space we do not report the coefficient estimates from the hedonic model, but we note here that the sign of the coefficient estimate on the self-insured dummy is negative, contrary to expectations. Though statistically-significant, the coefficient estimate of 0.006 is economically small: a self-insured plan typically costs 0.6% more than a fully-insured plan, *ceteris paribus*. Together with the estimates from the demand model, in which self-insured plans were found to be more attractive to consumers all else equal, this implies any cost savings associated with self-insurance are being passed on to employees in the form of higher quality.

#### 4.c. Simulations

The next step is to use the estimated coefficients to predict employee choices and the resulting consumer surplus if employees are permitted to shop for health plans beyond those

offered by their employers. We assume that the set of plans available in the market is unchanged across the two scenarios so that when additional options are introduced each consumer can access not just the plans that were offered by his or her employer but also all other plans offered by other employers in the market-year in our data. As noted earlier, because our utility equation includes a logit error term which has unbounded support, adding all of these options to each consumer's choice set would probably over-estimate the value to consumers of increased choice. Thus, our preferred counterfactual "swaps" the least-preferred plan in an employee's observed choice set with the most-preferred plan in the relevant market and year (defined as the plan that is estimated to generate the most utility, on average, for employees within a given employer-market-year). This scenario allows employees to select a plan that better matches their preferences without adding extra draws of the idiosyncratic shock. We consider the value of increasing the size as well as the quality of the choice set by repeating the simulations adding all the options to every employee's choice set; these results should be interpreted as an upper bound on the consumer surplus change. The results of both simulations are set out below.

The measure of consumer surplus used in this analysis follows that discussed by Nevo (2001) and based on McFadden (1981). Consumer  $i$ 's expected gain from a change in the set of healthplans available to him is:

$$\Delta_i = u_i^t - u_i^{t-1} \quad (4)$$

where  $u_i^t$  and  $u_i^{t-1}$  are define by:

$$u_i^t = E_\varepsilon \max_j (\delta_{jt} + \varepsilon_{ijt}). \quad (5)$$

Note that this is the expected welfare gain from the perspective of the econometrician given the available data. A dollar-valued measure can be obtained using the method suggested by Hicks (1939) to create the equivalent variation (EV). The EV is the change in consumer wealth

that would be equivalent to the change in consumer welfare due to the modification in provision of health insurance. McFadden (1981) shows that:

$$EV_{it} = (u_i^t - u_i^{t-1}) / \alpha \quad (6)$$

where  $\alpha$  is the coefficient on premium in the plan utility equation. Integrating analytically over the extreme value distribution of  $\varepsilon$  implies that the equivalent variation of consumers in employer  $e$ , market  $m$  and year  $t$  is given by:

$$EV_{emcjt} = (1 / \alpha_e) [\ln \sum_{j \in J_{emcjt,cft}} \exp(\delta_{emcjt,cft}) - \ln \sum_{j \in J_{emcjt,obs}} \exp(\delta_{emcjt,obs})] \quad (7)$$

where  $J_{emcjt,obs}$  and  $J_{emcjt,cft}$  are the choice sets available to employees of firm  $e$  in the observed and counterfactual scenarios respectively and  $\delta_{emcjt,obs}$  and  $\delta_{emcjt,cft}$  are the values predicted by the demand model.

The inputs to  $\delta_{emcjt,obs}$  and  $\delta_{emcjt,cft}$  are price, plan design, the fixed effects from the demand model and the unobserved quality  $\xi_{jmt}$ . The prices in both the observed and the counterfactual scenarios are the values predicted by the hedonic regression described above. Unobserved quality  $\xi_{jt}$  is defined in both cases as the weighted average estimated value in the relevant market-carrier-plan type-year (MCPY), where the weight is the number of observations in that group. This reduces the noise caused by particularly high or low estimated unobserved quality for particular employers. As a robustness test we repeat our analysis using the median value of  $\xi_{jt}$ . This has very little effect on our estimates.

We define a health insurance plan as an MCPY combination, for example United HealthCare's Chicago-based PPO in 2005. We exclude from the counterfactual plans that are offered by fewer than three employers in the relevant market-year<sup>11</sup>. If in reality we observe

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<sup>11</sup> We assume these plans are provided by third parties who are already represented in the data. During our study period, it is reasonably common for insurance carriers who do not participate in the entire set of geographic markets

more than one option within a particular MCPY (e.g. both firm X and firm Y offer an Aetna HMO in Detroit in 2002), we calculate employee-weighted averages for plan design and unobserved quality ( $\xi$ ) to obtain a single option. There is one exception to these rules. If a particular employer offers a specific product to its employees in the data, in the counterfactual those employees are offered exactly the same product even if it is offered by fewer than three employers and even if there are multiple plans in the MCPY. That is, our counterfactual does not completely remove employers from the process of health plan selection. As in the Wyden-Bennett bill, instead we give employees the power to shop for alternatives beyond those already offered by their firms.

Finally, the simulations must also incorporate employer subsidies to health insurance; in our data the average employer pays 80% of premiums. In the counterfactual analysis we assume the employee receives a voucher to use toward the plan of her choice; as in the current system employees forego this subsidy if they do not take up insurance. Employers remain budget-neutral: for every employer-market-year, total spending on vouchers equals total employer contributions to premiums in the original data.<sup>12</sup> The median percentage subsidy is 77%.

## 5. Simulation Results

Figures 4A and 4B summarize the utility gains from the two counterfactuals. Figure 4A focuses on the effects of replacing the least-preferred with the most-preferred plan. Each boxplot represents a different model; the brown box is bounded by the 25<sup>th</sup> and 75<sup>th</sup> percentiles of the distribution of utility changes and the ends of the vertical lines define the 5<sup>th</sup> and 95<sup>th</sup> percentiles.

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in which a given employer has employees to “rent” the network of a participating carrier in the relevant area in order to provide service in markets where they are not otherwise present. In the counterfactual simulations we allow employer-market-years where these small products are currently offered to keep them; that is, employees never lose MCPY combinations that are currently offered to them.

<sup>12</sup> This requires us to solve for the fixed point of an equation, since the share of the outside good depends on the total cost to each consumer of choosing an inside good but that in turn depends on the employer subsidy, i.e. on the number of consumers choosing to be insured.

Every model generates weakly positive changes in consumer surplus. In the model using the full sample, assuming no outside option and excluding the self-insured dummy from the utility equation, the 25<sup>th</sup> percentile of the distribution is an increase in expected utility of \$615 per person per year and the 75<sup>th</sup> percentile is an increase of \$3996 per person per year. The median is a \$1721 utility improvement.

The second plot of Figure 4A uses the same model as the first but includes the self-insured dummy in the utility equation. As noted above, our goal is to allow for the possibility that self-insured products are observably different to consumers on dimensions other than price. The coefficient on the self-insured dummy in the utility equation was positive and significant: consumers gain some positive value from self-insured plans, perhaps because employers make greater quality-control efforts than they do for other plans. We assume that this utility is no longer available when an employee shops for this plan outside his own employer (that is, we set this variable to zero in the counterfactual when the plan is added to other employer-market-years). Not surprisingly, the consumer surplus gain in this model is smaller than in our baseline model: the median gain falls from \$1718 to \$1480 per person per year.

The four remaining plots in the Figure relate to the models using the restricted sample: two estimated using the main model (which excludes an outside option), and two others that include an outside option. Moving to the restricted sample reduces the consumer gains from the counterfactual. This is at least in part due to measurement error: fewer plans are observed in each market in the restricted sample so fewer options are newly available to consumers. (In addition, the plans that insurers offer to the largest firms, which are disproportionately represented in this sample, may be better tailored to their employees than those made available to employers with weaker negotiating positions.) Within the restricted sample, there is some

difference between the models with and without the outside option: median surplus is lower when opting out is possible (a median surplus gain of \$518 as compared to \$923 per person, per year). However, these differences are not meaningful when compared to the potential changes in premiums (see below for a discussion). This is reassuring since the model with the outside option is theoretically the most appealing but constrained by data problems.

Figure 4B sets out the same six plots, relating to six different models, but refers to the counterfactual where we include all other employers' plans in the employee's choice set. We expect this to be an upper bound on the value of increasing choice as well as improving the match between employees and plans. The consumer surplus increases are larger than those in Figure 4A, as expected, but the differences are not dramatic: for example in the first model the median consumer surplus gain moves from \$1721 per person per year to \$2815 per person per year.

Table 1 of the Appendix also provides the results of both counterfactuals where we use the uncensored predicted prices from the hedonic regression. This has very little effect on the results.

## **6. Discussion**

Our findings reveal that, on average, employers forego substantial amounts of surplus by offering the “wrong” plans from their employees' perspective. This result raises several intriguing questions, including: *why* do they choose poorly, and *on which dimensions* do they make the wrong choices? (In future work we intend to examine the distributional implications of our findings as well.)

### *6a. Letting the Data Speak: How Preferred Plans Differ from Offered Plans*

To ground our discussion, we begin by investigating the source of the utility gains from our counterfactuals. Panel A of Table 5 compares the plan types of the plan removed from the choice set (listed in the first column) to that of the plan added (the first row). For example, 30% of employer-market-year observations would trade a PPO for a POS plan. In fact, employees in general appear to prefer POS plans more than employers, as a total of 63% of the plans swapped in are POS plans, as compared to 17% of plans in the estimation sample.

Panels B through D are constructed in the same way as Panel A, except they capture the dimensions of price, plan design, carrier identity, and quality due to unobservable characteristics, respectively. (This quality level is denoted by  $\xi$  above, and is derived from the popularity of a plan, after controlling for the influence of carrier identity, plan type, its interaction, plan design, etc.) From Panel B we see that the vast majority of plan swaps appear along the diagonal; that is, low-priced plans are optimally replaced with low-priced plans, medium with medium, and so forth. Note for this table we use the combined employer + employee premium (per effective enrollee). These findings suggest employers are *not* overweighting premiums in their decisions, as some studies of employer decisionmaking imply (e.g. Gabel et al. 1998, and Maxwell, Temin and Watts 2001, whose survey of Fortune 500 firms conducted in 2000 leads them to conclude that, relative to efforts made to negotiate favorable prices, “[c]ommittment to quality in carrier selection and management remains a less well developed component of companies’ purchasing).

Panel C reveals that employees’ preferred plans have more generous *plan designs* than are currently on offer, and Panel E that these plans are also more attractive for unobservable reasons. We do not observe strong patterns in terms of carrier identity, apart from the fact that free choice would slightly increase the market shares of the largest carriers, i.e. 60 percent of the

plans dropped are offered by a top 3 carrier, and 64 percent of those preferred in their stead are offered by one of the triumvirate (Blue Cross/Blue Shield, CIGNA, and United HealthCare).

Collectively, the results imply that employees would like more value for their (tax-free) dollars. Given free choice, they would select a plan with the same total price tag, but lower co-pays (one of the principal determinants of *plan design*), and higher quality. We underscore these plans *are* available in the relevant markets; they are simply not included in employees' choice sets.

Perhaps the most pronounced finding is the strong preference for POS plans, which are far more popular among employees than the offer rate of such plans would suggest. A closer examination of the POS results, together with some market research, helps to explain why. Traditional POS plans are a hybrid of the HMO and PPO models; a primary care physician serves as a “gatekeeper” who determines what referrals and treatments are needed (as in an HMO), but if the enrollee goes out of network for these approved services a reasonable share of the charges are covered (as in a PPO). Industry observers note that in recent years, the line between POS and PPO plans has blurred (Cross 2005). Our source singled out the “Aetna Open Access” Managed Choice Plans as such an example. These plans offer care through a traditional HMO, with an option for PPO-style coverage *without* a gatekeeper. Indeed, upon examining the identity of the carriers offering the POS plans employees would like to see in their choice sets, we find these are disproportionately offered by Aetna (25 percent of POS plans swapped in) and Blue Cross/Blue Shield (24 percent). Blue Cross /Blue Shield plans typically have the largest PPO provider networks, thereby increasing the value of the PPO component of such a plan. These facts help to explain why “POS” plans are particularly attractive to enrollees.

The tables are silent with regard to *why* employers' revealed preferences are not perfectly aligned with those of their employees. There are several candidate explanations, including: inertia of decisionmakers (which may be optimal if the aggregate benefit to employees of a switch is less than the opportunity cost of the time decisionmakers would need to invest in making such a switch); a lack of information about employee preferences; misalignment of decisionmakers' preferences and those of the average employee, which includes the possibility that certain carriers offer attractive services to benefits administrators – and these services are not valued directly by employees; inability to negotiate “market rates” on plans as assumed in our simulations. Assessing the relative importance of these explanations is beyond the scope of this paper, but it is an interesting subject for future research. We now turn to the question of whether the value of choice is likely to exceed its cost.

*6b. Will Anticipated Premium Increases Offset Anticipated Benefits of Choice?*

Our estimates of consumer surplus are calculated under the (unrealistic) assumption that individuals would enjoy group pricing when choice is expanded. However, for reasons we detail below, premiums are likely to rise if employer involvement in plan sponsorship is limited to a subsidy. We begin by presenting data on the amount by which premiums would have to increase to fully offset the gains from choice. We express this figure as a percentage of original premium for a given employer-market year, and present boxplots of the distribution for each of the 6 models in Figure 5.

Unsurprisingly, the distribution shifts downward quite a bit when shifting from the full to the restricted sample, however the absolute values remain quite large: the median is 71 percent for model 1 and 33 percent for model 6. Of course, to interpret these results we require projections regarding the likely premium increase when the choice set is expanded.

According to the American Society of Actuaries, there are four key components to administrative costs of healthplans, and most are likely to be higher for individual plans (paper not yet citable). First, plans must engage in marketing functions, which include product design, marketing materials, and broker commissions. Second, they incur administrative costs associated with medical care, including provider network management/contract negotiation and claim review. Third, they have various administrative responsibilities associated with enrollment, billing, customer service, and fraud; and fourth, there are corporate administrative duties such as accounting, regulatory compliance, and risk management. It is clear the first and third elements will be more costly when serving the individual as compared to the large group market, in part because of economies of scale but in part because large groups often perform many of these functions themselves. With regard to risk management (component 4), this is not only more costly due to the increase in adverse selection that characterizes the individual market, but also because insurers are required to maintain reserves that self-insured employers are not; this capital cost is non-trivial and drives up the price of fully-insured products.

While there are few sources that compare the total administrative costs for large group vs. individual/small group plans, several sources offer estimates of total administrative costs. These include the CBO, which reports that 11 percent of premiums are spent on administrative costs, the Sherlock Company (a health plan finance firm) that reports the median BCBS plan spends 10.4 percent of premiums on administration, and the Lewin Group (a health policy and management consulting firm), which puts the figure at 13.4 percent.

Given these average estimates, it seems unlikely that the difference in large and small group/individual premiums would exceed 32 percent of premiums (the lowest median figure we find). The Lewin Group estimates that administrative costs for an “exchange” with only private

plans would be 10.7 percent if all workers were eligible to participate (as opposed to only small groups and individuals, as some reform proposals specify). However, the figures underlying these estimates are not reported.<sup>13</sup> Recently, BCBS plans in Rhode Island and Florida reported administrative costs of 14 to 18 percent for small group and individual plans. Perhaps the highest estimate of administrative costs for individual policies (Matthews 2006) is 30 percent, and this study still finds costs of 12.5 percent in the large group market, yielding a “load difference” of 17.5 percent, which includes margins that are known to be higher in this market.

Thus, it appears the value of choice is rather likely to exceed its cost, at least for most employees and their dependents. Of course, our analysis overlooks some costs (such as the “shopping cost” to individuals), but omits some benefits as well (such as the reduction in costs to employers who currently do much of the shopping as well as administering of plans).

## **7. Conclusions**

As revealed by the colossal failure of the Clinton Administration's 1994 attempt to reform healthcare, there is little political support for a complete dismantling of employer-sponsored insurance in the U.S. Indeed, there are many arguments in its favor, not least among them the virtue of including healthcare costs as part of total labor costs to facilitate efficient production decisions. However, while many have advocated fiercely in defense of the system, there is little research that quantifies the benefits of independent purchase, with the important exception of the "job lock" literature. This literature, exemplified by Gruber and Madrian (1994), finds

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<sup>13</sup> “The Impact of House Health Reform Legislation on Coverage and Provider Incomes,” The Lewin Group Testimony before the Energy and Commerce Committee, U.S. House of Representatives, June 25, 2009. Downloaded 9/23/2009 from <http://www.lewin.com/content/publications/June25TestimonyUpdate.pdf>.

significant labor market frictions due to the lack of insurance portability between jobs and in or out of the labor force.

Our research makes use of a large panel of employer healthplan offerings and employee plan selections to quantify the surplus foregone as a result of restricted choice in the employer-sponsored system. By examining employees' choices among the set of plans they are offered, we obtain estimates of their preferences that enable us to identify their most preferred plan (and corresponding dollar-valued utility) from the entire set available in their marketplace. We find the median employee would be willing to forego 75 percent of her subsidy for the right to apply the remainder to any plan she chooses, holding premiums constant at group rates.

Our estimates probably represent a lower bound on the value of increased choice both because we do not model consumer heterogeneity within employer-market-year triples and because we observe only a subset of the plans available in each market. In addition, the U.S. experience with the introduction of Medicare Part D plans suggests that more choice may become available under our counterfactual as individual carriers make efforts to attract consumers shopping with vouchers. None of these benefits are modeled in our simulations.

On the flip side, however, some of the plans currently provided by carriers to selected firms might disappear if a voucher scheme were introduced, if carriers find them too expensive to offer more broadly. If high-risk consumers disproportionately choose to opt out of employer-provided insurance, premiums in plans available through an individual exchange might increase dramatically, outweighing the benefits of increased choice. Even if adverse selection is not a major issue, not all choices may be available to all buyers, especially those whose observed characteristics make them unattractive to insurers. One unanswered question is whether the

government would provide a fallback plan for high-risk consumers if reforms that act to weaken ESI are put in place.

In conclusion, our estimates suggest substantial benefits to expanding choice in health insurance. Even if premiums were to rise significantly upon devolution of purchase to individuals, these increases are unlikely to fully offset consumer surplus gains from choice. The fact that choice is valuable to consumers implies that there may be scope for reducing the tax expenditure associated with the deductibility of health insurance premiums while still leaving most employees better off. These conclusions are highly relevant given the current policy focus on increasing coverage for the uninsured without substantially increasing overall health care spending.

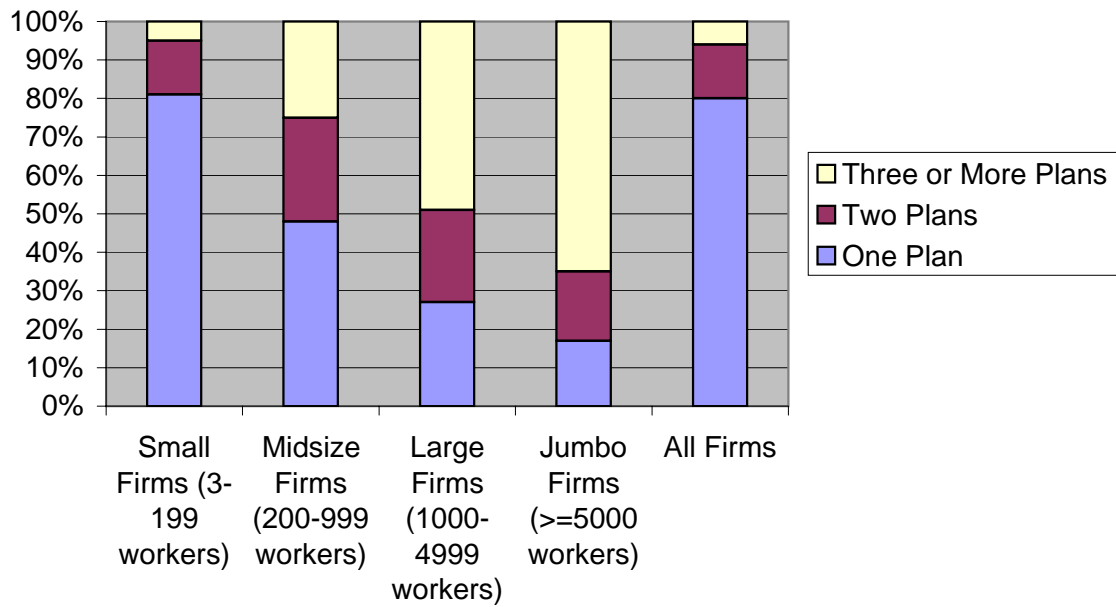
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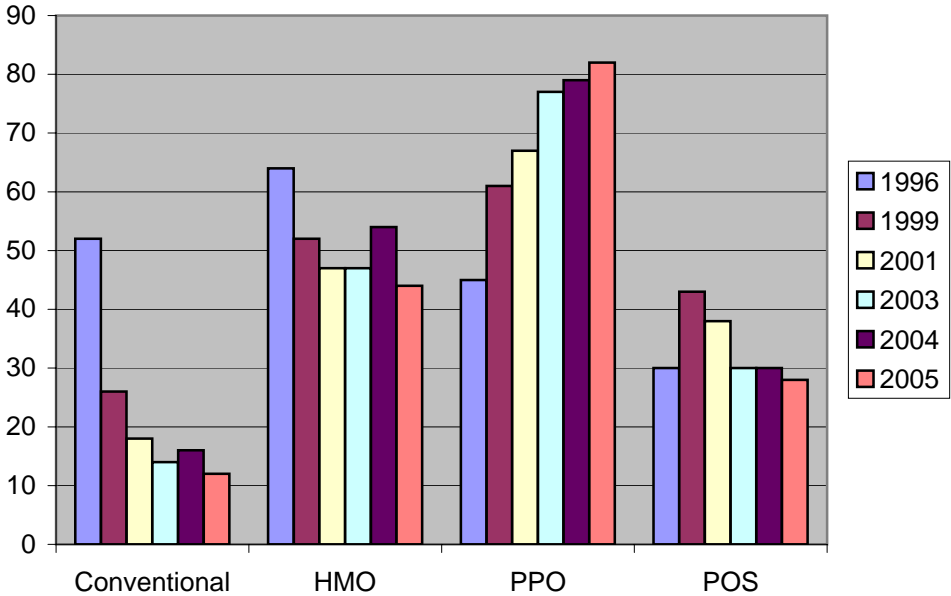
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**Figure 1: Distribution of Firms Providing a Choice of Health Plans, 2005**



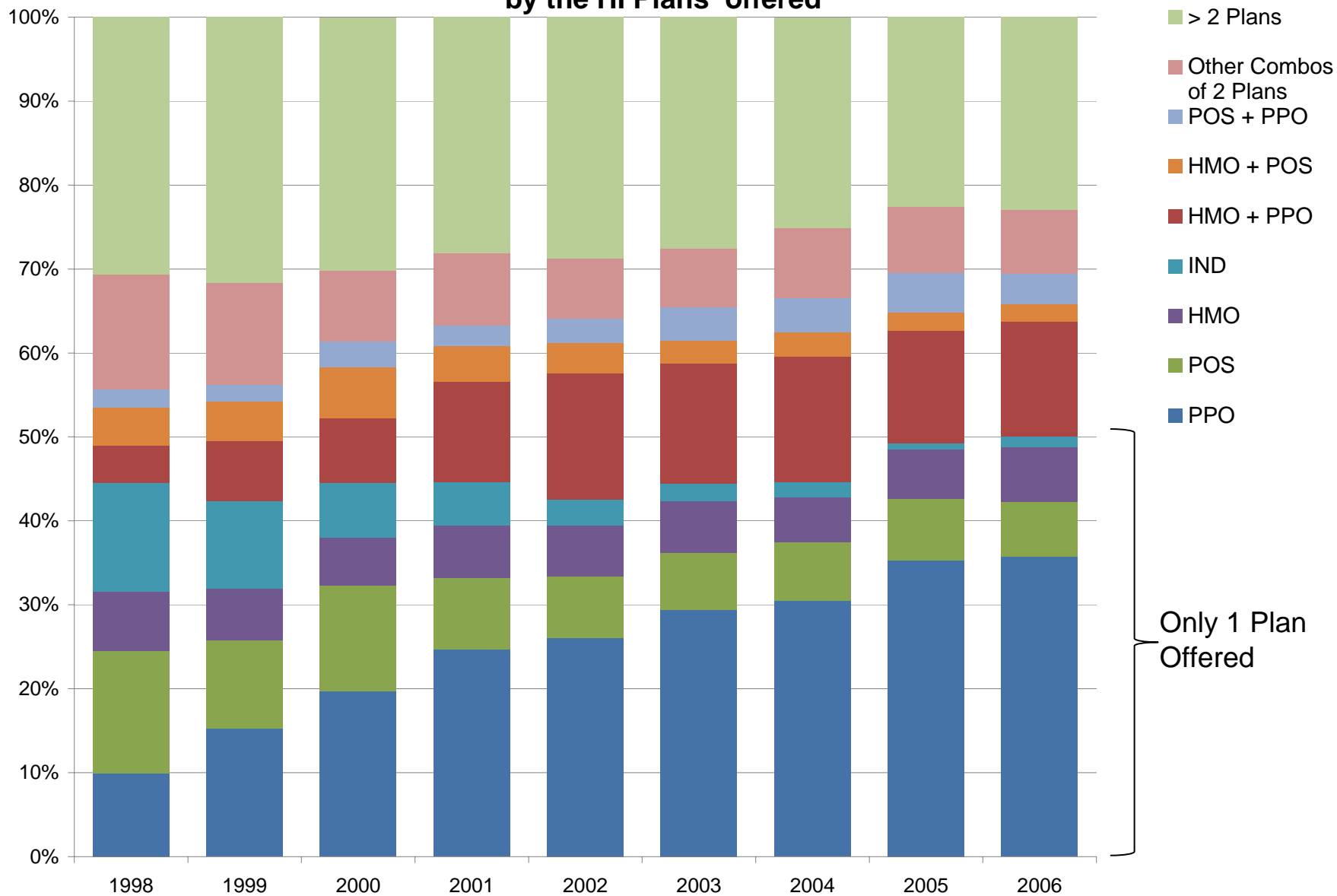
Source: Kaiser/HRET Survey of Employer-Sponsored Health Benefits

**Figure 2: Percentage of Covered Workers with a Choice of Conventional, HMO, PPO or POS Plans, 1996-2005**

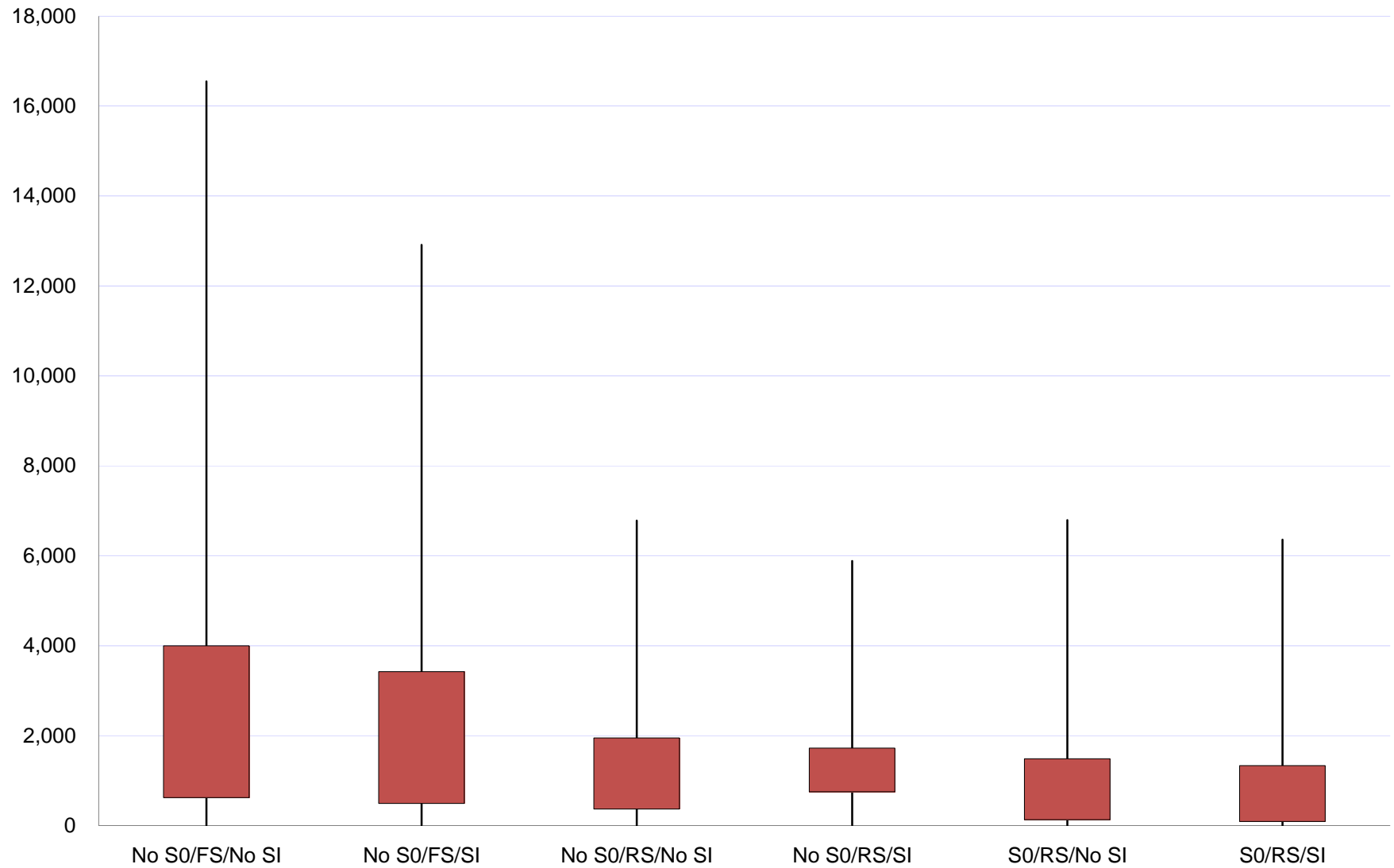


Source: Kaiser/HRET Survey of Employer-Sponsored Health Benefits, 1999-2005; KPMG Survey of Employer-Sponsored Health Benefits, 1996

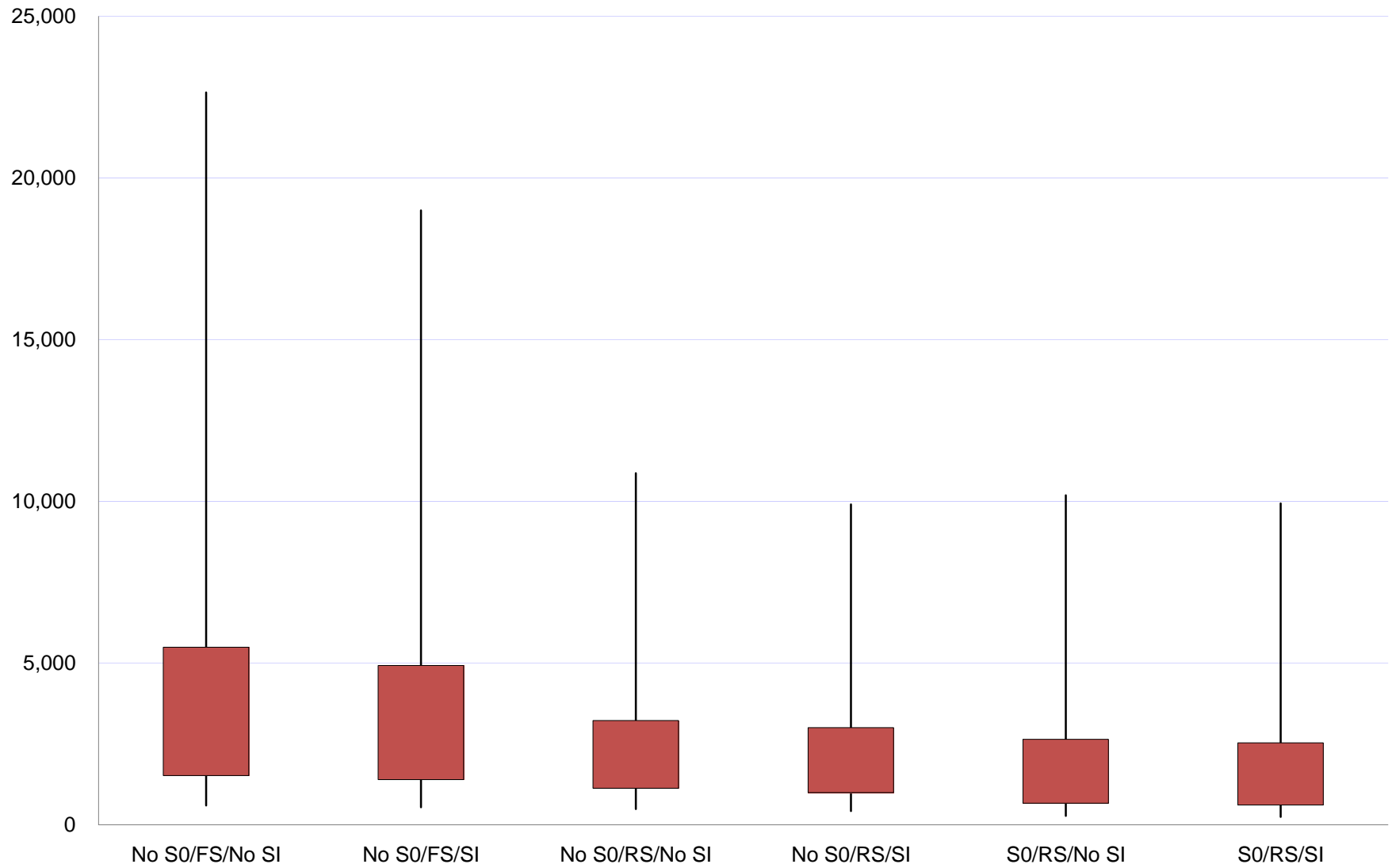
**Figure 3: Distribution of Employer-Markets (the relevant market place) by the HI Plans offered**



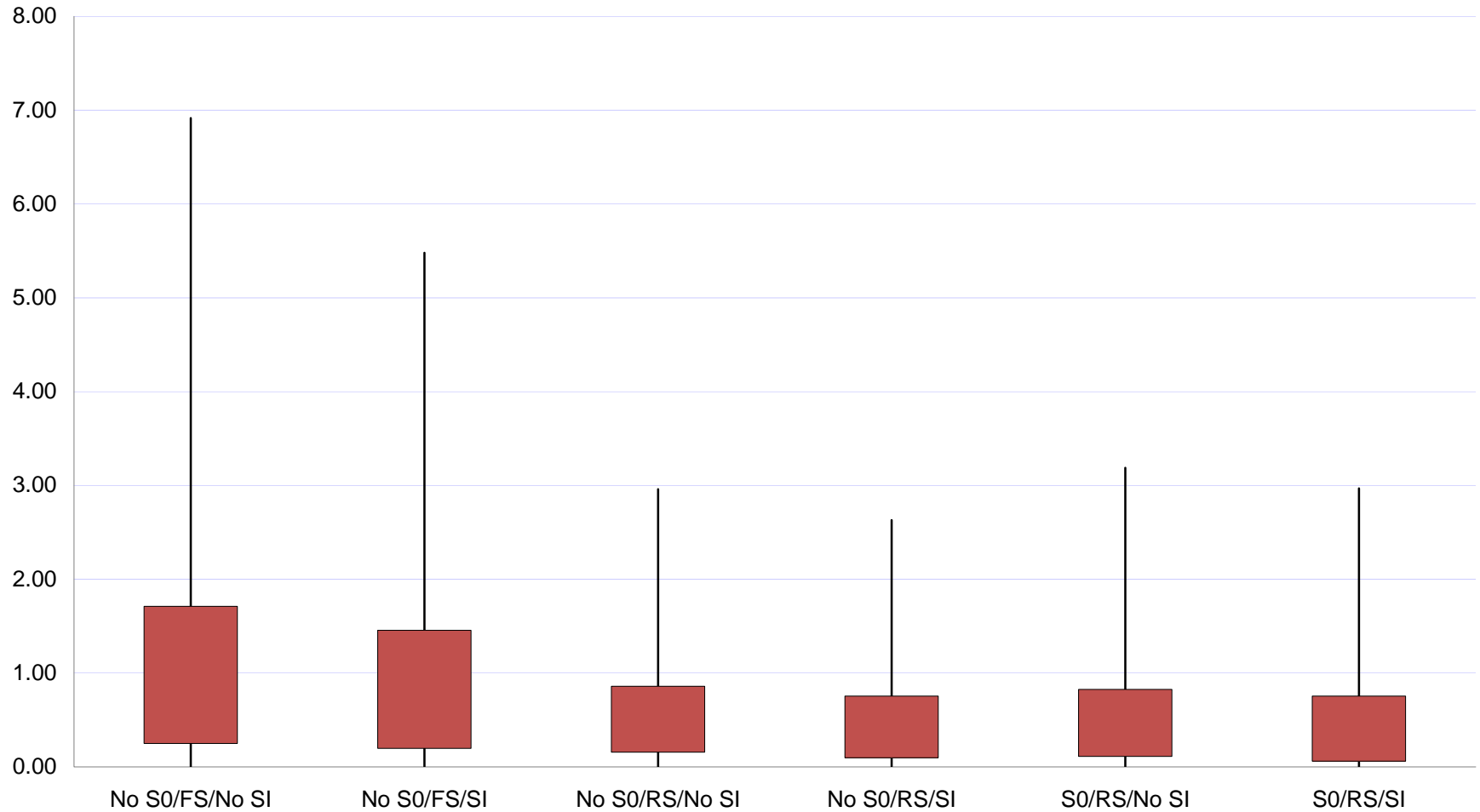
**Figure 4 - Panel A: Utility Gains from Replacing  
Less Preferred with Most Preferred Plan**



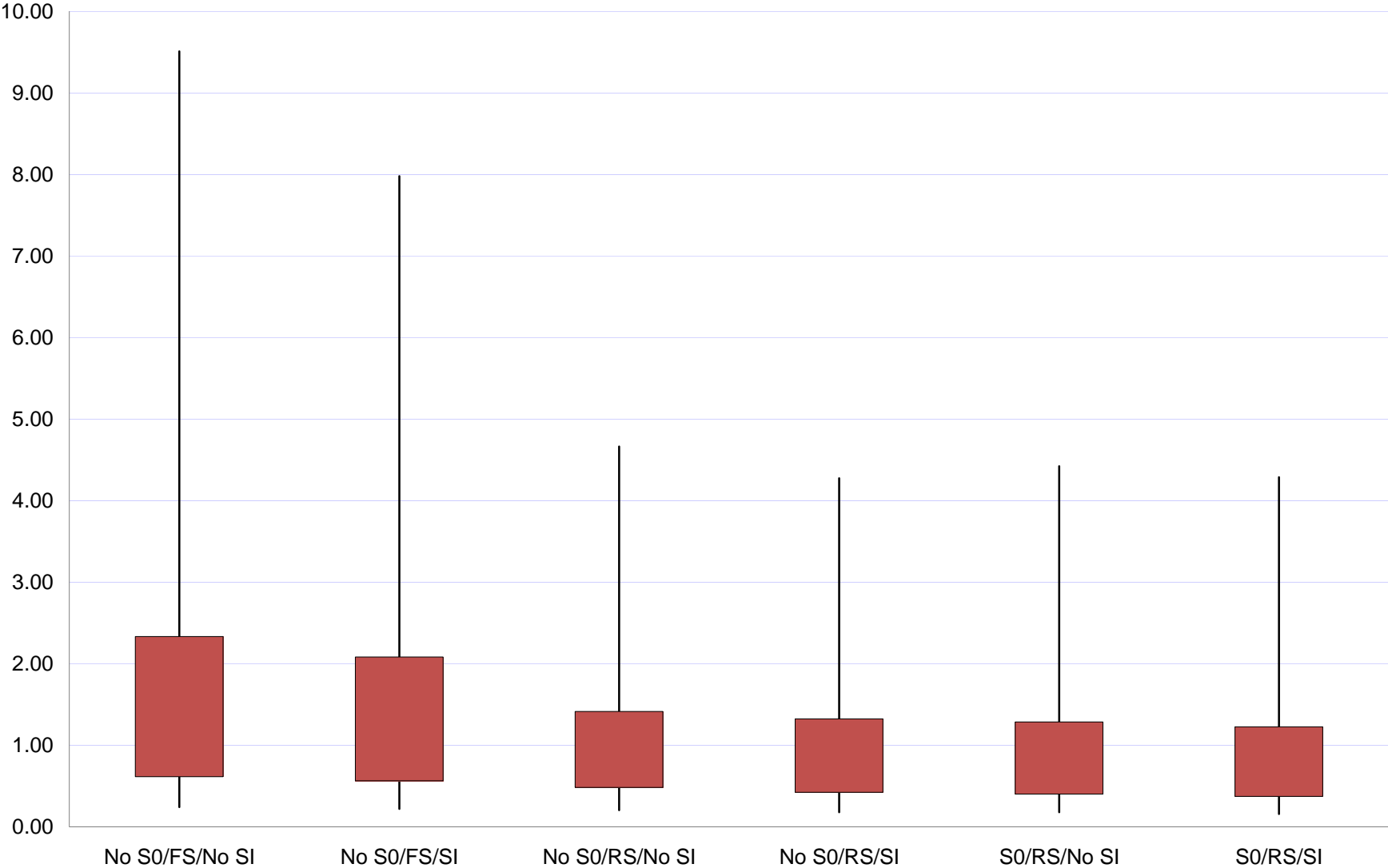
**Figure 4 - Panel B: Utility Gains from Including All Plans in Choice Set**



**Figure 5 - Panel A: Percentage Change In Premiums Needed to Offset Gains When Replacing Less Preferred with Most Preferred Plan**



**Figure 5 - Panel B: Percentage Change In Premiums Needed to Offset Gains When Including All Plans in Choice Set**



**Table 1A. Descriptive Statistics**

	<u>Full Sample</u>	<u>Restricted Sample</u>
Premium (\$)	2437 (698)	2317 (558)
Employee Contribution (%)	0.217 (0.117)	0.215 (0.116)
Enrollment	176 (596)	174 (514)
Demographic Factor	2.233 (0.442)	2.268 (0.420)
Plan Design	1.038 (0.086)	1.044 (0.083)
Self Insured (%)	0.678	0.662
Plan Type (%)		
HMO	38.3	40.1
POS	16.4	15.9
PPO	35.4	34.1
Indemnity	9.9	9.9
Industry (%)		
Manufacturing	13.3	13.6
Retail	12.2	16.1
Financial	11.5	13.1
Technology	9.8	11.2
Consumer Products	7.3	6.0
Insurance	6.5	4.2
Pharmaceuticals	6.3	7.7
Transportation	5.3	3.5
Entertainment & Hospitality	5.1	4.8
Telecommunications	5.1	5.1
Health Care	3.4	3.1
Professional Services	3.4	1.5
Energy Production/Transmission	3.0	2.0
Printing & Publishing	2.8	2.6
Utilities (Gas & Electric)	2.4	2.7
Chemicals	1.6	2.2
Government/Education	0.9	0.0
Unclassified	0.3	0.5
Number of employers	755	439
Number of markets	139	139
Number of carriers	354	316
Number of EMY	111,733	72,025
Number of Observations (EMCPY)	228,342	151,704
Uninsured (%)	NA NA	0.545 (0.236)

Notes: (1) Industry breakdown percentages obtained using the employer-market-year as the unit of observation, as this is the unit of interest for the choice models.

(2) Restricted sample excludes all employer-year observations for which employee data could not be obtained from Compustat or for which takeup rates (enrollees / employees) were outside the unit interval

(3) Percentage uninsured obtained using employer-year as the unit of observation. Compustat does not report number of employees at city level.

**Table 1B. Distribution of Employer-Markets in the Panel**

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	<u>Full Sample</u>	<u>Restricted Sample</u>
Appear in every year	3%	5%
Appear once	37%	37%
Appear twice	20%	20%
Appear thrice	12%	13%
Other	28%	25%
Total # of EM's	37,359	25,103

**Table 2. Demand Estimates**

	<u>Full Sample</u>		<u>Restricted Sample</u>		<u>Restricted Sample</u>	
	<u>Base: Least Generous</u>		<u>Base: Least Generous</u>		<u>Base: Uninsured</u>	
Price (\$ 000's) *	0.852 (0.403)	0.886 (0.401)	0.530 (0.723)	0.319 (0.721)	-0.992 (0.300)	-1.061 (0.300)
Price x DemoFactor *	-0.990 (0.168)	-0.984 (0.167)	-0.868 (0.285)	-0.774 (0.284)	-0.131 (0.118)	-0.096 (0.118)
PlanDesign *	1.509 (0.196)	1.497 (0.195)	1.995 (0.286)	1.980 (0.286)	1.755 (0.212)	1.826 (0.212)
Self Insured	NA	0.302 (0.011)	NA	0.300 (0.014)	NA	0.259 (0.011)
Mean Demofactor for Manufacturing	2.42	2.42	2.51	2.51	2.51	2.51
Implied price coefficient for Manufacturing **	-1.54	-1.49	-1.65	-1.63	-1.32	-1.30
Fixed Effects						
Industry-PlanType-Year	YES	YES	YES	YES	YES	YES
Market-Carrier	YES	YES	YES	YES	YES	YES
Market-PlanType	YES	YES	YES	YES	YES	YES
Market-Year					YES	YES
Employer-Market					YES	YES
N	228,342	228,342	151,708	151,708	151,708	151,708
Adj R-Sq	0.373	0.377	0.378	0.382	0.735	0.736
# of Regressors	5,405	5,406	4,458	4,459	4,887	4,868

\* Price, Price x Demofactor, and PlanDesign are interacted with industry dummies. The estimates shown in table are for the interactions with Manufacturing dummy.

\*\* A Wald test was used to determine if different than 0. All implied price coefficients are statistically different than 0 at 95% level

**Table 3. Average Implied Price Coefficients & Elasticities for Selected Industries**

	<u>Full Sample</u>		<u>Restricted Sample</u>		<u>Restricted Sample</u>	
	<u>Base: Least Generous</u>		<u>Base: Least Generous</u>		<u>Base: Uninsured</u>	
	(I)	With SI (II)	(III)	With SI (IV)	(V)	With SI (VI)
<b>Price Coefficients *</b>						
Manufacturing	-1.54	-1.49	-1.65	-1.63	-1.32	-1.30
Financial	-0.19	-0.21	-0.23	-0.26	-0.36	-0.35
Retail	-1.30	-1.25	-1.35	-1.29	-1.22	-1.19
Technology	-0.76	-0.74	-0.75	-0.74	-0.82	-0.77
Consumer Products	-1.35	-1.31	-1.24	-1.23	-1.10	-1.09
Telecommunications	-1.24	-1.22	-0.80	-0.75	-0.65	-0.61
Pharmaceuticals	-0.73	-0.69	-1.14	-1.10	-0.56	-0.50
<b>Elasticities **</b>						
Manufacturing	-0.27	-0.26	-0.28	-0.27	-0.36	-0.35
Financial	-0.09	-0.10	-0.11	-0.12	-0.17	-0.17
Retail	-0.48	-0.46	-0.51	-0.49	-0.70	-0.68
Technology	-0.17	-0.19	-0.16	-0.16	-0.28	-0.27
Consumer Products	-0.23	-0.22	-0.21	-0.21	-0.32	-0.32
Telecommunications	-0.18	-0.18	-0.10	-0.10	-0.10	-0.10
Pharmaceuticals	-0.10	-0.09	-0.17	-0.17	-0.15	-0.13
# of Employer-Market-Years	111,733	111,733	72,025	72,025	72,025	72,025
# of E-M-Y with positive implied price coefficients	7,229	7,401	6,467	6,269	515	330

\* A Wald test was used to determine if *price coefficients* are different than 0. All coefficients are significantly different than 0 at 95% level.

\*\* Elasticities calculated for each observation (employer-market-year-plan combination) within the industry classification. Average values reported.  
Elasticity = implied price coefficient \* (1 - share) \* price

**Table 4. Hedonic Results**

<b>Panel A: Residual Ratio</b>		<b>Panel B: Predicted Premiums</b>			<b>Panel C: Span Ratio</b>			
					<b>Grouped by E-M-Y</b>		<b>Grouped by M-C-P-Y</b>	
		<i>Uncensored</i>	<i>Censored</i>	<i>Observed Data</i>	<i>Predicted</i>	<i>Actual</i>	<i>Predicted</i>	<i>Actual</i>
1%	-0.962	1,324	1,424	1,251	0.60	0.00	0.25	0.01
5%	-0.340	1,579	1,601	1,514	0.16	0.02	0.35	0.06
25%	-0.085	1,965	1,974	1,932	0.26	0.09	0.43	0.24
50%	0.000	2,320	2,319	2,338	0.35	0.19	0.48	0.40
75%	0.076	2,734	2,721	2,816	0.43	0.31	0.53	0.57
95%	0.211	3,538	3,463	3,722	0.57	0.58	0.64	0.85
99%	0.335	4,227	4,179	4,577	0.68	0.82	0.75	1.10
Smallest	-535	362	786	226	0.00	0.00	0.00	0.00
Largest	1171	12,696	8,288	8,155	1.60	1.69	1.06	2.21
Mean	-0.029	2,400	2,396	2,437	0.352	0.226	0.484	0.417
Std. Dev.	3.260	608	579	698	0.131	0.179	0.092	0.242
# Obs	228,342	3,170,755	3,170,755	228,342	104,475	57,597	34,621	22,466

Notes:

- (1) Hedonic results reported for full sample.
- (2) Rs. Ratio = Residuals / Actual Premiums
- (3) Span Ratio = (Largest - Smallest) / Mean
- (4) Predicted premiums (in Panel B and C) are predicted for the E-M-Y observations that had negative price coefficient under Demand Model I (No S0 / Full Sample / No SI).
- (5) Censored predicted premiums (Panel B2 and Panel C) were censored at the 5% and 95% values within each market-year
- (6) E-M-Ys with only 1 plan offering excluded from Panel C, col. 2. Similarly, M-C-P-Ys whose plan is offered in only 1 E-M-Y are excluded from Panel C, col. 4

**Table 5: Characteristics of Plans Swapped In/Out of Choice Set**

*Panel A: Plan Types*

OUTIN	HMO	POS	PPO	IND	Total
HMO	0.03	0.17	0.04	0.00	<b>0.24</b>
POS	0.03	0.06	0.03	0.00	<b>0.12</b>
PPO	0.11	0.30	0.05	0.01	<b>0.48</b>
IND	0.02	0.10	0.03	0.00	<b>0.16</b>
<b>TOTAL</b>	<b>0.19</b>	<b>0.63</b>	<b>0.16</b>	<b>0.02</b>	

*Panel B: Predicted Premiums*

OUTIN	S	M	L	XL	Total
S	0.16	0.04	0.00	0.00	<b>0.21</b>
M	0.04	0.15	0.05	0.00	<b>0.24</b>
L	0.00	0.05	0.17	0.05	<b>0.26</b>
XL	0.00	0.00	0.04	0.24	<b>0.29</b>
<b>TOTAL</b>	<b>0.21</b>	<b>0.24</b>	<b>0.26</b>	<b>0.30</b>	

*Panel C: Plan Design*

OUTIN	S	M	L	XL	Total
S	0.05	0.10	0.15	0.02	<b>0.33</b>
M	0.03	0.09	0.16	0.03	<b>0.31</b>
L	0.02	0.06	0.10	0.02	<b>0.20</b>
XL	0.01	0.04	0.09	0.01	<b>0.15</b>
<b>TOTAL</b>	<b>0.12</b>	<b>0.29</b>	<b>0.50</b>	<b>0.08</b>	

*Panel D: Carriers*

OUTIN	BCBS	United	Aetna	other	Total
BCBS	0.05	0.05	0.04	0.08	<b>0.22</b>
United	0.05	0.03	0.04	0.07	<b>0.19</b>
Aetna	0.05	0.04	0.03	0.07	<b>0.19</b>
other	0.10	0.08	0.07	0.14	<b>0.40</b>
<b>TOTAL</b>	<b>0.26</b>	<b>0.21</b>	<b>0.18</b>	<b>0.36</b>	

*Panel E: Unobserved Quality*

OUTIN	S	M	L	XL	Total
S	0.01	0.02	0.04	0.16	<b>0.23</b>
M	0.02	0.04	0.08	0.31	<b>0.44</b>
L	0.00	0.01	0.03	0.16	<b>0.21</b>
XL	0.00	0.01	0.01	0.10	<b>0.12</b>
<b>TOTAL</b>	<b>0.03</b>	<b>0.08</b>	<b>0.16</b>	<b>0.73</b>	

**Notes:**

(1) Statistics only for those Employer-Market-Years that swapped a plan.

(2) 12% of EMYs did not swap a plan since the Least Preferred plan in the current choice set was better than any other plan in the Market-Year

(3) Results based on simulation that uses Demand Model 1: Least Generous plan as base, full sample, and excluding SI

(4) Small is less than the 1st quartile of the observed variable; Medium is between the 1st and 2nd quartile; Large is between the 2nd and 3rd quartile; Xlarge is larger than the 3rd quartile

**Appendix Table 1A. Distribution of Utility Gains from Model with Censored Premiums**

	Including All Plans in Choice Set						Replacing Least-Preferred Plan with Most-Preferred Plan					
	Base: No Outside Option			Base: Uninsured			Base: No Outside Option			Base: Uninsured		
	Full Sample w/o SI	Full Sample with SI	Restr. Sample w/o SI	Restr. Sample with SI	Restr. Sample w/o SI	Restr. Sample with SI	Full Sample w/o SI	Full Sample with SI	Restr. Sample w/o SI	Restr. Sample with SI	Restr. Sample w/o SI	Restr. Sample with SI
1%	207	190	166	132	97	86	0	0	0	0	(0)	0
5%	596	542	486	420	274	247	0	6	0	6	0	1
25%	1,514	1,390	1,121	988	659	607	615	485	363	746	125	85
50%	2,815	2,591	1,863	1,700	1,202	1,142	1,721	1,480	923	225	518	444
75%	5,492	4,924	3,220	3,006	2,640	2,537	3,996	3,421	1,947	1,724	1,484	1,333
95%	22,643	18,996	10,868	9,902	10,184	9,939	16,549	12,912	6,779	5,885	6,792	6,357
99%	109,187	97,825	47,808	41,220	52,897	40,845	80,335	64,704	27,903	23,439	36,267	29,703
Mean	15,762	12,238	7,775	5,451	7,365	5,912	11,067	7,541	4,549	3,039	6,016	3,423
Std. Dev.	823,748	375,338	386,821	104,351	479,964	441,784	710,226	196,452	269,638	59,514	542,863	186,305
Smallest	0	(2,582)	0	(20)	(58)	(47)	0	(2,692)	0	(1,313)	(7)	(1,740)
Largest	2.37E+08	8.37E+07	8.56E+07	1.63E+07	1.24E+08	1.17E+08	2.18E+08	4.23E+07	6.47E+07	9.28E+06	1.38E+08	4.78E+07
Obs	104,475	104,304	65,552	65,750	71,503	71,688	104,475	104,304	65,552	65,750	71,503	71,688

**Appendix Table 1B. Distribution of Utility Gains from Model with NON-Censored Premiums**

	Including All Plans in Choice Set						Replacing Least-Preferred Plan with Most-Preferred Plan					
	Base: No Outside Option			Base: Uninsured			Base: No Outside Option			Base: Uninsured		
	Full Sample w/o SI	Full Sample with SI	Restr. Sample w/o SI	Restr. Sample with SI	Restr. Sample w/o SI	Restr. Sample with SI	Full Sample w/o SI	Full Sample with SI	Restr. Sample w/o SI	Restr. Sample with SI	Restr. Sample w/o SI	Restr. Sample with SI
1%	206	190	167	133	90	84	0	0	0	0	(0)	0
5%	598	541	487	418	272	238	0	6	0	6	0	1
25%	1,512	1,389	1,123	990	651	597	615	484	364	224	117	73
50%	2,811	2,589	1,862	1,697	1,203	1,131	1,718	1,476	924	746	521	426
75%	5,485	4,914	3,215	3,002	2,643	2,567	3,986	3,410	1,943	1,720	1,456	1,285
95%	22,643	18,985	10,858	9,895	10,091	9,924	16,528	12,899	6,768	5,868	6,731	6,232
99%	109,188	97,825	47,808	41,123	54,445	40,571	80,335	64,704	27,903	23,436	35,843	28,103
Mean	15,757	12,233	7,772	5,448	7,803	5,878	11,062	7,537	4,547	3,037	5,091	3,571
Std. Dev.	823,748	375,338	386,820	104,350	611,668	388,289	710,226	196,451	269,637	59,513	357,904	223,991
Smallest	0	(2,582)	0	(271)	(81)	(51)	0	(2,692)	0	(1,313)	(10)	(2,115)
Largest	2.37E+08	8.37E+07	8.56E+07	1.63E+07	1.59E+08	1.02E+08	2.18E+08	4.23E+07	6.47E+07	9.28E+06	8.86E+07	5.75E+07
Obs	104,475	104,304	65,552	65,750	71,503	71,688	104,475	104,304	65,552	65,750	71,503	71,688