Risk Selection and Payment

The Magnitude and Nature of Risk Selection in Employer-Sponsored Health Plans

Sean Nicholson, Kate Bundorf, Rebecca M. Stein, and Daniel Polsky

Objective. To determine whether health maintenance organizations (HMOs) attract enrollees who use relatively few medical resources and whether a simple risk-adjustment system could mitigate or eliminate the inefficiency associated with risk selection.

Data Sources. The first and second rounds of the Community Tracking Study Household Survey (CTSHS), a national panel data set of households in 60 different markets in the United States.

Study Design. We use regression analysis to examine medical expenditures in the first round of the survey between enrollees who switched plan types (i.e., from a non-HMO plan to an HMO plan, or vice versa) between the first and second rounds of the survey versus enrollees who remained in their original plan. The dependent variable is an enrollee's medical resource use, measured in dollars, and the independent variables include gender, age, self-reported health status, and other demographic variables.

Data Collection Methods. We restrict our analysis to the 6,235 non-elderly persons who were surveyed in both rounds of the CTSHS, received health insurance from their employer or the employer of a household member in both years of the survey, and were offered a choice of an HMO and a non-HMO plan in both years.

Principal Findings. We find that people who switched from a non-HMO to an HMO plan used 11 percent fewer medical services in the period prior to switching than people who remained in a non-HMO plan, and that this relatively low use persisted once they enrolled in an HMO. Furthermore, people who switched from an HMO to a non-HMO plan used 18 percent more medical services in the period prior to switching than those who remained in an HMO plan.

Conclusions. HMOs are experiencing favorable risk selection and would most likely continue to do so even if employers adjusted health plan payments based on enrollees' gender and age because the selection is based on enrollee characteristics that are difficult to observe, such as preferences for medical care and health status.

Key Words. Risk selection, adverse selection, risk adjustment

Managed care health plans currently cover about 90 percent of the people who receive employer-sponsored health insurance. The extent to which managed care plans disproportionately enroll low-risk relative to high-risk

individuals has been a major concern from a policy perspective. Managed care plans may either be inherently more attractive to low- than high-risk enrollees or they may be more likely to design their plans to attract low-risk and repel high-risk enrollees. A number of studies have shown that Medicare HMOs attract a disproportionate share of the healthy elderly population (Eggers 1980; Eggers and Prihoda 1982; Brown et al. 1993; Cox and Hogan 1997; Call et al. 1999). Unlike the Medicare risk selection studies that are national in scope, most studies of risk selection in the employer-sponsored health insurance market examine single employers or employer coalitions, and the available evidence is mixed. Cutler and Zeckhauser (1998) found substantial favorable risk selection among state government employees in Massachusetts for the HMO plan relative to the fee-for-service plan. Altman, Cutler, and Zeckhauser (2003), examining the same dataset, find that almost half of the expenditure difference between indemnity and HMO plans for eight medical conditions is due to a lower incidence rate among HMO patients (favorable risk selection), with the remaining difference due to lower provider reimbursement. In contrast, the RAND Health Insurance Experiment did not find that a Seattle HMO experienced a favorable selection of patients (Manning, Newhouse, and Duan 1987), and Polsky and Nicholson (2004) conclude that HMOs in 60 metropolitan areas were not experiencing favorable selection with respect to non-HMOs in 1996 and 1997.

Risk selection occurs when a certain type of health plan attracts a disproportionate share of enrollees with relatively low (or high) expected medical costs. Risk selection between managed care and nonmanaged care plans may reflect differences between low- and high-risk individuals in their preferences for a style of health care. In this case, risk selection is not necessarily inefficient. However, if premiums are not risk-adjusted to reflect the expected utilization of enrollees, health plans will have incentives to attract and retain relatively low-risk enrollees. In this case, risk selection may be inefficient with too few people in nonmanaged care plans (Cutler and Zeckhauser 1998).

We would like to thank the Robert Wood Johnson Foundation for supporting this research project.

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Eighty percent of the non-elderly who had health insurance in 1999 received it from their employer or from a family member's employer.¹ In the employer-sponsored market, inefficient risk selection may occur because only 1 percent of U.S. employers adjust the premium payment to a health plan based on an employee's risk, or expected medical expenditures (Keenan et al. 2001).² As a result, most health insurance companies receive the same revenue for enrolling a young healthy worker as an old sick worker, although the expected medical costs of the two workers could differ substantially. If health insurers design their plans to attract the relatively profitable, low-risk enrollees, an inefficient allocation of individuals to plans may result. A plan that attracts low-risk enrollees can charge a lower premium than a plan attracting high-risk enrollees. As a result, some people who would enroll in a relatively expensive plan (usually a non-HMO) if premiums were risk-adjusted to reflect their unique expected costs, will enroll instead in a less expensive plan (often an HMO) once the premium difference becomes sufficiently large (Cutler and Zeckhauser 1998).

Even though few firms formally risk-adjust premium payments to health plans, risk selection may not be creating substantial inefficiencies. An estimated 20 percent of the employer-sponsored market is enrolled in self-insured plans where health insurance companies usually receive a fixed payment per employee to administer the plans and do not bear the financial risk of uncertain medical expenditures (McDonnell and Fronstin 1999; InterStudy 2000). Furthermore, about 50 percent of the people insured in the employer-sponsored market were offered a plan or a choice of plans from a single insurance carrier (Keenan et al. 2001). In these two situations health insurers have no incentive to design plans to attract low-risk employees. Some firms may also be implementing implicit (to the analyst) risk adjustment by setting the employer's contribution for plans experiencing adverse selection higher than the employer's contribution for plans experiencing favorable risk selection. Such behavior would encourage employees to enroll in the plan experiencing unfavorable selection.

With the exception of Polsky and Nicholson (2004), all of the studies cited above that examine risk selection of HMOs in the non-elderly, employer-sponsored market are case studies of a single employer or employer coalition in a single market. Since many employers have instituted measures to mitigate incentives for health plans to target low-risk enrollees, the results from the case studies mentioned above may not be representative of national conditions. In this paper we examine whether HMO plans experience favorable risk selection in the employer-sponsored market by applying a "switcher" methodology to the Community Tracking Study Household Survey (CTSHS), a recently released national, panel dataset of enrollees in employer-sponsored

health plans. The switcher methodology compares medical expenditures in the initial year for people who chose to switch from a non-HMO (a fee-for-service indemnity plan or a preferred provider organization) to an HMO plan versus the expenditures in the initial year for the people who remained in the non-HMO plan both years (and likewise for people who initially were enrolled in an HMO). By applying this methodology to a household survey rather than an employer-based survey, we are able to include switches that occur when people change employers. Finally, to provide a practical test of whether a simple risk-adjustment system can equate premiums with the associated costs of an enrollee, we further decompose risk selection into a component based on enrollee characteristics that health plans and employers clearly observe (e.g., gender and age) and a component based on enrollee characteristics that are more difficult to observe (e.g., preferences for medical care or health status). This decomposition will help determine whether risk-adjusting individual enrollee premiums based on easily observed characteristics is likely to minimize or eliminate the inefficiency associated with risk selection.

We find that HMOs are experiencing favorable selection and that this selection would probably persist even if employers adjusted premiums based on an enrollee's gender and age. People who switched from a non-HMO to an HMO plan used 11 percent fewer medical services in the period prior to switching than people who remained in non-HMO plans, and this relatively low use persists once they enroll in an HMO, relative to those already enrolled in an HMO. We also find that people who switched from an HMO to a non-HMO plan used 18 percent more medical services in the period prior to switching than people who remained in the HMO plan. This relatively high use rate does persist once they enroll in the non-HMO, but the differential is not statistically significant. Ten percent of HMO enrollees switched to a non-HMO between the first and second round of the CTSHS survey, and their departure is predicted to reduce an HMO's aggregate medical expenditures by 2.0 percent per year. Favorable risk selection by HMOs would most likely persist even if employers adjusted health plan payments based on enrollees' gender and age, because the selection appears to occur based on enrollee characteristics that are difficult to observe, such as preferences for medical care and health status.

EMPIRICAL METHODOLOGY

We define risk selection as the difference in medical resource use between HMO enrollees and non-HMO enrollees due to differences in enrollees'

characteristics, and therefore their demand for medical services, but not due to differences in the design and management of the two plan types. If we compare resource use for people who have chosen to enroll in an HMO to people who have chosen to enroll in a non-HMO plan, we cannot determine how much of the difference is due to enrollee characteristics and how much is due to differences in how the plans are designed and managed. Instead, we examine people for two years and compare *first period* medical resource use between people who were initially enrolled in a non-HMO and switch to an HMO in the second period to those who remain in a non-HMO plan, and likewise for people initially enrolled in an HMO. By comparing resource use when the two sets of individuals were enrolled in the same type of plan, expenditure differences can be attributed to differences in demand for medical services due to differences in health and preferences for medical care, rather than differences in cost sharing or the extent of the plans' utilization management efforts. Since we examine risk selection only for people who switch from a non-HMO to an HMO or from an HMO to a non-HMO, we estimate a *marginal* risk-selection measure that is relevant for the enrollees switching plan types, rather than an average risk selection measure that would be relevant for all enrollees. Risk selection can create inefficiencies if plans distort their benefits to induce the most profitable enrollees to switch in and the least profitable enrollees to switch out or if the employee premium contribution enrollees face does not reflect differences among potential enrollees in their expected utilization. If selection is occurring at the margin, this indicates that the market may be unstable.

We derive separate estimates of risk selection for those who are initially enrolled in an HMO plan (H) and for those who are initially enrolled in a non-HMO plan (NH). We aggregate medical resource use into a single expenditure measure using unit prices for each type of service (e.g., price per hospital day, price per physician visit). Consider a sample of people who are observed in two time periods and were offered a choice of a non-HMO and an HMO plan by their employer in the second time period. We categorize people into four mutually exclusive groups according to the plan in which they were enrolled in the first and second periods: people who were enrolled in a non-HMO plan in both periods are coded as *NH_NH*, people who were enrolled in an HMO plan in both periods as *H_H*, people who switched from a non-HMO to an HMO plan as *NH_H*, and people who switched from an HMO plan to a non-HMO plan as *H_NH*.

Using ordinary least squares, we regress medical expenditures for person i in the first period, measured in dollars (Y_{i1}), on the four indicator

variables that characterize the type of plan in the first and second periods, and individual and firm characteristics ($\mathbf{X}_i$) that could potentially be observed by an employer and used to risk adjust premiums:

$$Y_{i1} = \beta_1 NH_NH_i + \beta_2 NH_H_i + \beta_3 H_H_i + \beta_4 H_NH_i + \beta_5 \mathbf{X}_i + \varepsilon_i \quad (1)$$

The difference in first-period medical expenditures between those who switch to an HMO in the second period ($NH_H = 1$) and those who remain enrolled in a non-HMO plan ($NH_NH = 1$) is $(\beta_2 - \beta_1)$. If this difference is negative and significantly different from zero, then HMO plans experience favorable risk selection relative to the non-HMO plans. That is, among the population who are not already enrolled in an HMO, HMOs would be attracting people with relatively low medical expenditures. The difference in first period medical expenditures between those who switch to a non-HMO in the second period ($H_NH = 1$) and those who remain enrolled in an HMO plan ($H_H = 1$) is $(\beta_4 - \beta_3)$. If this difference is positive and significantly different from zero, then non-HMO plans experience adverse risk selection relative to the HMO plans (i.e., among the population who are not already enrolled in a non-HMO, non-HMOs would be attracting people with relatively high medical expenditures).

If an employer uses observed characteristics (e.g., age, gender, and health conditions) to estimate an employee's expected medical expenditures and adjusts the premium that a health plan receives, all employees could be equally profitable from a health insurer's perspective, *ex ante*. To explore this, we first estimate Equation (1) with controls for the geographic site (usually a metropolitan area) but without any enrollee characteristics $\mathbf{X}$. We then estimate Equation (1) with an indicator variable for an employee's gender and a set of indicators for their age. If $(\beta_2 - \beta_1)$ and $(\beta_4 - \beta_3)$ are significant without controlling for age and gender but insignificant once these characteristics are included in the regression, this implies that employers can eliminate the incentives for plans to induce risk selection by simply adjusting health plan payments for age and gender. That is, health plans would not have incentives to design their plans to attract people who are expected to be relatively low users of medical services, because the premiums would be adjusted such that the expected profit would not vary across employee types.

We also estimate Equation (1) with a more comprehensive set of possible risk adjusters such as self-reported health, income level, size of firm, marital status, and the presence of children to see if the inefficiency associated with risk selection would persist with a more sophisticated risk-adjustment system. Although this specification includes more information than many employers

have, employers who observe prior medical claims could infer what chronic illnesses each employee has. If risk selection is based on observable enrollee characteristics only, then health insurance premiums could be risk-adjusted to prevent plans from designing their plans to attract the most profitable employees. If risk selection is based on unobserved characteristics, on the other hand, then other policies such as a patient bill of rights law that restrict plan design may be useful.

We then restrict the samples in the above two regressions to people who could choose either an HMO or a non-HMO in the second period because we want to focus on situations where risk selection is most likely to occur. If a firm offers one type of plan to its workers from one health insurer, then it is relatively easy for the insurer to predict aggregate medical costs since it will enroll all employees. However, some people in our sample had a constrained choice of health plan types in the initial period—they were either offered an HMO plan only or a non-HMO plan only—and then had a choice of plan types in the second period. Among those unconstrained in their ability to choose their type of health plan in the initial observation period, much of the sorting of risk between managed care and nonmanaged care may have already taken place in previous years. To examine the influence of this constraint, we create eight rather than four indicator variables in Equation (1) four variables for people without a choice of plan types in the first period (e.g., H_H^{NC} for people who were only offered an HMO in the first period, and chose an HMO in the second period when they had a choice of plan types), and four variables for people who were offered both an HMO and a non-HMO by their employer in the first period (e.g., H_{NH}^C for people who had a choice of plans in the first period and chose an HMO, and chose a non-HMO in the second period when they had a choice of plan types). The “*NC*” superscript refers to no choice and the “*C*” refers to a choice of plan types. We would expect more pronounced risk selection among those who move from a constrained environment (*NC* in the first period) to an unconstrained environment relative to people who had a choice of plan types in both periods.

An alternative method to the switcher methodology for detecting risk selection is to see whether non-HMO enrollees with relatively high medical expenditures in round 1 are more likely to switch to an HMO in round 2, and if HMO enrollees with relatively low medical expenditures in round 1 are more likely to switch to a non-HMO in round 2 (Call et al. 1999). We perform this analysis on the same sample used in the switcher analysis to see if the two methods produce similar conclusions. We separately analyze those enrolled in a non-HMO in round 1 and those enrolled in an HMO in round 1.

Finally, we examine medical expenditures in the second period to see if people who switch plan types have higher or lower expenditures relative to the group of enrollees they join. If, for example, HMOs attract relatively low users of medical care among the people initially enrolled in non-HMO plans but these enrollees have second period expenditures that are similar to those initially enrolled in an HMO, then risk selection may lower the profitability of non-HMOs but it will have little effect on the profitability of HMOs. This would be the case, for example, if the first period expenditure difference is due to a negative or positive health shock that is transitory, and does not persist in the second period. We run regressions similar to Equation (1), where the dependent variable is an enrollee's medical expenditures in the second period, and the key variables are indicators for people who switched plan types between the first and second time periods.

DATA

We use data from the first (1996–1997) and second (1998–1999) rounds of the Community Tracking Study Household Survey (CTSHS). Each survey was administered to more than 60,000 people and was designed to be representative of the civilian noninstitutionalized population in 60 U.S. communities and the country as a whole (Kemper et al. 1996). The CTSHS attempted to resurvey a random subset of the round-1 respondents by calling the respondents' telephone numbers used in round 1. A person who changes his telephone number, perhaps because he moved to another metropolitan area or residence within the same metropolitan area, would not be included in our sample. Of the 34,029 people who were non-elderly and receiving employer-sponsored health insurance in round 1 of the CTSHS, 11,672 were resurveyed and were still receiving employer-sponsored health insurance in round 2. From this group we drop those who were not offered a choice of health plan type by their employer in round 2. Our analysis sample is 6,235 people.

In the appendix we report coefficient estimates of a logit regression that equals 1 if the round-1 respondent who was eligible from our perspective was resurveyed and still eligible in round 2 (see online-only appendix available at <http://www.blackwell-synergy.com>). Many of the coefficients are statistically significant, which indicates systematic nonresponse. People between the ages of 18 and 55, nonmarried individuals, nonwhites, and people with relatively low levels of education and income were less likely to be resurveyed, possibly because they are more transient than the entire population. People

who used medical services relatively intensely in the first round were also less likely to be resurveyed. Our results on risk selection apply, therefore, only to a relatively stable subpopulation; we cannot extrapolate our findings to the general employer-sponsored population. However, it is not obvious, to us at least, whether the systematic nonresponse biases our risk-selection estimates and, if so, whether they are biased toward or against finding favorable selection for HMOs. That is, people who responded in round 1 used a lot of medical services, and did not respond in round 2, may have been either more or less likely than those who responded to both surveys to switch from an HMO to a non-HMO.

The four key variables for this study are the characterization of HMO and non-HMO plans, the definition of a person who has a choice of plan types, the definition of a person who switches plan types, and a person's estimated medical expenditures. The CTSHS respondents were asked to define their plan as being an HMO or not.³ Ideally this question would result in preferred provider organizations (PPOs) being grouped with non-HMO plans, so we would be comparing lightly managed non-HMO plans (indemnity and PPO) versus more strictly managed plans (point-of-service and HMO plans). The organizers of the CTSHS contacted the respondents' health plans in order to determine how much consumers actually know about their health insurance. About 75 percent of the respondents reported accurately whether or not their plan was an HMO, and they were equally accurate whether they were enrolled in an HMO or a non-HMO (Cunningham, Denk, and Sinclair 2001).⁴ Measurement error in the four indicator variables of Equation (1) that record plan switches will attenuate the coefficients on those variables. This will result in an underestimate of the magnitude of selection.

We estimate the risk selection among the subsample offered a choice of plan types in the second round of the survey. We define those with a choice of plan type as all members of a household in which the main health plan policyholder had the opportunity to select either an HMO plan or a non-HMO from his or her employer. We also consider household members to have choice if one member (usually a spouse) was offered an HMO plan only and another member a non-HMO plan only. A "switcher" is defined as an individual who is enrolled in an HMO plan in round 1 and a non-HMO plan in round 2, or in a non-HMO plan in round 1 and an HMO in round 2.

Respondents were asked to report the number of medical services they used (e.g., number of physician visits, number of hospital days). We aggregate the measures of medical use into overall medical expenditures by applying resource weights per unit of medical care (i.e., unit prices) for each of the

reported medical services. Manning et al. (1984); Goldman, Leibowitz, and Buchanan (1998); and Polsky and Nicholson (2004) use a similar method. The resource use weights are estimated from the 1996 Medical Expenditure Panel Survey (MEPS). Sample means and standard deviations are presented in Table 1.

RESULTS

We present our risk selection estimates in Tables 2 and 3. In the first column of Table 2 we regress an individual's medical expenditures in the first round on four indicator variables that describe a person's plan in round 1 and round 2 and a set of 60 indicator variables for a person's market (usually an MSA). We do not include employee characteristics in the first specification in order to measure risk selection in a situation where firms engage in no formal or informal risk adjustment of premiums. Coefficients on the plan indicator variables that appear in bold are statistically different from one another at the 10-percent level, and provide evidence that the expenditures of people who switched plan types differed from those who remained, on average.

People who switched from a non-HMO to an HMO plan and had a choice of plan types in the first round used \$210 fewer medical resources in the first round (\$1,320–\$1,530) than those who remained in a non-HMO plan (column 1 of Table 2). However, this difference is not statistically significant. On the other hand, HMOs did experience favorable selection because the enrollees who switched to non-HMO plans in the second round used more medical resources than those who remained in an HMO. HMO enrollees who switched to a non-HMO in round 2 used \$370 more medical services in round 1 (\$1,957–\$1,587), or 18 percent of the mean medical expenditures of HMO enrollees in round 1.

In the second column of Table 2 we add indicator variables for gender and age to see if the differences in medical utilization between those who do and do not switch plan types are due to enrollee characteristics that an employer could use to adjust premiums so that they are commensurate with medical costs. If those switching from a non-HMO to an HMO have lower expenditures because they are male and relatively young, characteristics associated with lower predicted medical expenditures, then employers could pay plans relatively low premiums when they enroll these types of workers. Although gender and age do affect first-round medical expenditures, as can be seen in column 2 of Table 2, HMOs would have still experienced favorable

Table 1: Sample Means and Standard Deviations ($n = 6,235$)

<i>Round 1 Variables</i>	<i>Mean</i>	<i>Standard Deviation</i>
Medical Resource Use (\$000)		
1st round (1996–1997)	\$1,962	\$4,453
2nd round (1998–1999)	\$1,746	\$4,202
Individual and Firm Characteristics from Round 1:		
Age		
Under 2 years	0.015	0.121
2–17	0.189	0.392
18–39	0.322	0.467
40–55	0.381	0.486
56–64	0.093	0.290
Female	0.529	0.499
Marital status		
Single, with children	0.072	0.258
Single, no children	0.128	0.334
Married, no children	0.217	0.412
Married, with children	0.583	0.493
Race		
White	0.823	0.382
African American	0.082	0.275
Asian	0.036	0.187
Hispanic	0.059	0.235
Education		
Less than high school	0.243	0.428
High school graduate	0.228	0.420
College graduate	0.407	0.491
Masters degree	0.132	0.339
Self-reported health		
Excellent	0.348	0.476
Very Good	0.394	0.489
Good	0.202	0.402
Fair	0.047	0.212
Poor	0.009	0.097
Household income		
Below \$10,000	0.051	0.220
\$10,000–\$49,999	0.375	0.484
\$50,000–\$99,999	0.467	0.499
\$100,000+	0.107	0.309
Employer		
Government	0.290	0.453
Fewer than 10 employees	0.078	0.269
10–1,000 employees	0.226	0.419
1,000+ employees	0.405	0.491

Table 2: Risk Selection Based on Medical Care Use in Round 1

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Coefficient</i>	<i>Std. Error</i>
Non-HMO in round 1						
Non-HMO in round 2 (control)	1,530**	466	1,992**	495	943	695
HMO in round 2 (switcher)	1,320**	482	1,803**	503	860	691
HMO in round 1						
HMO in round 2 (control)	1,587**	472	2,058**	508	961	702
Non-HMO in round 2 (switcher)	1,957**	489	2,435**	525	1249	724
Female			632**	110	593**	104
Age (56–65 is omitted group)						
Under 2 years of age			3,934**	700	4,912**	811
Between 2 and 17			– 1,445**	264	– 557	486
Between 18 and 40			– 766**	274	– 190	298
Between 40 and 55			– 865**	270	– 556**	281
Other potentially observable characteristics included?	NO		NO		YES	
Number of observations	6,235		6,235		6,235	

Notes: Dependent variable is medical care use in round 1, measured in dollars.

** = significantly different from zero at the 5-percent level;

* = significantly different from zero at the 10-percent level. **Bold** coefficients indicate that the expenditure difference in round 1 between the people switching plan types and those remaining in a particular plan type is significantly different from zero at the 10-percent level. All specifications include indicator variables for the site of the survey (usually a metropolitan statistical area). Additional potentially observable enrollee and employer characteristics include: self-reported health, marital status, children, race, education, household income, type of employer (i.e., private or government), and number of employees at the person's firm. The constant is omitted. Sample includes people who had a choice between an HMO and a non-HMO plan in round 2.

selection in a market with a simple premium risk-adjustment system. Medical expenditures for the HMO enrollees who switched to a non-HMO are still significantly higher than those who remained (\$2,435 versus \$2,058), even after controlling for gender and age. This implies that selection occurs based on unobserved preferences for medical care or characteristics that are more difficult for employers to observe.

In the third column of Table 2 we include an extensive set of individual and firm characteristics, such as self-reported health status, marital status, household structure (e.g., married with children), race, education, household income, type of employer (i.e., private or government), and number of employees at the person's firm. If premiums were adjusted based on this more comprehensive set of enrollee characteristics, neither plan type would experience favorable or adverse selection.

Table 3: Risk Selection Based on Medical Care Use in Round 1 for Enrollees with and without a Choice of Plan Types in Round 1

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Coefficient</i>	<i>Std. Error</i>
Non-HMO, no choice in round 1						
Non-HMO in round 2 (control)	1,241**	488	1,793**	252	764	710
HMO in round 2 (switcher)	1,658**	551	2,084**	342	1,072	713
Non-HMO, with choice in round 1						
Non-HMO in round 2 (control)	1,647**	468	2,064**	251	982	696
HMO in round 2 (switcher)	1,121**	478	1,626**	239	695	702
HMO, no choice in round 1						
HMO in round 2 (control)	1,475**	503	1,977**	284	806	724
Non-HMO in round 2 (switcher)	2,475**	598	2,898**	429	1,691**	798
HMO, choice in round 1						
HMO in round 2 (control)	1628**	474	2,078**	215	976	702
Non-HMO in round 2 (switcher)	1752**	501	2,239**	314	1,037	727
Female			633**	110	594**	105
Age (56–65 is omitted group)						
Under 2 years of age			3,899**	694	4,904**	808
Between 2 and 17			– 1,428**	265	– 515	487
Between 18 and 40			– 756**	274	– 185	298
Between 40 and 55			– 852**	271	– 547*	282
Other potentially observable characteristics included?	NO		NO		YES	
Number of observations	6,235		6,235		6,235	

Notes: Dependent variable is medical care use in round 1, measured in dollars.

** = significantly different from zero at the 5-percent level;

* = significantly different from zero at the 10-percent level. **Bold** coefficients indicate that the expenditure difference in round 1 between the people switching plan types and those remaining in a particular plan type is significantly different from zero at the 5-percent level. All specifications include indicator variables for the site of the survey (usually a metropolitan statistical area). Additional potentially observable enrollee and employer characteristics include: self-reported health, marital status, children, race, education, household income, type of employer (i.e., private or government), and number of employees at the person's firm. The constant is omitted. Sample includes people who had a choice between an HMO and a non-HMO plan in round 2.

Does the favorable risk selection for HMOs that we detect have a substantial impact on health insurers' financial performance? In our sample there were 609 people who switched from an HMO to a non-HMO. Based on the second specification from Table 3, these people who switched to a non-HMO used \$377 more medical expenditures in the initial year than those who remained in an HMO, or 18 percent more medical resources than the average HMO enrollee. These 609 people represent 10 percent of HMO enrollment in round 1 of our sample, so the loss of these relatively expensive HMO enrollees would be predicted to decrease aggregate HMO medical expenditures by 2.0

percent. Although the annual impact appears to be small, if this magnitude of risk selection occurred over an extended time period, it could presumably allow HMOs to charge lower premiums than non-HMO plans and attract employees who would prefer to enroll in a non-HMO plan under a perfect risk-adjustment scheme.

In Table 3 we repeat the analysis presented in Table 2 but we now include eight indicator variables to examine risk selection separately for people who did and did not have a choice of plan types in the first round of the survey. We expect selection to be more pronounced for people who were initially constrained—their employer offered either an HMO only or a non-HMO only. We find some evidence supporting this hypothesis. According to column 1 of Table 3, people who switched from a non-HMO plan and had a choice of plan types in the first round used \$526 fewer medical resources in the first round (\$1,121–\$1,647) than those who remained in the non-HMO plan. This difference, which is 28 percent of the non-HMO average expenditure, is statistically significant at the 5-percent level and economically significant as well.

The favorable selection for HMOs that we report in Table 2 appears to be concentrated among people who were offered an HMO only in the first round of the survey. Among people who had no choice of plan types in round 1 and were in an HMO, those who switched to a non-HMO in round 2 used \$1,000 more medical services in round 1 (\$2,475–\$1,475). In the second column of Table 3, when we control for an enrollee's gender and age, the adverse selection experienced by non-HMOs and the favorable selection experienced by HMOs would persist. When we include a more extensive set of risk adjusters in column 3 of Table 3, HMOs would still experience favorable selection among the enrollees who did not have a choice of plan types in the first round.

An alternative risk selection analysis is presented in Table 4. We run probit regressions where the dependent variable is one if a person switches plan types between round 1 and round 2, and is a zero otherwise. In the first two columns we restrict the sample to people enrolled in a non-HMO plan in the first round who also had a choice of plan types in the second round. In the first column we include an indicator variable for individuals who did not use any medical care in the first round, a continuous variable of medical expenditures in the first round, and expenditures squared. None of these coefficients is significant. This is consistent with the results from Table 2, where the non-HMO enrollees switching to HMOs did not have statistically different expenditures than those remaining in a non-HMO.

Table 4: Probit Coefficient Estimates: Likelihood of Switching Plan Types

Variable	Enrolled in a Non-HMO in Round 1		Enrolled in an HMO in Round 1	
No medical use in Round 1	-0.169 (0.0732)	-0.0066 (0.0745)	0.217** (0.0772)	0.205** (0.0784)
Round 1 medical expenditures (\$000)	-0.0191 (0.0120)	-0.0196 (0.0123)	0.025** (0.010)	0.026** (0.011)
Round 1 expenditures squared	3.7×10^{-7} (3.4×10^{-7})	4.0×10^{-7} (3.5×10^{-7})	-4.0×10^{-7} (2.6×10^{-7})	-4.3×10^{-7} (2.7×10^{-7})
Female		0.0333 (0.0502)		-0.0252 (0.0519)
Age (56-65 is omitted group)				
Under 2 years of age		0.463** (0.231)		-0.136 (0.222)
Between 2 and 17		0.375** (0.096)		-0.0615 (0.112)
Between 18 and 40		0.469** (0.089)		0.0190 (0.104)
Between 40 and 55		0.152* (0.087)		0.0100 (0.104)
Constant	-0.537** (0.0324)	-0.834** (0.085)	-0.968** (0.0332)	-0.952** (0.101)
Pseudo R^2	0.001	0.01	0.004	0.004
Number of observations	2,934	2,934	3,301	3,301

Notes: Dependent variable is one if respondent was enrolled in a non-HMO plan in round 1 and an HMO in round 2, or was enrolled in an HMO plan in round 1 and a non-HMO plan in round 2 of the survey. Sample is restricted to people with a choice of both an HMO and a non-HMO plan in round 2.

** = significantly different from zero at the 5-percent level;

* = significantly different from zero at the 10-percent level.

When we include indicator variables for a person's gender and age in column 2, the coefficients on medical expenditures now indicate whether people who used more medical resources than would be *predicted* based on these observable characteristics, were more likely to switch to an HMO. Such would be the case, for example, if non-HMO enrollees with strong preferences for medical care and poor health used a lot of medical care and switched to HMO plans. The insignificant coefficients on the medical expenditure variables in column 1 and column 2 indicate that medical use is not strongly correlated with the likelihood that non-HMO enrollees will switch to an HMO plan. The positive coefficients on the age variables in column 2 demonstrate that relatively young non-HMO enrollees switched to HMO plans in the second period.

In column 3 and column 4 of Table 4 we present results of probit regressions for the sample of people who were enrolled in an HMO in round 1 and had a choice of plan types in round 2. The positive coefficient on the medical expenditures in column 4 indicates that non-HMOs are experiencing unfavorable risk selection, and this selection is based on characteristics other than gender and age. That is, HMO enrollees who used more medical resources than predicted based on their gender and age were more likely to switch to a non-HMO plan in the second round. However, medical expenditures in round 1 have a fairly small impact on the likelihood that an HMO enrollee will switch to a non-HMO plan. A one-standard-deviation increase in medical expenditures (\$4,657) is associated with a 2.5 percentage point increase in the predicted probability that an HMO enrollee will switch to a non-HMO plan (from 0.184 to 0.209).

The two methods of examining risk selection appear to be producing consistent results. People who use medical resources relatively intensively are slightly more likely to switch from an HMO to a non-HMO plan. Since the distribution of medical expenditures is skewed to the right, this small difference in the likelihood of switching among the heaviest users of medical services can produce fairly large aggregate differences in medical costs between HMOs and non-HMOs, especially if the risk selection occurs over multiple years.

Our analysis indicates that people switching from HMOs to non-HMOs tend to have relatively high medical expenditures. However, if this expenditure difference is not persistent, then risk selection may not affect health plan profits and may not cause distortions in plan design. This would be the case if the switchers' deviations from average expenditures are due to transitory health shocks that do not persist in the following years. In Table 5 we present coefficient estimates of the determinants of medical resource use in the second round of the survey. The structure of the regressions is similar to Table 2 and the sample consists, as before, of people who had a choice of plan types in the second round.

People who switched from an HMO in round 1 to a non-HMO in round 2 used \$119 more (\$1,421–\$1,302) medical resources in round 2 than the non-HMO enrollees who remained in a non-HMO. This expenditure difference is not significant in column 1 or in the other columns when we control for enrollees' personal characteristics. Therefore, we cannot reject the hypothesis that the enrollees that non-HMO plans acquire from HMOs have the same expenditures as the experienced non-HMO enrollees once they join the non-HMO plan. One explanation for this is regression to the mean: these people

Table 5: Coefficient Estimates on the Determinants of Medical Care Use in Round 2 of CTSHS Survey

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Coefficient</i>	<i>Std. Error</i>
Enrolled in non-HMO in round 2						
Non-HMO in round 1 (control)	1,302**	240	1,749**	323	795	549
HMO in round 1 (switcher)	1,421**	281	1,917**	405	851	616
Enrolled in HMO in round 2						
HMO in round 1 (control)	1,258**	232	1,751**	318	722	577
Non-HMO in round 1 (switcher)	936**	252	1,431**	332	515	572
Female			552**	103	532**	102
Age (56–65 is omitted group)						
Under 2 years of age			– 228	653	506	790
Between 2 and 17			– 1,201**	264	– 523	510
Between 18 and 40			– 832**	274	– 318	303
Between 40 and 55			– 715**	265	– 412	269
Other potentially observable characteristics included?	NO		NO		YES	
Number of observations	6,235		6,235		6,235	

Notes: Dependent variable is medical care use in round 2, measured in dollars.

** = significantly different from zero at the 5-percent level;

* = significantly different from zero at the 10-percent level. **Bold** coefficients indicate that the expenditure difference in round 2 between the people switching plan types and those remaining in a particular plan type is significantly different from zero at the 5-percent level. All specifications include indicator variables for the site of the survey (usually a metropolitan statistical area). Additional potentially observable enrollee characteristics include: self-reported health, marital status, children, race, education, and household income. The constant is omitted. Sample includes people who had a choice between an HMO and a non-HMO plan in round 2.

had an acute illness in the initial period, used a relatively large amount of medical resources in the HMO, became disenchanted with the HMO and switched to a non-HMO in the second period, and used an average amount of medical resources in the non-HMO when their health returned to its normal state. Another explanation is that the resource utilization, independent of plan type, is higher among those enrolled in non-HMO plans. In other words, the period 1 HMO enrollees who switched to a non-HMO plan in period 2 have resource utilization similar to those already enrolled in the non-HMO plan, but higher than those who stayed in the HMO plan.

The non-HMO enrollees who switched to an HMO, on the other hand, used \$322 fewer medical resources (\$936–\$1,258) in round 2 than the HMO enrollees who remained in an HMO. This difference is statistically significant and remains significant when we control for age and gender, which indicates that the expenditure difference is due to unobserved enrollee characteristics

such as preferences for medical care or health. Even with a simple method of risk adjusting premiums, HMOs would appear to be able to benefit from favorable selection. This is a somewhat surprising result because overall, across the choice and no-choice groups, the non-HMO enrollees who switched to an HMO did use \$200 fewer medical resources than the enrollees who remained in a non-HMO, but this difference was not statistically significant. Apparently the people who switched to an HMO have persistently lower expenditures, possibly because they have weaker preferences for medical care or their health is positively and strongly correlated over time. The expenditure difference is slightly smaller in magnitude and statistically insignificant in the final specification where we include variables that would be difficult to incorporate into a feasible risk-adjustment system.

DISCUSSION

In this article we examine whether HMOs experience favorable risk selection in the employer-sponsored market by applying a “switcher” methodology to a national panel data set of enrollees in employer-sponsored health plans. We find evidence that HMOs experience favorable selection, and that this favorable selection would persist even if employers adjusted health plan premiums based on an enrollee’s gender and age. People who switched from a non-HMO to an HMO plan used 11 percent fewer medical services in the period prior to switching than people who remained in the non-HMO plan, and that this low use persists once they enroll in an HMO, relative to those already enrolled in an HMO. Furthermore, we find that people who switched from an HMO to a non-HMO plan used 18 percent more medical services in the period prior to switching than people who remained in the HMO plan. This relatively high use rate does persist once they enroll in the non-HMO, but the differential is not statistically significant.

Our results, from a national dataset, are generally consistent with switcher studies that have used a single employer or a coalition of employers in a single market, although the magnitudes of the effects we find are smaller. Altman, Cutler, and Zeckhauser (1998), for example, find that people switching from an indemnity to an HMO plan spent 36 percent less on medical care than those remaining in the indemnity plan, and people switching from an HMO to an indemnity plan spent 47 percent more than those who remained in an HMO. Jackson-Beeck and Kleinman (1983) find that people enrolling in an HMO when it was offered for the first time had an average of 53 percent

fewer hospital days relative to people who remained in the indemnity plan. One explanation for our relatively small selection results is that as people sorted over time into their preferred plans, there is now more homogeneity in a plan type, and therefore a smaller cost difference between the low- and high-risk members. Another explanation is that by using a national sample of employees, our sample includes employees who work for employers who are vulnerable to risk selection and those who are not. Many employers self-insure or offer a variety of health plans from a single insurance company, which may mitigate the incentive for the health plans to target low-risk enrollees. A national sample gives a more accurate view of the scope of risk selection in the national health care market. Case studies of particular situations where risk selection was occurring may overstate the magnitude of risk selection nationally.

Our finding of favorable risk selection for HMOs differs from the RAND study and the study by Polsky and Nicholson (2004), studies that estimate average rather than marginal risk selection measures. As part of the RAND Health Insurance Experiment, people were randomized to a Seattle HMO and their medical utilization was compared to people who chose to enroll in the same HMO. Differences in utilization would be due, therefore, to differences in the demand for medical care rather than plan design. Manning, Newhouse, and Duan (1987) found no difference in the use of medical services between the two groups.

Likewise, Polsky and Nicholson (2004) found no evidence of risk selection using the first wave of the CTSHS. They decompose differences in expenditures between HMO and non-HMO enrollees into a utilization, reimbursement, and risk selection effect, where the latter effect is measured as a residual. They find that the expenditure difference between HMO and non-HMO can be explained entirely by relatively low provider reimbursement rates. The switcher methodology generates a *marginal* risk selection estimate, since we identify the risk selection coefficients by the people who switch plan types (rather than *all* enrollees). For example, for the 10 percent of HMO enrollees who switched to a non-HMO between the first and second round of the CTSHS survey their expenditure was 18 percent higher, but their departure would reduce an HMO's aggregate medical expenditures by only 2.0 percent. In addition, if those who remain in HMOs use slightly more medical services than those who remain in non-HMOs, then the *average* risk-selection measure may in fact be zero, even though HMOs are benefiting from favorable selection at the margin. The average effect analysis of Polsky and Nicholson (2004) complements the analysis of this paper because it puts in

perspective the 2.0 percent reduction in aggregate medical expenditure attributed to risk selection. Differential reimbursement rates rather than risk selection account for the majority of the difference in medical expenditure.

It is important to highlight two potential limitations of this study. The sample is restricted to people who were offered health insurance by their employer over a two-year period, had a choice of an HMO and a non-HMO plan in the second year, and responded to the CTSHS survey in both years. Our results, therefore, apply to a relatively stable group of people and cannot be extrapolated to the population as a whole. Furthermore, about one-quarter of the respondents mistakenly reported that they were enrolled in an HMO when in fact they were in a non-HMO, or vice-versa. This will create measurement error in the plan-switching variables and bias the selection estimates toward zero.

Our conclusion that HMOs were experiencing favorable selection nationally in the late 1990s is consistent with earlier case studies, although the magnitude of our effect is smaller. We also show that if employers were willing to adjust premiums based on a relatively comprehensive set of enrollee characteristics, including measures of health, the potential inefficiency associated with adverse selection would likely be eliminated.

ACKNOWLEDGMENTS

Helpful comments have been provided by Roger Feldman, Jeannette Rogowski, and participants of the Eighth Northeast Regional Health Economics Research Symposium, the International Health Economics meetings, and a conference at the University of California, Irvine: Competition and Consumer Choice in Health Insurance: An International Perspective.

NOTES

1. Current Population Survey, 1999.
2. Medicare, on the other hand, does adjust payments to HMOs based on an enrollee's hierarchical condition category (HCC). These categories are based on an enrollee's demographic characteristics and health conditions, and are intended to reflect a person's expected medical costs in the next year. The HCC system is being phased in over time to replace the simpler risk adjustment system based on age, gender, and county of residence.

3. If necessary, an interviewer elaborated as follows: "With an HMO, you must generally receive care from HMO doctors; otherwise, the expense is not covered unless you were referred by the HMO or there was a medical emergency."
4. People who were offered a choice of plans by their employer—the sample we focus on in this paper—had more accurate information on their plan's attributes.

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Appendix

Analysis of Response Bias for Round 2 of the Community Tracking Study Household Survey

Dependent variable is one if the person was re-interviewed in round 2, and zero otherwise

	<u>Coefficient</u>	<u>Standard Error</u>
Enrolled in an HMO	-0.153**	0.034
Offered HMO and non-HMO	-0.027	0.035
HMO * offered both plan types	0.079*	0.047
Age indicator: 18-39	-0.691**	0.040
Age indicator: 40-55	-0.159**	0.039
Female	0.062**	0.024
Marital status:		
- single, with children	-0.405**	0.046
- single, no children	-0.446**	0.036
- married, no children	-0.193**	0.033
African American	-0.369**	0.044
Asian	-0.416**	0.066
Hispanic	-0.408 **	0.049
High school graduate	0.530**	0.046
College graduate	0.476**	0.045
Masters degree	0.403**	0.054
Self-reported health:		
- very good	0.133**	0.028
- good	0.096**	0.034
- fair	0.028	0.055
- poor	0.096	0.112
Household income:		
- below \$10,000	-0.248**	0.056
- \$10,000 - \$49,999	-0.252**	0.043
- \$50,000 - \$99,999	0.006	0.040
Employer:		
- government	0.051	0.033
- fewer than 10 employees	-0.088**	0.041
- 10-1000 employees	-0.036	0.029
Medical resource use in round 1	-1.6 X 10 ⁻⁵ **	3.22 X 10 ⁻⁰⁶
Constant	-0.362**	0.053
n	34,029	
Pseudo R ²	0.03	

Notes: ** = significantly different from zero at the five-percent level; * = significantly different from zero at the 10-percent level.