Health Insurance Decisions

Preference Diversity and the Breadth of Employee Health Insurance Options

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Objective. To examine the effect of worker heterogeneity, firm size, and establishment size on the breadth of employer health insurance offerings.
Data Sources. The data were drawn from the 1993 Robert Wood Johnson Foundation Employer Health Insurance Survey of 22,000 business establishments selected randomly from ten states.
Study Design. The analysis was cross-sectional, using ordered probit models to relate the breadth of plan offerings to firm characteristics.
Principal Findings. Firms with more diverse workforces offered a more diverse set of health insurance options. Firm and establishment size independently influenced the breadth of plan offerings.
Conclusions. Employers are responsive to worker heterogeneity when determining the breadth of their health insurance offerings. However, diseconomies of scale in the purchase and administration of health insurance appear to limit the extent to which small employers can accommodate diverse worker preferences.
Key Words. Health insurance

Employers have considerable latitude over the health insurance options they make available to their employees. In a system of fee-for-service (FFS) insurance, employer-sponsored plans primarily influenced the level and scope of coverage available to workers. Historically these were largely financial issues, and most plans provided substantial coverage. However, as the prevalence of managed care has grown, employers' decisions carry increasingly strong implications for the site and style of care received by their employees. Selection of a health plan increasingly implies selection of a physician, hospital, or style of care. If an employee's preferred physician does not contract with the plans offered by the employer, the employee may not be covered for services delivered by that physician. Although many managed care plans provide some coverage for out-of-network care (typically requiring the patient to bear a larger fraction of the cost), other plan traits may still affect service delivery.

These trends have raised concerns regarding the extent to which the employment-based system may preclude employees from selecting a health plan appropriate to their particular needs and circumstances. This may occur either because smaller employers find it prohibitively costly to offer multiple plans or because employers fail to incorporate employee preferences into their benefit decisions.

The view that employer benefit choices may be discordant with the desires of workers has been a persistent criticism of the employment-based system. During the debate over the Clinton health plan, analysts frequently argued that an important drawback of the current system is the potential for mismatched priorities of employers and employees (Hilzenrath 1994). This view was echoed by KPMG Peat Marwick's Derek Liston, who, after completing a study of the health insurance options provided by employers, observed "They [employers] definitely have different criteria. The employee wants all services covered, wants low out-of-pocket costs, wants choice of doctor. The employer just wants to save money" (Hilzenrath 1994). As a result of these concerns a number of observers have called for reforms to bolster the degree of plan choice available to workers.[1] Such proposals indicate that substantial policy interest exists not only in the provision of insurance generally but also in the breadth of choices offered to workers.

Although a body of research on the employer's decision to offer health insurance already exists (Leibowitz and Chernew 1992; McLaughlin and Zellers 1992; Morrisey, Jensen, and Morlock 1994; Cantor, Long, and Marquis 1995), relatively little is known about the determinants of the breadth (number and differentiation) of health plans offered by employers. In this article we explore the relationship between preference heterogeneity and the breadth of employer health insurance offerings. If health plan offerings reflect worker preferences, we would expect firms with more diverse workforces to offer a broader array of plans. The ability of employers to satisfy worker preferences will depend on the extent to which they can spread the costs of offering additional plans among workers. Because administrative and other costs are likely to accrue at both the firm and establishment level, we control for both firm and establishment size in our empirical analysis.

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A recent article by Peele et al. (2000) used structured interview and focus group techniques in a sample of 40 large employers to assess how well employers' health insurance purchasing decisions reflect the preferences of their employees. The present article extends this work as well as work by Rice, Pourat, Levan, et al. (1997) that examined plan availability as a function of firm and market characteristics but without a focus on the role of preference heterogeneity. Our article is also complementary to work by Bundorf (1998), who examined the effect of worker heterogeneity on employer health insurance offerings but whose analysis differed in its emphasis on preference heterogeneity driven by differences in anticipated medical expenses and its focus on variation in plan generosity, as opposed to plan type, as the primary measure of plan breadth. Moreover, none of the previous articles addressed the independent effects of firm and establishment size in influencing the breadth of employee health insurance options.

THEORETICAL BACKGROUND

In the standard economic model (see, e.g., Rosen 1986) employees receive fringe benefits in lieu of cash compensation because workers are willing to trade wages for benefits.[2] If all employees value a given benefit (e.g., health insurance) equally, total compensation costs (wages plus insurance premiums) could be minimized by providing employees with their most preferred combination of wages and insurance coverage. However, because health insurance plans are multidimensional and employees attach different valuations to plan attributes, employees will vary in the extent to which they are willing to trade lower wages for coverage from particular plans. This provides an incentive for workers to sort across firms based on their preferences for health insurance. If workers could sort perfectly, employer groups would be homogeneous with respect to insurance preferences, and each firm would offer a single health plan embodying the precise combination of plan attributes desired by their (homogeneous) workforce (Goldstein and Pauly 1976).

However, in practice, impediments to perfect sorting, such as limited numbers of employers, search frictions, and the differing technological and educational requirements of jobs, lead to employer groups that are heterogeneous with respect to employee preferences over health plans. This generates a potential benefit from offering multiple plans as first suggested by Goldstein and Pauly (1976).[3]

Yet offering multiple plans is costly. Existing research suggests that the presence of fixed costs of plan administration leads to significant economies of scale in the offering of health plans (U. S. Congressional Budget Office 1991).[4] As a result employers face a trade-off between the fixed costs of offering additional plans and the larger wage reductions made possible by more closely matching a larger proportion of the workforce to their most preferred plan.

These observations suggest two empirical implications. First, all other things being equal, we would expect to observe a positive relationship between the degree of preference heterogeneity existing within a firm and the breadth of plans offered by the employer. Second, all other things being equal, larger firms would be expected to offer more insurance plans than smaller firms because of their ability to spread fixed costs over a larger number of enrollees.

The foregoing discussion rests on the assumption that employers incorporate employee preferences into their insurance purchasing decisions. Such an assumption can be justified through an appeal to economic theory, which implies that in a perfectly competitive labor market, competition for workers will compel firms to offer the benefit packages most attractive to their workers. However, a variety of factors suggest that labor markets may not operate with this level of efficiency. Specific human capital, limited numbers of employers, and the vagaries of the search process generate explicit and implicit costs that limit the ability of some workers to switch employers. One concern is that, in making decisions regarding employee benefits or working conditions, employers may ignore the preferences of these inframarginal workers and choose instead to cater only to those employees most likely to be lured away by a rival firm (Oi 1974; Viscusi 1980; Freeman 1981). Such actions by firms, although optimal from the perspective of the individual employer, lead to a divergence between the actual and socially efficient set of insurance plans available to workers.

Adverse Selection

In arguing that greater preference heterogeneity will be reflected in greater plan choice, we have not explicitly discussed the factors that lead different individuals to prefer different plans. It should be noted that if preference heterogeneity is in part driven by private information on health status, concerns about adverse selection might induce insurers to require smaller firms to enter into exclusive contracting arrangements, thereby precluding them

from offering a choice of health plans.[5] However, to the extent that adverse selection limits the ability of some firms to offer multiple plans, it would likely bias the coefficient estimates on our heterogeneity measures downward. This will be true as long as the correlation between measured worker heterogeneity and the unobserved variability in medical expenditures is positive, as would be the case, for example, if firms with greater age heterogeneity also had greater dispersion in the underlying health of their workers.

THE DATA

Our data were drawn from a survey of 22,000 business establishments in ten states conducted in 1993 and early 1994. The 1993 Robert Wood Johnson Foundation Employer Health Insurance Survey (RWJF-EHIS) (Long and Marquis 1997) is a random sample of all private business establishments[6] and all public employers in the following ten states: Colorado, Florida, Minnesota, New Mexico, New York, North Dakota, Oklahoma, Oregon, Vermont, and Washington. Approximately 2,000 business establishments were sampled in each state, allocated equally to four strata defined by the number of workers employed at each establishment: one to four, five to nine, ten to 24, and 25+. In addition, 46 to 262 public employers were sampled in each state.[7] Cantor, Long, and Marquis (1995) presented evidence that the states in question are representative of the United States as a whole in a number of important dimensions (Table 1).[8] The survey had an overall response rate of 71 percent with a range of 59 percent (New York) to 80 percent (North Dakota).

 The RWJF-EHIS is well suited to our analysis because it is the only data set currently available that includes information on both the complete set of insurance plans offered at an establishment and the demographic composition of the establishment's workforce. To control for geographic variation in health plan availability we appended information from *The InterStudy Competitive Edge 5.1* (InterStudy 1995) on the number of HMOs operating in each county in the ten survey states. Controlling for market-level variation in plan availability is likely to be important in cases in which the employers' choice set may be limited by the absence of certain types of plans. Unfortunately, comparable data on the number of preferred provider organizations (PPOs) operating in each county were not available; previous research has shown that in terms of market share in large metropolitan areas, HMO and PPO penetration are not strongly correlated (Morrisey and Jensen 1997).

Table 1:   Descriptive Statistics ($N = 13{,}761$)

Variable	Definition	Mean	Standard Deviation
Tiny establishment, tiny firm	Establishment size 1–10; firm 1–10	.281	.449
Tiny establishment, small firm	Establishment size 1–10; firm 11–25	.022	.148
Tiny establishment, medium firm	Establishment size 1–10; firm 26–100	.027	.162
Tiny establishment, big firm	Establishment size 1–10; firm 101–500	.023	.149
Tiny establishment, huge firm	Establishment size 1–10; firm > 500	.042	.200
Small establishment, small firm	Establishment size 11–25; firm 11–25	.185	.388
Small establishment, medium firm	Establishment size 11–25; firm 26–100	.029	.167
Small establishment, big firm	Establishment size 11–25; firm 101–500	.018	.133
Small establishment, huge firm	Establishment size 11–25; firm > 500	.033	.178
Medium establishment, medium firm	Establishment size 26–100; firm 26–100	.142	.349
Medium establishment, big firm	Establishment size 26–100; firm 101–500	.031	.174
Medium establishment, huge firm	Establishment size 26–100; firm > 500	.045	.206
Big establishment, big firm	Establishment size 101–500; firm 101–500	.058	.234
Big establishment, huge firm	Establishment size 101–500; firm > 500	.039	.193
Huge establishment, huge firm	Establishment size > 500; firm > 500	.027	.161
For profit, unincorporated	Business is for profit, unincorporated	.104	.305
Nonprofit	Business is not-for-profit	.112	.316
Corporation	Business is for profit, incorporated	.784	.412
Denied insurance	Establishment previously denied health insurance	.057	.233
Years in business	Number of years in business	29.83	28.87
% full time	Percentage of workers employed full time	76.21	31.64
% temporary	Percentage of temporary workers	7.177	17.73
% union	Percentage of union workers	4.965	18.42
% female	Percentage of female workers	.435	.292
% young	Percentage of workers < 25 years old	.175	.204
% middle aged	Percentage of workers aged 25–55 years	.720	.223
% old	Percentage of workers > 55 years old	.105	.149
% < 10k	Percentage of workers earning < $10,000 per year	.104	.210
% 10–14k	Percentage of workers earning $10,000–14,000 per year	.195	.240
% 14–20k	Percentage of workers earning $14,000–20,000 per year	.243	.233

Continued

Table 1:   *Continued*

Variable	Definition	Mean	Standard Deviation
% > 20k	Percentage of workers earning > $20,000 per year	.457	.340
Gender heterogeneity	Degree of gender heterogeneity in establishment	.368	.157
Age heterogeneity	Degree of age heterogeneity in establishment	7.888	4.074
Income heterogeneity	Degree of income heterogeneity in establishment	9.184	5.045
No. of HMOs	Number of HMOs operating in the county	5.733	4.451

MEASUREMENT ISSUES

Two important measurement issues must be addressed before an empirical model can be specified. First, we need to devise measures of the overall breadth of insurance options offered by each employer. Second, we need to construct a proxy for the degree of preference heterogeneity present in each establishment.

Breadth of Offerings

We view breadth as encompassing both the total number of plans and the number of plan types offered at each establishment. Survey respondents, generally the person deemed most knowledgeable about the establishment's health benefits, were asked to categorize each offered plan into one of three categories: HMO; PPO or point-of-service (POS) plan; and conventional health insurance. The exact definitions used in the survey are given in Figure 1. The key distinction drawn between the three plan types was whether the plan provided coverage for out-of-network care, with HMOs being defined as nonindemnity plans that do not cover out-of-network care (beyond emergency room visits or specialist referrals) and PPO or POS plans defined as nonindemnity plans that do provide coverage for visits to out-of-network providers, albeit at a higher cost to the patient.[9]

   Given our data, plan breadth can be defined in terms of either the number of plans or the number of plan types available at each establishment so that one firm's benefit package would be viewed as broader than another's if it offered either more plans or more types of plans. Looking at these variables

Figure 1:   RWJF-EHIS Health Insurance Plan Definitions

- HMO: Employees receive comprehensive health care from doctors and other providers who are a part of the HMO. HMOs also typically cover emergency care outside the HMO and care from specialists if an employee is referred by the HMO. Otherwise, employees' costs are not covered when they receive care from doctors who are not part of the HMO.
- PPO and POS plans: Employees pay less for doctor visits and have lower deductibles when they see doctors who are part of the PPO plan. These doctors are called preferred or participating providers. Health costs are still covered when they see doctors outside the PPO plan—nonpreferred providers—but the employee pays more.
- Conventional health insurance: Also called fee-for-service or indemnity plan. In conventional health plans enrollees can choose to see any doctor or go to any hospital. The plan pays either a percentage or a flat fee for covered services. The enrollee is responsible for the balance.

separately is problematic because in doing so we forgo the ability to use the other variable as a tie breaker in cases in which two establishments offer either the same number of plans or the same number of plan types. For example, it seems intuitive that offering two plans of the same type contributes less to plan breadth than offering two plans of different types, but such a difference is ignored if only the number of plans is used. Similarly, it seems clear that an employer who offers an indemnity plan and two HMOs provides a broader set of insurance options than one who offers an indemnity plan and a single HMO, yet this distinction is overlooked when only the number of plan types is considered.

To avoid these problems we constructed an index of overall plan breadth predicated on the following three axioms:

Axiom 1. Symmetry: No plan type contributes more to plan breadth than any other type.

Axiom 2. Monotonicity: Adding a plan (of any type) increases breadth.

Axiom 3. Diversity: $(1,1X) \succ (2,0,X) \sim (0,2,X)$ for all X

Here, X indicates the number of plans of a given type being offered and $\sim$ and $\succ$ denote indifference and strict preference, respectively. For reasons

of tractability we assume that the monotonicity axiom only applies to the first two plans of each type (i.e., adding a third plan of any type does not increase breadth). This assumption allows us to partition all observed plan configurations into 27 mutually exclusive categories. Applying the above axioms results in eight distinct levels of plan breadth,

$$(2,2,2)$$
$$\succ(2,2,1) \sim (2,1,2) \sim (1,2,2)$$
$$\succ(2,1,1) \sim (1,2,1) \sim (1,1,2)$$
$$\succ(1,1,1) \text{ or } (0,2,2) \sim (2,0,2) \sim (2,2,0)$$
$$\succ(0,2,1) \sim (0,1,2) \sim (1,0,2) \sim (1,2,0) \sim (2,0,1) \sim (2,1,0)$$
$$\succ(0,1,1) \sim (1,0,1) \sim (1,1,0)$$
$$\succ(0,0,2) \sim (0,2,0) \sim (2,0,0)$$
$$\succ(0,0,1) \sim (0,1,0) \sim (1,0,0).$$

These levels can then be used to construct a categorical dependent variable for use in an ordered probit model.[10] Although we believe that this index represents a reasonable measure of plan breadth, like many indices it has the drawback of not being easily interpretable. Accordingly, we present results for models based on the number of plans and the number of plan types as well.

Preference Heterogeneity

To construct a proxy for employee preference heterogeneity we postulate that insurance preferences are correlated with observable worker characteristics (age, gender, and income) that have been shown to be important determinants of plan choice (Barringer and Mitchell 1994; Feldman et al. 1989; Marquis and Long 1995). If data were available on the demographic characteristics of individual workers, an obvious way to measure preference heterogeneity would be to use the intraestablishment standard deviations of the variables of interest. Unfortunately, we are not aware of any large-scale data set that contains this information. Instead, the best that we can do is to use information on the proportions of workers within various categories to construct an approximation to the underlying standard deviation.[11]

The RWJF-EHIS contains categorical information on the proportion of employees by age, gender, and income. Employee age distributions are measured in terms of the proportion of employees in three categories: under age 25, age 25 to 55, and over age 55. For income, we know the proportions of employees earning less than $10,000, $10,000 to $14,000, $14,000 to $20,000,

and more than \$20,000 per year. Gender is of course binary. We approximate the intraestablishment standard deviations of these variables by

$$\sigma = \left(\sum_{i=1}^{k} p_i \, (m_i - \overline{m})^2 \right)^{1/2},$$

where k is the number of categories, m_i is the midpoint of each category, p_i is the proportion of workers in category i, and $\overline{m} = \sum_{i=1}^{k} p_i m_i$. Because gender is a discrete variable we set $m_i = 1, 2$.[12] Given that few people enter the labor force before 16 and the majority retire in their early to mid-60s, it seems reasonable to use 20 as the midpoint of the lowest age category and 60 as the midpoint of the highest category. Income is more problematic because of the lack of a clear upper bound on the highest category and the likely presence of part-time workers in the under-\$10,000 group.[13] Rather than impose arbitrary midpoints, we calculated the mean earnings of workers in these categories using data from the *1992 Current Population Reports* (U. S. Bureau of the Census 1993, Table 31). These means were then inflated to 1993 dollars using the 1992–93 inflation rate.[14] This procedure resulted in a mean earnings figure of \$4,444 for workers earnings less than \$10,000 per year and \$41,740 for those in the \$20,000+ category.

MODEL SPECIFICATION

We considered three measures of the breadth of insurance options available at each establishment: the number of plans offered, the number of plan types offered, and the index of overall plan breadth described in the previous section. Because the values of these variables have a natural ordinal ranking, we use ordered probit models to relate each to the intraestablishment dispersion of workers in terms of age, gender, and income.

Our primary objective was to characterize the determinants of the breadth of offerings, not the decision to offer any coverage versus none. The factors influencing whether to offer any insurance may differ from those influencing the breadth of offerings conditional on some insurance being offered. For example, although we would expect breadth to increase with workforce heterogeneity conditional on at least one plan being offered, a firm choosing between no coverage and offering a single plan might be more likely to offer insurance if their workforce were homogeneous, and hence a single plan that would satisfy most employees could be chosen. For these

reasons we restrict attention to establishments that offer at least one health plan (15,591 of the 22,890 establishments in the survey).[15]

To ensure accurate measurement of workforce heterogeneity we deleted 452 establishments whose reported age, gender, and income percentages summed to less than 99 or more than 101. We included as controls all available variables that were expected to exogenously influence the breadth of insurance plans offered at a given establishment. These include measures of firm and establishment size (specified as a set of dummy variables representing various firm-establishment size pairings);[16] firm ownership (proprietorship, nonprofit, or corporation); age of the establishment; whether the establishment had previously been denied health insurance coverage; and percentage of the workforce that is temporary, employed full time, and belongs to a union. We used dummy variables for firm and establishment size because we expected the effects of these variables to be different at different levels. We also included ten state and ten industry dummies as well as the proportions of workers in each demographic category used in our heterogeneity measures. The proportion of workers in each demographic category might have an independent effect on plan offerings because of unmeasured heterogeneity within the category. This is particularly likely for income, where the highest category ($20,000 per year and over) is quite broad. Alternatively, some of the demographic variables, like the percentage of the workforce that is female, may proxy for other (unobserved) preferences for health insurance such as the availability of coverage through a working spouse.

Finally, to control for market-level variation in health plan availability we used data from *The InterStudy Competitive Edge 5.1* (InterStudy 1995) to construct a measure of the number of HMOs operating in the county in which each establishment is located. Exact definitions and summary statistics for all variables are reported in Tables 1 and 2. Missing observations resulted in final samples of 13,761 and 13,777 establishments depending on which dependent variable was used.

A key concern when using cross-sectional data is that the error variance may be heteroscedastic. This is particularly problematic in an ordered probit model where, in contrast to linear models, the existence of a heteroscedastic disturbance causes both the estimated standard errors and the parameter estimates themselves to be inconsistent (for a discussion see Greene 1997, pp. 888–90). On the other hand, if heteroscedasticity is not present, incorporating an explicit model of the error variance will reduce the efficiency of the resulting estimates. Thus, for each dependent variable we report two sets of estimates, one based on an ordinary (homoscedastic) probit and another that

Table 2:   Frequency Counts for Dependent Variables

Plans			Plan Types			Breadth Index		
No. of plans	Frequency	%	No. of types	Frequency	%	Breadth	Frequency	%
1	10,553	76.6	1	11,511	83.6	1	10,553	76.7
2	2126	15.4	2	2,015	14.6	2	958	7.0
3	666	4.8	3	235	1.7	3	1,401	10.2
4	243	1.8				4	518	3.8
5	114	.8				5	212	1.5
6	41	.3				6	76	.6
7	34	.2				7	22	.2
						8	21	.2

allows the error variance to vary with firm and establishment size (all models were estimated using LIMDEP 7.0, Econometric Software). In so doing we assume that the error variance takes the multiplicative form proposed by Harvey (1976).[17]

An additional concern is that workers may self-select into firms partially on the basis of the breadth of insurance options offered by the employer. Thus, employers who for unobservable reasons offer a broader set of insurance options may attract more diverse workforces, all other things being equal. However, such self-selection would not necessarily lead to spurious conclusions about how well the employment-based health insurance system accommodates diverse preferences. Specifically, if the workforce is considered exogenous, a finding that plan offerings respond to heterogeneity would suggest that employers respond to the preferences of their exogenously determined employees. Alternatively, if the workforce is endogenously determined (which it surely is in the long run), such a finding would suggest that worker preferences are in part met by workers' ability to self-select into firms. This would be consistent with the view that employers design benefits to attract or retain the desired workforce. In either case such a finding would suggest that the breadth of benefits is related to worker heterogeneity, mitigating concerns that employee preferences for benefits are completely neglected.

In an attempt to address the possible endogeneity between plan breadth and worker heterogeneity we implemented an exogeneity test for ordered probit models developed by Butler and Chatterjee (1997). (The test was implemented on a Unix workstation using Matlab 11.1, The MathWorks.) A key advantage of this test is that it does not require the use of instrumental variables.[18] One drawback of the test is that its computational burden rises

sharply with the number of categories contained in the dependent variable. This, combined with the large number of observations in our samples, made it impossible for us to conduct the test when either the number of plans or the plan breadth index were used as dependent variables.

RESULTS

Results for each specification are presented in Table 3. Consistent with our main hypothesis, we found that employers with more diverse workforces in terms of age and income offered a broader set of insurance plans than employers with more homogenous employees. These findings are robust to changes in the way plan breadth is measured and continue to hold when the empirical specification is modified to incorporate heteroscedasticity based on firm and establishment size.[19] Moreover, by separately controlling for the proportion of workers within each age and income category we allow for the possibility that shifts in the distributions of these variables have an independent effect on the breadth of plan offerings. Thus, the effects we attribute to heterogeneity should be pure in the sense that they hold constant the influence of having a workforce that is older or better paid on average.[20] Finally, we note that the results of the Butler-Chatterjee (1997) exogeneity test were mixed; it did not reject the null hypothesis of exogeneity for the one model (the number of plan types) for which estimation was possible but did reject exogeneity for a collapsed version of the number-of-plans model.

    The results for the gender heterogeneity variable were more mixed. When breadth was measured in terms of the number of plans offered or as an index embedding both the number and type of plans, gender heterogeneity exerted a significant influence. However, this was not the case when breadth was measured solely in terms of the number of plan types offered.

    To illustrate the size of these effects we considered a firm in the medium establishment–medium firm size category with mean characteristics for all other explanatory variables and calculated the effect on plan offerings of moving from 1 s.d. below the mean to 1 s.d. above the mean of each heterogeneity variable. For such a firm, moving from 1 s.d. below the mean for age heterogeneity to 1 s.d. above the mean resulted in an 8.6 percent increase in the relative probability of offering more than one plan and a 12.0 percent increase in the relative probability of offering more than one plan type (Table 4). For income heterogeneity, this movement in standard deviation resulted in a 6.5 percent increase in the relative probability of offering multiple plans

Table 3:   Ordered Probit Models

Explanatory Variables	No. of Plans†		No. of Plan Types		Breadth Index	
	Ordinary Probit	Heteroscedastic Probit	Ordinary Probit	Heteroscedastic Probit	Ordinary Probit	Heteroscedastic Probit
Constant	-1.763***	-1.736***	-2.469***	-2.387***	-1.835***	-1.811***
Tiny establishment, small firm	-.011	.241	.107	.035	.025	-.026
Tiny establishment, medium firm	.090	-.019	.306***	.183	.119	-.276
Tiny establishment, big firm	.462***	.586***	.616***	.820***	.489***	.494***
Tiny establishment, huge firm	.933***	.897***	.925***	1.058***	.920***	.897***
Small establishment, small firm	.081*	.128	.169***	.326**	.086**	.142
Small establishment, medium firm	.226***	.519***	.343***	.516**	.260***	.386***
Small establishment, big firm	.569***	.742***	.686***	.696***	.609***	.656***
Small establishment, huge firm	1.165***	1.168***	1.079***	1.160***	1.126***	1.163***
Medium establishment, medium firm	.508***	.656***	.673***	.785***	.549***	.580***
Medium establishment, big firm	.762***	.880***	.861***	.964***	.775***	.858***
Medium establishment, huge firm	1.229***	1.160***	1.109***	1.195***	1.130***	1.133***
Big establishment, big firm	.877***	.985***	.984***	1.146***	.907***	.975***
Big establishment, huge firm	1.402***	1.425***	1.458***	1.517***	1.423***	1.440***
Huge establishment, huge firm	1.725***	1.704***	1.630***	1.644***	1.694***	1.684***
For profit, unincorporated	.083*	.081**	.080	.082*	.069	.069
Nonprofit	.009	.018	.001	-.005	.017	.022
Denied insurance	.029	.012	-.011	-.015	.033	.023
Years in business	.003***	.003***	.003***	.003***	.003***	.003***
% full time	.000‡	.000‡	.000‡	.000‡	.000‡	.000‡
% temporary	-.002***	-.002***	-.002**	-.001**	-.002***	-.002***
% union	.006***	.005***	.004***	.003***	.005***	.005***
% female	.008	.016	-.121**	-.106**	-.038	-.038
% middle aged	.095	.084	.168*	.141*	.126	.117
% old	-.045	-.036	-.113	-.106	-.052	-.042

	(1)	(2)	(3)	(4)	(5)	(6)
% 10–14k	.117	.093	.159	.119	.122	.101
% 14–20k	.137*	.108	.128	.103	.098	.079
% > 20k	.255***	.218***	.304***	.252***	.254***	.233***
Gender heterogeneity	.182**	.180**	.118	.097	.166**	.162**
Age heterogeneity	.010**	.008**	.012**	.010**	.011**	.010**
Income heterogeneity	.006**	.005**	.009***	.007***	.007***	.006**
No. of HMOs	.024***	.023***	.032***	.029***	.027***	.027***
μ_1	.847***	.768***	1.408***	1.163***	.310***	.295***
μ_2	1.425***	1.291***	–	–	1.018***	.964***
μ_3	1.871***	1.697***	–	–	1.576***	1.483***
μ_4	2.314***	2.100***	–	–	2.088***	1.956***
μ_5	2.651***	2.411***	–	–	2.556***	2.382***
μ_6	–	–	–	–	2.858***	2.654***
N	13,777		13,761		13,761	
Log likelihood	–9,256.70	–9,231.20	–5,667.41	–5,655.40	–10,270.70	–10,261.57
LR test for heteroscedasticity§	51.00***		24.01**		18.26	
Butler-Chatterjee Exogeneity Test	77.34§§		6.82§§		NA	

*, **, and *** denote significance at the .10, .05, and .01 levels, respectively.

†When the dependent variable is the number of plans we dropped categories that comprise less than 0.1 percent of the sample.

‡Coefficient estimate was less than .001 in absolute value.

§.10 and .05 critical values are 21.07 and 23.69, respectively.

§§Distributed chi-square with 49 degrees of freedom (.05 critical value is 66.05). Note that in the case in which the number of plans was the dependent variable it was only possible to run the Butler-Chatterjee test for a collapsed version of the dependent variable based on three categories (one, two, or three or more plans).

Note: All models contain ten industry and ten state dummies (not reported).

Table 4:   Heterogeneity and Group Size Effects (%)

Variables	Number of Plans		Number of Plan Types	
	Probability of Offering Multiple Plans	*Predicted No. of Plans**	*Probability of Offering Multiple Plan Types*	*Predicted No. of Plan Types**
Gender heterogeneity[†]	+7.3	+2.4	+4.4	+0.8
Age heterogeneity	+8.6	+2.7	+12.0	+2.1
Income heterogeneity	+6.5	+2.1	+10.8	+1.9
Firm size[†]	+139.8	+23.4	+85.2	+7.7
Establishment size[†]	+31.1	+12.0	+82.2	+13.9

*Expressed as a percentage increase.

[†]For the heterogeneity variables we considered an employer in the medium establishment size–medium firm size category with all other variables fixed at their mean values. Table entries represent the effect of moving from 1 s.d. below the mean to 1 s.d. above the mean for the variable in question.

[†]For the firm size variable the increases shown in the table represent the effect for a small establishment (11–25 employees) of moving from a small firm (11–25 employees) to a big firm (101–500 employees) with all other variables held at their mean values. For the establishment size variable table entries represent the relative effects of being in a small establishment within a big firm versus being in a big establishment within a big firm.

and a 10.8 percent increase in the relative probability of offering multiple plan types. For gender heterogeneity the corresponding probabilities were 7.3 percent and 4.4 percent, respectively.

To our knowledge this is the first study that isolates the independent effects of firm and establishment size on plan offerings.[21] We found that both firm and establishment size had large and for the most part monotonic effects on the breadth of offered plans. That is, holding constant the size of the establishment, increases in firm size translated into more diverse plan offerings. Analogously, when firm size is controlled and the size of the establishment is allowed to vary, larger establishments offered broader options, all else being equal.

The absolute magnitude of the effects implied by the firm and establishment size coefficients were larger than those implied by the heterogeneity coefficients. To isolate the effect of firm size, consider the case of two establishments in the small size category (11 to 25 employees) in which one is in a small firm (11 to 25 employees) and the other is part of a big firm (101 to 500 employees). All other independent variables take their mean values. As shown in Table 4, being part of the big firm results in a 139.8 percent increase in the relative probability of offering more than one plan and an 85.2 percent increase in the relative probability of offering more than one plan type.

Likewise we isolate the effect of establishment size by comparing predicted insurance offerings of small establishments within big firms to those of big establishments within big firms. This increase in establishment size (again at the mean values for all other variables) results in a 31.1 percent increase in the predicted relative probability of offering more than one plan and an 82.2 percent increase in the predicted relative probability of offering more than one plan type.

Although our primary focus was on the role of preference heterogeneity, a number of other consistent findings emerged from our analysis. For example, older and more heavily unionized establishments offered a broader set of plans, as did establishments with a greater proportion of high-income workers. As mentioned previously, this latter finding may arise from unmeasured heterogeneity within the highest income category. Not surprisingly, establishments employing a greater percentage of temporary workers tended to provide a narrower set of health benefits. These findings parallel those from studies of the firm's decision to offer insurance generally (Cantor, Long, and Marquis 1995). We also found that establishments in counties with more HMOs offered both more plans and more types of plans than establishments in counties with fewer HMOs. Although the magnitude of this effect was small, it nevertheless suggests that some employers may be precluded from offering a broader set of insurance options by the absence of certain types of plans from their local market. In addition, firms with higher proportions of female employees, which may proxy the availability of coverage through a working spouse, offered significantly fewer plan types. At the means for all other variables our point estimate indicated that moving from 1 s.d. below the mean proportion of females to 1 s.d. above the mean proportion of females was associated with an 8.5 percent decline in the relative probability of offering multiple plan types.

Contrary to expectations we found few significant differences in plan offerings by ownership type. Relative to incorporated businesses (the omitted category), unincorporated for-profit firms offered more plans, more plan types, and greater breadth, but the difference was rarely significant at conventional levels. In addition, nonprofit firms did not offer more plan breadth than incorporated or unincorporated for-profit firms. Thus, we found no evidence that for-profit firms systematically take less account of the preferences of their workers than their nonprofit counterparts.

Our findings provide strong evidence that employer health insurance offerings do reflect worker preferences. Unfortunately the data do not permit us to estimate the optimal breadth of plan offerings in a given establishment.

Thus, it is possible that the preferences of some employees are systematically underweighted or even ignored. However, the fact that plan breadth rises with worker heterogeneity suggests that employers do not target their plan offerings to small groups of marginal workers. Furthermore, the lack of systematic differences in the breadth of plan offerings by firm ownership is consistent with the presumption that labor market conditions require firms to respond to worker preferences regardless of their own desires.

CONCLUSIONS

The strong form of the hypothesis that workers' preferences do not matter in determining the breadth of health insurance options offered by employers is clearly rejected. Consistent with a simple theory of benefits determination, increases in the three heterogeneity measures were associated with increased breadth of plan offerings. Likewise the finding that breadth rises substantially with firm and establishment size confirms the other hypothesized conse-quence of preference heterogeneity. If workers unanimously agreed about which health plan they would choose, there would be no reason to offer more than one plan even if the fixed cost per enrollee of offering additional plans approached zero (as it would if firm size approached infinity).

However, the absolute magnitude of the effect of heterogeneity on plan offerings is relatively small, and we have no basis to determine the optimal number and mix of plans. We can only conclude that breadth changes in the expected direction with changes in heterogeneity or employer size. Thus, we cannot rule out the possibility that although firms take workers' preferences into account when structuring their benefits packages they do not do so in an optimal fashion. Moreover, it must be remembered that what is efficient in the context of a specific employee group may provide suboptimal plan breadth relative to a system in which health insurance is not tied to one's employer.

Restricted choice of plans may be a problem mainly for employees of smaller establishments and firms for which the costs of offering additional options cannot be spread over enough enrollees to warrant broader choice. Thus, the preferences of these workers may not be accommodated as well as those of workers in larger organizations. Interestingly our results indicate that both firm and establishment size are important determinants of the breadth of insurance options available to workers. Geographic dispersion of the business units and the added complexity of information flows and

benefits management when multiple business sites are involved may explain why establishment size remains an important predictor of the breadth of offerings even after controlling for firm size.

Taken together these findings suggest that diseconomies of scale, rather than employer nonresponsiveness, are the primary impediments to expanded plan choice for workers. Thus, programs that allow small employers to realize economies of scale in the purchase and administration of health insurance (e.g., purchasing alliances) may be helpful in expanding the breadth of insurance options available to workers.[22]

One important limitation of this study is that we cannot directly observe worker preferences. Rather we observed characteristics (age, income, and gender) that have been found by other researchers to be related to preferences over health insurance plans. In addition, we only observed the proportions of workers within three age classes and four income classes as well as the two gender classes. The effect of these limitations is that our estimates of employer responsiveness to preference heterogeneity are likely to be conservative because the conceptual variable of interest—overall preference diversity—is measured with error.

Another limitation involves the potential endogeneity of worker sorting into firms. The process of worker self-selection into firms may partly be a function of health insurance offerings, suggesting that the worker heterogeneity variables might be endogenous (i.e., firms with more diverse health plan offerings may attract more diverse workforces). To explore this possibility we conducted a Butler-Chatterjee (1997) exogeneity test for the specification that uses the number of plan types as the dependent variable and for a collapsed version of the number-of-plans model. The results of this test were mixed, with exogeneity being rejected for the collapsed number-of-plans model but not for the model that used the number of plan types as the dependent variable. However, it is worth remembering that all firms in our estimation sample offered at least one plan. If the strongest self-selection of workers into firms occurs with respect to whether any coverage is offered, the remaining selection with respect to breadth of coverage (conditional on offering at least one plan) may be relatively modest. Even if the remaining self-selection is nontrivial, we do not believe it would necessarily invalidate the results reported here. Rather, understanding the sorting of workers by preferences for health insurance offerings would help elucidate the mechanisms by which the employment-based health insurance system accommodates diverse preferences.

NOTES

1. As noted by Cutler (1996), many proposals advocate the use of multifirm purchasing groups to expand the number of health insurance options available through the workplace. Such a proposal was recently endorsed by *USA Today* in an editorial that called on Congress to adopt a two-pronged approach that would simultaneously mandate that all employers offer a minimum number of insurance plans and aid small firms by facilitating the formation of multifirm purchasing alliances (*USA Today* 1998). The American Medical Association goes further, arguing that the link between health insurance and employment should be weakened by offering individual consumers the same tax deductibility of insurance premiums that is currently afforded employer-sponsored group coverage (Dickey 1998).

2. Tax incentives further encourage firm provision of health insurance benefits.

3. Rice, Pourat, Levan, et al. (1997) cite several studies suggesting that choice of health plans is important for employees.

4. At the level of the insurer, fixed (per-plan) costs arise from claims processing, benefits administration, and medical underwriting. From the perspective of an employer, offering additional plans is costly because of the need to communicate the details of different plans to workers and negotiate with different insurers. In addition, because insurance loading charges are inversely related to group size, employers potentially face higher premiums when fewer employees are enrolled in each plan.

5. The extent to which adverse selection exists in health insurance markets remains an open question. For conflicting evidence see Cutler and Reber (1998) and Hendel and Cardon (1998).

6. Self-employed proprietors with no employees were not included in the survey.

7. Although fielded in the survey, sample restrictions and missing data combined to eliminate all public employers from the final sample.

8. The survey states were similar to the national averages in terms of their unemployment rates, average annual pay, composition of employment, per capita medical spending, and percent uninsured (Cantor, Long, and Marquis 1995, Table 1).

9. During the interviews these definitions were not read to respondents unless they requested that the plan types be defined. Thus, in some cases a plan was listed as an HMO even though the respondent reported that the plan does in fact cover out-of-network care, or was classified as a PPO or POS plan even though such coverage is not provided. One way to address this ambiguity would be to reclassify plans solely on the basis of whether coverage for out-of-network care is provided. To the extent that the ability to use out-of-network providers is the principal margin along which plans are differentiated, such a classification scheme would be the right one for gauging the degree of plan breadth at a given establishment. However, there may be other important differences between plans that would be obscured by adopting a unidimensional definition. For example, capitated payment mechanisms, common among HMOs but not PPOs, may influence physician practice styles in ways consumers dislike. As a

result an "open" HMO may differ substantially from a PPO even if both specify identical rules for using out-of-network providers. Because it seems plausible that some of the discrepancies in plan definitions were based on the respondent's knowledge of these differences, we used the original self-reported plan definitions in our analysis. As a sensitivity check we re-estimated each of our models using an alternative classification method that categorized HMOs based entirely on whether coverage for out-of-network care is provided. Under this method any HMO that covers out-of-network care was reclassified as a PPO or POS plan. The sensitivity analysis also deleted any establishment offering a PPO or POS plan that reported not covering visits to out-of-network providers. These plans were harder to categorize than HMOs that do provide out-of-network coverage. In the case of self-reported HMOs such plans are almost certainly POS-type plans. In contrast, a plan that is reported to be a PPO but does not cover visits to out-of-network providers may be either an HMO (mistaken for a PPO by the respondent) or a PPO that simply does not reimburse for care received outside of the network. Results based on this alternative classification scheme, available upon request from the authors, were virtually identical to those obtained using the self-reported plan definitions.

10. Among all possible combinations, the three axioms allow for a definitive ordering in all but one case, that being $(1,1,1)$ versus $(0,2,2) \sim (2,0,2) \sim (2,2,0)$. We resolve this case by assuming that $(1,1,1)$ and $(0,2,2) \sim (2,0,2) \sim (2,2,0)$ contribute equally to breadth.

11. A frequent criticism of the standard deviation as a measure of dispersion in empirical work is that it is not invariant to the scale of the variable being measured (Ehrenberg and Smith 1988, pp. 349–50). Thus, if all incomes in a firm were to exactly double, the standard deviation of income would double as well. This particular problem is not an issue in our case because the measure we used is based entirely on changes in the proportions of workers within fixed demographic categories, that is, within categories that do not vary across employers.

12. It is easy to show that in the case of a binary variable (like gender) our heterogeneity measure reduces to $\sqrt{p(1-p)}$, the formula for the standard deviation of a binary variable.

13. In our analysis we included controls for the percentage of the workforce that is temporary and employed part time.

14. The inflation rate is the change in the Consumer Price Index from 1992 to 1993 (U. S. Bureau of the Census 1994, Table 747).

15. The heterogeneity coefficients are somewhat larger if we treat not offering insurance as the lowest plan breadth category.

16. The establishment is the individual business site that was sampled in the RWJF-EHIS. If this establishment is the firm's only business site, establishment size equals firm size. Conversely, if the firm has multiple business sites, the establishment would be smaller than the firm.

17. Because under this specification the ordinary model is a restricted version of the heteroscedastic model, it is possible to test for heteroscedasticity using a

likelihood ratio test. The test statistic LR is distributed as a chi square with degrees of freedom equal to the number of explanatory variables included in the model of the error variance.

18. We initially used data from the 1996 Area Resource File (U. S. Department of Health and Human Services 1997) to construct county-level heterogeneity measures for age, gender, and income that could serve as instruments for the corresponding establishment-level variables. Unfortunately the county-level variables had virtually no explanatory power for the establishment-level variables and therefore were not viable instruments.

19. The ordinary (homoscedastic) specification was strongly rejected for two of the three dependent variables. As discussed previously, the results are also robust to changes in the way plans are classified.

20. Including each age and income category as a separate variable places fewer restrictions on the functional relationship between age/income and plan breadth than would be the case if we only used average age or average income. For this reason it seems unlikely that our heterogeneity measures pick up nonlinearities that have nothing to do with heterogeneity per se.

21. We re-estimated the models using firm and establishment size separately to characterize the size of the employment group. Establishment size appears to be a slightly better predictor of the breadth of plan offerings than firm size. Results for the remaining variables were similar to those obtained in our base specification that controlled for both firm and establishment size simultaneously.

22. One example is the Health Insurance Plan of California, a small-group purchasing alliance that has significantly increased the number of plan choices available to employees of participating firms (Buchmueller 1997).

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