HOUSEHOLD DEMAND FOR HEALTH INSURANCE: PRICE AND SPOUSE'S COVERAGE

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Abstract

Demand for employment-based insurance is typically treated as an individual rather than a household decision. Dual-earner households are now the modal U.S. married household, however, and most firms offer family coverage as an option available to employees. Findings from a model estimating married workers' take-up of their own insurance with their own and their spouses' offers indicate that both own price and potential coverage under spouses' plans are important determinants of take-up. We find evidence of selection into jobs offering insurance among wives but not husbands. Findings also suggest that dual-earners are not aware of the potential wage/benefit trade-off. Data are from the 1996 panel of SIPP.

Demand for employment-based health insurance has typically been treated as an individual rather than a household decision. Dual-earner households are now the modal U.S. married household, however, and most firms offer family coverage as one of the options available to employees. Casual observation and economic theory suggest that the insurance coverage decision commonly takes place in a household joint optimization framework.

Previous research has focused on the employee rather than the household decision in large part because of the unavailability of data providing a key element in the take-up decisions of all working households -- the price of insurance -- together with information critical to the decisions of dual-earner households -- whether spouses are offered their own health insurance. In this study, we estimate household offer and take-up functions using Wave 5 of the 1996 panel of the Survey of Income and Program Participation (SIPP), which provides information on the out-of-pocket premium for each worker in the household offered insurance and on several other features of insurance offers, in addition to detailed demographic and employment information on spouses as well as respondents.

Our findings from a selection model that estimates married workers' take-up of their own employer-based insurance with both their own and their spouses' insurance offers indicate that both own insurance cost and opportunities for coverage under spouses' employer-based plans are

statistically important determinants of insurance take-up in dual-earner households. Relative elasticities of price and spouse's offer suggest that potential coverage by spouses plays a larger role in the decision to elect own coverage. We also find evidence of worker sorting into jobs offering health insurance among wives in dual-earner households, but not among husbands. Finally, our findings suggest that dual-earners may be unaware of the potential trade-off between wages and health benefits.

The following section reviews the evidence to date on the influence of price and spouse's coverage on insurance take-up. We then present a selection model of household offers and take-up and provide a number of alternative scenarios of joint optimization in dual-earner households. The next section describes our estimation strategy and the SIPP data. The last section presents our findings and discusses their implications for the alternative models of household decision-making we have posed.

I. Measuring Price and Spousal Options

Determining the relative roles of price and alternative coverage options in explaining take-up has been complicated by the absence of information on both factors in a single data source. Studies using employer surveys to examine the effect of price on insurance demand have lacked the necessary information on spouse's offers. In Chernew, Frick, and McLaughlin (1997), for example, the analysis is limited to single workers. Cooper and Vistnes (2001) examines the role of price on single and married workers' take-up but, for the latter, cannot evaluate the role of spousal offers. Analyses using household surveys, lacking data on prices facing workers and eligible spouses, have used proxies such as firm size (reflecting loading fee charges), household marginal

tax rates, or geographical identifiers, and have focused on the less complex issue of worker rather than household demand (see Marquis and Long [1995] for a review of the early literature and more recently, Gruber [2001], Bernard and Selden [2003], and Gruber and Washington [2003]).

Monheit, Schone, and Taylor (1999) examines the probability of double coverage among dual-offer households. The authors avoid the limitations of using either an employer or a household survey by merging the 1987 Medical Expenditure Panel Survey household component with the survey's insurance component to link demographic data with employer-provided information on premiums. Information on insurance price is available for only a small fraction of this sample, however, either because workers refused to identify employers or employers failed to respond. Findings on a sample of 656 dual-offer households with reported premium values indicate that double coverage was elected only when both spouses were offered no-cost coverage; in cases in which only one spouse was offered no-cost coverage, the no-cost option was elected.

Marquis and Kapur (2004) also examines the role of price in the choices of households offered dual coverage using data from the March CPS for 1997-2001 and the 1997 Robert Wood Johnson Foundation Employer Health Insurance Survey. Consistent with the findings of Monheit et al (1999), families with children were more likely to purchase two family policies when both employers paid the full premium cost. If both employers paid the full premium for single coverage, families were more likely to purchase some type of plan from both employers.

In Blumberg, Nichols, and Banthin (2001), the 1996 versions of the Medical Expenditure Panel Survey household and insurance components are merged to examine take-up among single workers and workers in family units (married or with children). As in the earlier versions of these

surveys, information on insurance price is available for only a small proportion (15 percent) of the sample. Findings indicate that workers in families, but not single workers, respond to out-of-pocket premiums. In addition, workers whose spouses have insurance offers, receipt of which is treated as exogenous, are found to have lower take-up rates.

Dushi and Honig (2003) uses data from several supplements to the Current Population Survey (CPS) covering the period 1988-2001 to examine the relative roles of insurance cost, measured by the employee's share of total premium costs, and spousal coverage in the decisions of married wage and salaried workers to elect employer-based coverage. Unlike previous studies, spouses' coverage under his or her own employer plan is treated as endogenous to the employee's take-up decision. Findings indicate that the decisions of workers to elect coverage are influenced both by their share of plan costs and by whether their spouses are covered under their own plans. Paying part or all of the total premium results in a 2 percent decline in take-up among married men and a 5 percent decline among married women. The effect of having spouses with their own insurance is considerably larger. Spouses' coverage lowers the likelihood of husbands' take-up of own insurance by 23 percent and the likelihood of wives' take-up of own insurance by 50 percent.

The issue of joint decision-making is not addressed in these studies because of the limited information on spouses. In this analysis, we make use of the more complete information on the demographic and employment characteristics of both respondents and spouses, and on the prices they face, in Wave 5 of the 1996 panel of SIPP. These data provide two measures of insurance price, the out-of-pocket premium and the worker's share of total premium cost, for which survey response rates are high. Information on spouses' offers comparable to that provided for

respondents allows us to consider take-up in dual-earner households as a joint decision. This information also permits us to treat the receipt of insurance *offers* in such households in a joint decision-making framework. The concept of worker sorting into jobs offering different wage/benefit packages is part of the broader literature on compensating wage differentials and was first discussed in the context of employer-sponsored health insurance in Goldstein and Pauly (1976). Profit maximization in competitive markets requires firms offering non-wage compensation to pass the costs to workers in the form of lower wages. Utility-maximizing workers with tastes for health benefits are willing to accept this wage offset and will accordingly select into firms offering insurance coverage.

Empirical confirmation of worker sorting has been limited. Monheit and Vistnes (1999) finds lower offer rates among single workers who report weak preferences for health insurance coverage in the 1987 National Medical Expenditure Survey.[1] Blumberg et al (2001) provides evidence of sorting in a sample of male and female workers who are married or have children. Oyer (2004) finds that workers with families are significantly more likely to hold jobs offering employer-provided health insurance. Evidence on whether dual-earner households engage in joint job sorting is mixed. Buchmueller (1996/97) finds no indication that full-time working wives sort into jobs not offering insurance if their husbands are offered coverage. Royalty and Abraham (2004), however, finds that husband's/wife's coverage has significant negative effects on spouse's labor force participation, full-time work status, and offer of insurance coverage.

Evidence of a wage/benefit trade-off is also mixed. Findings by Gruber (1994) and Olson (2002) support the prediction of a negative relationship between wages and benefits. The latter,

for example, finds that wages are lower among full-time working wives with insurance coverage. Levy and Feldman (2001) and Simon (2001), however, find no evidence of the predicted trade-off.[2]

We present below a simple framework for estimating married workers' take-up of their own employer-based insurance with both their own and their spouses' offers that allows us to determine whether offers, as well as take-up, are considered in household decisions.

II. Estimating Household Demand for Health Insurance

We first consider the demand for insurance by an individual worker. Let TU be the probability that an employee elects offered insurance coverage, which is a function of employee characteristics X, price P, and unobservables, including tastes for insurance, ε_1:

$$TU_i = \alpha_0 + X_i\alpha_1 + \alpha_2 P_i + \varepsilon_{1i} \qquad (1)$$

The parameters of this demand equation estimated on workers offered health insurance will be biased if workers select into jobs that offer health insurance based on their preferences for insurance, which are unobserved. We thus estimate insurance take-up in a sample-selection framework:

$$\begin{aligned} TU_i &= \alpha_0 + X_i\alpha_1 + \alpha_2 P_i + \varepsilon_{1i} \\ Off_i &= \beta_0 + X_i\beta_1 + Z_i\beta_2 + \varepsilon_{2i} \end{aligned} \qquad (2)$$

where Off is the probability of receiving an offer, X is a vector of individual characteristics, Z is a vector of job characteristics, and the ε's are the error terms. If job sorting is an important aspect of worker behavior, $Cov(\varepsilon_1,\varepsilon_2)>0$. If, in addition, workers sort on price, P is endogenous to take-up.

Estimation of insurance demand in the case of a married worker in a dual-earner household is more complex because of the option of coverage under a spouse's employment-based plan. Assuming that dual-earner households maximize household rather than individual utility, the couple may decide whether to select into jobs with offers of insurance coverage, which member should do so if not both and, based on offer outcomes, who should elect coverage if there is more than one offer.[3] The wife's take-up, shown below, may thus be jointly determined with both her own and her husband's offer:

$$\begin{aligned} TU_{wi} &= \alpha_0 + X_{wi}\alpha_1 + \alpha_2 P_{wi} + \alpha_3 Off_{hi} + \varepsilon_{1i} \\ Off_{wi} &= \beta_0 + X_{wi}\beta_1 + Z_{wi}\beta_2 + \beta_3 Off_{hi} + \varepsilon_{2i} \\ Off_{hi} &= \gamma_0 + X_{hi}\gamma_1 + Z_{hi}\gamma_2 + \gamma_3 Off_{wi} + \varepsilon_{3i} \end{aligned} \qquad (3)$$

The husband's take-up is determined similarly:

$$\begin{aligned} TU_{hi} &= \alpha_0 + X_{hi}\alpha_1 + \alpha_2 P_{hi} + \alpha_3 Off_{wi} + \varepsilon_{1i} \\ Off_{hi} &= \beta_0 + X_{hi}\beta_1 + Z_{hi}\beta_2 + \beta_3 Off_{wi} + \varepsilon_{2i} \\ Off_{wi} &= \gamma_0 + X_{wi}\gamma_1 + Z_{wi}\gamma_2 + \gamma_3 Off_{hi} + \varepsilon_{3i} \end{aligned} \qquad (3')$$

The model above generates a number of alternative scenarios of household decision-making regarding health insurance coverage, depending on whether the couple is aware that insurance offers may be offset by lower offered wages and whether they engage in job selection on the basis of insurance offers.

In Scenario 1, couples are aware of a potential wage/benefit offset and select into jobs that provide them with the best combination of wage income and insurance coverage. The household

decides which partner will sort into a job with an offer of family health insurance and which one into a job with a good wage offer, and the household receives a single insurance offer. Offer decisions are thus jointly determined. Error terms of the two offer equations, $\varepsilon_2\varepsilon_3$, will be negatively correlated due to joint optimization of the wage/offer package. Coefficients on spouses' offers in the wife's and husband's offer equations, β_3 and γ_3, will also be negative.[4]

In addition, error terms $\varepsilon_1\varepsilon_2$ will be positively correlated for the partner sorting into a job with an offer because the couple's taste for insurance, expressed in this offer, will be reflected in a higher probability that he/she elects coverage for the family. Finally, α_3, the coefficient on spouse's offer in the husband's and wife's take-up equations, will be negative because the household elicits only one offer.

Scenario 2, a less restrictive model, does not assume household awareness of a wage/benefit offset. The trade-off between wages and insurance may not, in fact, be transparent to workers because firms paying high wages, based in part on unobservable characteristics related to productivity, are also likely to offer benefits.[5] It may thus appear to the typical worker that the relationship is, on the contrary, positive.[6]

Scenario 2 does, however, maintain the assumption of Scenario 1 that one partner sorts into a job on the basis of an insurance offer to guarantee that the household receives an offer (thus Cov $(\varepsilon_1,\varepsilon_2)>0$ for this partner), and that the other partner sorts on a wage offer. Because the household is not aware of the possibility of a wage/insurance trade-off, however, the wage-sorting spouse does not sort *against* an insurance offer. Thus his/her best wage offer may be randomly

associated with an insurance offer. Errors $\varepsilon_1\varepsilon_2$ in this partner's offer and take-up equations will not be correlated, however, because he/she has not selected into this job on the basis of the offer.

The couple may decide to conduct their searches either simultaneously or sequentially. If job search is simultaneous, coefficients on spouses' offers in the wife's and husband's offer equations, β_3 and γ_3, will be zero. The partner sorting on a wage offer may receive an insurance offer, but this offer is not a function of his/her spouse's offer outcome; the other partner sorts on an insurance offer, regardless of the offer outcome of his/her partner. Correlation of the error terms of the two offer equations, $\varepsilon_2\varepsilon_3$, will also be zero due to the randomness of the offer outcome of the wage-sorting spouse.

If job searches are sequential, the partner designated to search for an insurance offer waits for the outcome of his/her partner's search because it may yield an insurance offer. The coefficient on spouse's offer, β_3, in this partner's offer equation, will thus be negative because he/she responds to the offer outcome of the partner. The coefficient on spouse's offer, γ_3, in the offer equation of the wage-sorting partner will be zero, as in the case of simultaneous search. Correlation of the error terms of the two offer equations, $\varepsilon_2\,\varepsilon_3$, is indeterminate, however. If the wage-sorting partner does not receive an offer, his/her partner will sort into a job with an offer to assure that the household has access to health insurance; thus $Cov(\varepsilon_2,\varepsilon_3)<0$. If the wage-sorting partner does receive an offer, there is no need for the other partner to sort on insurance; $Cov(\varepsilon_2,\varepsilon_3)=0$ if an offer is received randomly.

Whether there is simultaneous or sequential job search, the coefficient on spouse's offer, α_3, in each partner's take-up equation is likely on average to be negative. In households with just

one offer, the partner with the offer takes it and $\alpha_3<0$. If, instead, this partner is in a household with two offers, and the household maximizes on take-up, only one offer is taken. Thus, $\alpha_3<0$ if this partner's offer is not taken, but $\alpha_3>0$ if it is taken.

Thus far, we have assumed that joint utility maximization takes place at both the offer and take-up stages. It is possible, of course, that the issue of insurance coverage does not enter into household job search and thus Cov $(\varepsilon_1,\varepsilon_2)=0$ for both partners (Scenario 3). Nonetheless, offers may be received randomly. In this case, β_3, γ_3, and Cov $(\varepsilon_2,\varepsilon_3)$ are indeterminate. However, if households optimize with respect to take-up, $\alpha_3<0$, as in Scenario 2 above.

III. Data and Estimation

The SIPP is conducted by the Bureau of the Census on a nationally representative sample of the civilian non-institutionalized population.[7] All household members are interviewed at four-month intervals over a four-year period and asked a series of core demographic and economic questions. In addition, topical modules (waves) focus on specific areas of interest. We use the Wave 5 module in which all workers in the household were asked about employer offers of insurance, eligibility, participation, out-of-pocket premiums, and cost-sharing arrangements.[8] They were also asked whether alternative benefits were offered such as employer contributions to a 401(k) plan, medical savings accounts, tax-free employee contributions to a flexible spending account, or cash or salary bonuses. Demographic information on respondents and spouses includes race and ethnicity, education, age and health status; family characteristics include income, home ownership and presence of children. Our sample consists of 1,268 matched households in which both spouses are working either full- or part-time.[9]

Estimating demand for health insurance by dual-earner households is complicated because the offer decisions of the two partners are jointly determined. Estimating model (3) for the wife, for example, contains elements of both a structural model of household offers, Off_w and Off_h (each partner's offer is endogenous to the other's offer) and a sample selection model (wife's offer, Off_w, and her take-up, TU_w).

We thus estimate Off_h separately and include its predicted value in both equations, Off_w and TU_w, of the wife's selection model. Specifically, we estimate a reduced form probit equation of the probability that her husband has an offer (Off_h) as a function of his individual and job characteristics as well as those of his wife (instead of including his wife's offer, Off_w, as in simultaneous estimation).[10] We then include the fitted value of her husband's offer as a regressor in both the wife's offer and take-up equations.[11] Since Off_h is treated as endogenous to Off_w and TU_w, we require at least one instrument in Off_h that does not appear in Off_w and TU_w, but is correlated with Off_h and uncorrelated with ε_1 and ε_2. Previous researchers have used spouse's individual and/or job characteristics as instruments.[12] The estimated parameter of the predicted husband's offer will be biased, however, if either his job attributes are correlated with ε_2 (because he changed jobs in response to his wife's insurance offer) or his individual characteristics are correlated with ε_2 (due to assortative mating).[13] We tested for this potential bias in a linear structural model (see footnote 11) and were unable to reject the null hypothesis that our instruments for Off_h are not correlated with ε_2.[14] We then estimate Off_w and TU_w jointly using a standard Heckman selection procedure for probit models.[15]

In addition to the spouse's offer, we also treat the out-of-pocket premium as endogenous in

the take-up equation of each partner. Price may be endogenous for two reasons. If workers select into jobs because of strong preferences for health insurance, their response to the price of insurance will not reflect that of the typical employee.[16] In addition, price may be set by employers according to the preferences of their employees, as discussed above.

Because price is available only for employees who elect coverage, we use a regression-based method to impute the out-of-pocket premium for non-takers.[17] We first estimate a reduced form take-up equation, excluding the premium, among employees who are offered health insurance and generate the inverse Mills ratio (λ).[18] We then estimate among takers the out-of-pocket premium and cost sharing equations, including λ to control for differences between takers and non-takers.[19] We then impute the premium for both takers and non-takers using estimated parameters from this second step, which have been purged of potential selection bias.[20] Because we focus on married households, we use the family rather than the single premium[21]

Identification of the take-up equation requires that the offer equation include at least one variable that does not appear in the take-up equation. We use as exclusion restrictions firm size, occupation and industry.[22] Finally, all exogenous variables that appear in the offer equations are also included in the take-up equations.

IV. Estimation Results

Table 1 reports estimates of the probabilities of receiving a health insurance offer and of electing coverage in dual-earner households. Columns 1 and 2 present estimates of insurance take-up and offers of wives, and columns 3 and 4 present estimates for husbands.

Estimates in columns 1 and 3 confirm the intuition that dual-earner households jointly maximize with respect to the take-up of insurance. Coefficients on spouses' offers (α_3 in 3 and 3') are negative and significant in the take-up equations of both wives and husbands (*p*-values <.01), indicating that partners are less likely to elect their own offered coverage if spouses also have insurance options.

Values of ρ, indicating the correlation of residuals $\varepsilon_1\varepsilon_2$ in offer and take-up equations, are reported at the bottom of columns 1 and 3. The significant positive correlation for wives (0.82; *p*-value=.07) indicates that job sorting is an important aspect of household behavior. This finding allows us to eliminate Scenario 3 which, alone among the three alternative models of household behavior formulated above, does not provide for job search on health insurance coverage.

The insignificant value of ρ for husbands, however, suggests that job sorting on health insurance is an activity in dual-earner households engaged in primarily by wives. Job selection on health insurance by one spouse exclusively is consistent with both Scenarios 1 and 2. Also consistent with both scenarios is our finding, discussed above, that the coefficients on spouses' offers, α_3, are negative and significant in the take-up equations of both husbands and wives.

Scenarios 1 and 2 differ depending on whether the household is aware of the possibility of a wage/benefit offset. If this were the case (Scenario 1), the coefficients on the spouse's offer (β_3 in 3 and 3'), would be negative and significant in the offer equations of both wife and husband. The coefficient on the wife's offer in the husband's offer equation, however, is not different from zero, indicating that the partners do not jointly optimize the receipt of insurance offers. This

behavior is not consistent with recognition of the likelihood that jobs offering health benefits pay lower wages, all else equal.

We thus turn to Scenario 2, in which one partner sorts on an insurance offer to provide coverage for the household and the other partner sorts on wages (but does not sort against an insurance offer). This behavior is consistent with two alternative modes of job search, simultaneous or sequential, by the couple. If search is simultaneous, coefficients on spouses' offers in both partners' offer equations are expected to be zero (because offers are drawn randomly). We find, however, that in the wife's offer equation, the coefficient of husband's offer is negative and significantly different from zero (p-value<.01).

If job search is sequential, the coefficient on spouse's offer in the offer equation of the insurance-sorting partner will be negative and significant because he/she responds to the offer outcome of the wage-sorting partner, which may or may not involve an insurance offer. Our finding that in the wives' offer equation, the coefficient on spouse's offer is negative and significant suggests that, on average, it is the wife who is designated to sort on insurance and that she does so in response to the insurance offer outcome of her husband. If he happens to receive an offer, she does not sort on insurance (although she may receive an offer randomly); if he does not receive an offer, she sorts into a job with an insurance offer.

In sequential search, correlation of the error terms $\varepsilon_2\varepsilon_3$ of the two offer equations is indeterminate. If the wage-sorting partner does not receive an offer, his/her partner sorts into a job with an offer to assure that the household has access to health insurance; thus $Cov(\varepsilon_2,\varepsilon_3)<0$. If the wage-sorting partner receives an offer, there is no need for the other partner to sort on insurance,

but he/she may receive an offer randomly. In this case, Cov(ε_2,ε_3) is predicted to be zero, in contrast to alternative scenarios discussed above, which require Cov(e2,e3)<0. We find, however, that offer equation residuals ε_2 ε_3 are positively correlated.[23] This result is anomalous, given that all other estimated parameters are consistent with a model of sequential job search. We attribute this positive correlation to remaining unobserved aspects of positive assortative mating that we have been unable to control for in our estimation.[24]

We now turn to discussion of the question raised at the beginning of this paper: Does either the price of a dual-earner's own health benefits or the option of coverage under a spouse's insurance play a role in the decision to elect one's own employer-provided coverage? If both, which factor is more important?

Estimates of the take-up decision of wives and husbands offered coverage (columns 1 and 3 in Table 1) indicate that the out-of-pocket premium is an important determinant of take-up for both wife and husband (*p*-values<.01). Price elasticities are .19 for wives and .08 for husbands.[25] The opportunity for coverage under spouses' employer plans also has a significant negative impact on whether dual-earners elect their own coverage (*p*-values<.01), as discussed above. The elasticity of wives' take-up of their own offers with respect to their husbands' offers is .45; husbands' elasticity with respect to their wives' offers is .19. Two patterns emerge from these results. Husbands' take-up of their own employment-based benefits is less responsive to the price of their own insurance and to opportunities for coverage afforded by their wives' employment than is their wives' take-up. Secondly, among both wives and husbands, an increase in the probability that their spouses have

health insurance options results in a larger decline in the likelihood that they take their own offered coverage than an increase in their out-of-pocket premiums.

Columns 1 and 3 also indicate that the take-up of offered insurance of both wives and husbands is less likely if their employers offer alternatives to health benefits such as contributions to 401(k) plans, medical savings accounts, tax-free employee contributions to flexible spending accounts, or cash or salary bonuses. Higher wages increase the likelihood that both wives and husbands elect their own coverage. Among demographic factors, neither health status nor age affects the take-up of offered coverage; however, the presence of children in the household substantially reduces wives' take-up of their own offers. Because we examine dual-earner households, the availability of alternative insurance coverage for children from public sources is unlikely to explain this result.[26] A more plausible explanation is that in households with dual offers, the presence of children increases the probability that not only children but also wives will be covered under husbands' plans. This is particularly likely if husbands' higher wages are associated with more generous insurance coverage. [27]

Columns 2 and 4 report estimates of the offer equations of wives and husbands. As discussed above, wives are less likely to be in jobs offering health benefits if their husbands have employment-based offers, whereas husbands' offers are unrelated to their wives' offers. Firm and worker characteristics are strongly linked to the probability that members of the household are offered coverage. Larger firms and higher wages are positively associated with the probability of receiving an offer among both wives and husbands.[28] Employment in service-oriented occupations (laborers are the omitted category) is associated with a lower likelihood of being offered coverage

for both spouses, as is employment in technical occupations and goods-producing industries for husbands. Interestingly, being in a union does not have an additional effect for husbands, but it reduces substantially the probability that wives are offered coverage. Wives are more likely to be offered coverage in the south, and husbands less likely in the midwest, compared to the northeast; wives are less likely to receive offers in urban areas. Wives with children and husbands in poor health are less likely to work in jobs offering coverage.

While there are no observed racial or ethnic differences in the take-up of insurance, non-Hispanic black and Hispanic husbands are considerably less likely to be in jobs offering insurance than non-Hispanic white husbands, and Hispanic wives are less likely to be offered insurance than non-Hispanic wives.

V. Conclusion

Findings from a selection model that estimates married workers' take-up of their own employer-based insurance with both their own and their spouses' insurance offers indicate that both own insurance price and opportunities for coverage under spouses' employer-based plans are important determinants of insurance take-up in dual-earner households. Relative elasticities with respect to price and spouse's offer indicate that potential coverage by spouses plays the larger role in the decisions of both husbands and wives regarding take-up of their own coverage. We also find evidence that wives, but not husbands, in dual-earner households sort into jobs offering health insurance. Finally, our findings suggest that dual-earners may be unaware of the potential trade-off between wages and health benefits.

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Table 1. Heckman selection estimates of the probabilities of receiving a health insurance offer and of electing coverage, dual-earner households

	Wives		Husbands	
Independent variable	Take-up	Offer	Take-up	Offer
Constant	1.665	-3.128***	3.222***	-1.102***
	(1.151)	(0.449)	(1.030)	(0.406)
Out-of-pocket premium[a]	-0.012***	---	-0.013***	---
	(0.002)		(0.003)	
HI alternatives	-0.313***	---	-0.250*	---
	(0.114)		(0.138)	
Spouse has offer[a]	-0.537***	-0.222***	-0.485***	0.0006
	(0.127)	(0.072)	(0.139)	(0.052)
Log weekly wage	0.489***	0.579***	0.191*	0.294***
	(0.090)	(0.051)	(0.109)	(0.038)
Home ownership	0.103	0.008	0.186	0.217***
	(0.115)	(0.074)	(0.136)	(0.063)
Children[b]	-0.378***	-0.376***	-0.090	0.019
	(0.090)	(0.054)	(0.105)	(0.051)
Poor/fair health	0.131	-0.033	-0.264	-0.291***
	(0.188)	(0.119)	(0.233)	(0.109)
Age	-0.050	0.011	-0.007	-0.022
	(0.038)	(0.022)	(0.040)	(0.019)
Age^2	0.0004	-0.0003	-0.0001	0.0002
	(0.001)	(0.000)	(0.001)	(0.000)
Non-Hispanic black	-0.199	-0.131	0.012	-0.218**
	(0.168)	(0.103)	(0.206)	(0.098)
Non-Hispanic other	0.146	0.183	-0.196	-0.101
	(0.208)	(0.126)	(0.254)	(0.114)
Hispanic	-0.191	-0.258**	-0.195	-0.256***
	(0.165)	(0.102)	(0.206)	(0.094)
Midwest	-0.190	0.110	-0.135	-0.115*
	(0.135)	(0.080)	(0.156)	(0.068)
South	-0.072	0.367**	-0.095	0.051
	(0.143)	(0.079)	(0.161)	(0.067)
West	-0.027	0.122	0.038	-0.067
	(0.147)	(0.092)	(0.165)	(0.077)

Table 1 (cont.)

MSA	-0.128	-0.228***	-0.164*	-0.039
	(0.094)	(0.051)	(0.097)	(0.046)
Firm size 25-99	---	0.724***	---	0.508***
		(0.097)		(0.083)
Firm size 100+	---	0.785***	---	0.857***
		(0.073)		(0.065)
Union member	---	-0.359***	---	-0.066
		(0.107)		(0.114)
Professional occupation	---	-0.035	---	-0.070
		(0.141)		(0.077)
Technical occupation	---	0.022	---	-0.202***
		(0.106)		(0.072)
Service occupation	---	-0.315**	---	-0.339**
		(0.145)		(0.137)
Producation/craft/repair occupation	---	0.059	---	0.027
		(0.162)		(0.095)
Goods-producing industry [c]	---	-0.112	---	-0.161***
		(0.089)		(0.056)
High school graduate	---	0.067	---	-0.046
		(0.114)		(0.092)
Some college	---	0.055	---	-0.016
		(0.129)		(0.115)
College graduate	---	0.003	---	-0.114
		(0.140)		(0.111)
ρ (rho)	0.820		0.510	
p -value	(0.073)		(0.429)	
N	836	1268	940	1268

Notes: Dependent variables: Take-up = 1 if individual elects own coverage; Offer = 1 if individual is offered health insurance by employer. Robust standard errors in parentheses. Omitted racial, education, region, firm size and occupational categories are Non-Hispanic white, high school drop out, east, firm size <=24, and laborers, respectively.

[a] Treated as endogenous.

[b] Children = 1 if children present in household.

[c] Industry = 1 if agriculture, mining, construction or manufacturing; and 0 if transportation, utilities, trade or services.

* $p < .1$, ** $p < .05$, and *** $p < .01$

Appendix Table 1. Sample distribution of offers and take-up of husbands and wives

	Wife				
	Total	Not Offered	Offered	Of those offered	
				Take-up	Decline
Husband					
Total	1268	432	836	527	309
	100%	*34.07*	*65.93*	*41.56*	*24.37*
Not Offered	328	132	196	143	53
	25.87	*10.41*	*15.46*	*11.28*	*4.18*
Offered	940	300	640	384	256
	74.13	*23.66*	*50.47*	*30.28*	*20.19*
Of those offered:					
Take-up	734	249	485	264	221
	57.89	*19.64*	*38.25*	*20.82*	*17.43*
Decline	206	51	155	120	35
	16.25	*4.02*	*12.22*	*9.46*	*2.76*

Note: Numbers in italics are percentages of the total sample.

Appendix Table 2. Weighted sample means[1]

	Wives		Husbands	
	Take-up	Offer	Take-up	Offer
Offer		0.66		0.73
Take-up	0.63		0.78	
Independent variables				
Imputed out-of-pocket premium	95.97		114.17	
HI alternatives	0.13		0.11	
Spouse has an offer	0.76	0.73	0.68	0.66
Log weekly wage	6.15	5.96	6.45	6.36
Home ownership	0.81	0.80	0.83	0.8
Children present	0.50	0.54	0.54	0.54
Poor/fair health	0.05	0.06	0.04	0.05
Age	37.98 *(0.33)*	38.07 *(0.27)*	40.1 *(0.33)*	40.07 *(0.28)*
Non-Hispanic white	0.83	0.81	0.84	0.81
Non-Hispanic black	0.06	0.06	0.06	0.06
Non-Hispanic other	0.04	0.04	0.04	0.04
Hispanic	0.07	0.09	0.07	0.08
Northeast	0.16	0.17	0.18	0.17
Midwest	0.29	0.30	0.29	0.30
South	0.38	0.35	0.36	0.35
West	0.18	0.18	0.17	0.18
MSA	0.56	0.57	0.57	0.57
Firm size 1-24		0.23		0.20
Firm size 25-99		0.13		0.14
Firm size 100+		0.65		0.66
Union member		0.07		0.14

Appendix Table 2 (cont.)

Occupation				
Professional		0.33		0.27
Technical		0.41		0.22
Service		0.12		0.04
Producation/craft/repair		0.03		0.21
Laborer		0.11		0.25
Goods-producing industry		0.21		0.44
High school dropout		0.08		0.09
High school graduate		0.34		0.35
Some college		0.34		0.31
College graduate		0.23		0.25
N	836	1268	940	1268

[1] Standard errors < 0.02 unless noted.

Appendix Table 3. Sample Exclusions

Number of married persons ages 20-64	23,975
Number of married persons with matched spouses	19,967
Number of married persons in dual-earner households	12,107
with valid responses on own offer	9,611
with valid responses on own and spouse's offer	7,609
with consistent responses to cost sharing and premium	6,888
with valid responses on own demographic and job characteristics	4,113
with valid repsonses on own and spouse's demographic and job characteristics	2,536
Number of households	1,268

Notes

[1] See their discussion of studies providing empirical evidence consistent with sorting behavior.

[2] See Brown (1980), Smith and Ehrenberg (1983), and Rosen (1986) for a discussion of the difficulties involved in measuring the "price" of employer benefits in terms of lower wages.

[3] We do not specify here the process by which dual-earner households arrive at a single objective function regarding insurance coverage. There is an extensive literature on household decision-making, including models in which spouses' preferences are heterogeneous and decisions are a function of the bargaining power of each partner, and, more recently, models of preference-based assortative matching. See Becker (1973, 1974), McElroy and Horney (1980), Manser and Brown (1980), Lundberg and Pollak (1993, 1996), Browning and Chiappori (1998), and Lich-Tyler (2003).

[4] We present models for both the wife (3) and husband (3') for clarity of exposition throughout our discussion. Offer equations in (3) and (3') are identical but in reverse order for wives and husbands. In Table 1, which reports our estimation results, coefficients on spouse's offer are the β_3's in (3) and (3').

[5] A number of studies have thus found a positive relationship between wages and benefits; see Morrisey (1993), Cooper and Schone (1997), Blumberg (1999), Gruber and Lettau (2000), Bundorf (2002), and Vanness and Wolfe (2002).

[6] In addition, firms with worker heterogeneity may recover insurance costs through higher out-of-pocket premiums rather than reduced wages. In the presence of imperfect worker sorting, firms may use high premiums to select workers with strong tastes for insurance, allowing minimal wage

reductions for remaining employees (Levy 1998). As Cooper and Vistnes (2001) observe, their own finding, and that of other researchers, that take-up rates are more sensitive to changes in employee contributions than total premiums implies that employees view the out-of-pocket premium as the relevant price of insurance and may not recognize that higher employer contributions reduce wages.

[7] The 1996 Panel contains 40,188 households and 95,402 individuals.

[8] Survey response rates for out-of-pocket premium and cost-sharing are 81 and 95 percent of takers, respectively; imputed values are provided for non-reporting takers. There were inconsistencies in responses with respect to cost sharing and out-of-pocket premiums. Some respondents reported that the employer paid the full cost but gave a positive amount for the out-of-pocket premium; others reported that they paid some of the cost but reported a zero amount for the out-of-pocket premium. We excluded such cases. Similar to other surveys on health insurance coverage, SIPP collects information on plan features, including price, only for workers electing coverage. We impute values for non-takers using selection-correction imputation.

[9] Appendix Table 1 presents the sample distribution of offers and take-up for husbands and wives. Weighted descriptive statistics appear in App. Table 2 and sample exclusions in App. Table 3.

[10] The pseudo R^2 of Off_h is .111; the corresponding pseudo R^2 of Off_w is .186.

[11] This approach is similar to 3SLS estimation, which we would use if our interest were solely in estimating the two offer equations. In contrast to our approach, 3SLS estimates are consistent and efficient, as they are obtained using the covariance matrix of the equation disturbances. Our estimates, while not efficient, are consistent. To test the robustness of our offer equation

parameters, we estimated a structural model of the two offers by 3SLS. The signs and significance levels of the coefficients on spouse's offer in the offer equations, as well as of other explanatory variables, were consistent in the two approaches.

[12] Buchmueller (1996/1997), for example, uses both spouses' individual and job characteristics; Olson (2002) uses firm size and union status.

[13] See the discussion of these possibilities in Royalty and Abraham (2004).

[14] We use an overidentification test because we have more instruments than necessary to identify spouse offer equations. The test (Sargan) statistic is 19.17 (*p-value* = 0.260); the comparable statistics for Off_w in the husbands' model is 11.4 (*p-value* = 0.781).

[15] The husband's offer and take-up equations, Off_h and TU_h, are estimated similarly. We also estimated the take-up equation, including a sample selection correction derived from the estimation of the offer equation, by OLS and probit. Signs and significance levels of the estimated parameters were comparable to our maximum-likelihood estimates.

[16] For the same reason, wage may also be endogenous to the take-up decision. We refrain from treating it as such because of the number of other endogenous variables in our estimation and because it is not the major focus of our investigation.

[17] Hot deck imputation does not take into account differences in the unobservables that may determine election of coverage. See Blumberg et al (2001); also see Marquis and Louis (2002) for imputation of premiums for employers not offering insurance.

[18] We include individual characteristics such as gender, race, ethnicity, age groups, presence of children, log wage, homeownership, as well as job characteristics such as firm size, occupation, and

industry.

[19] The premium and cost-sharing equations are estimated using a standard Heckman procedure. In the first step, the cost sharing (whether employee pays none [=0] or a positive amount [=1]) equation is estimated; in the second step, we estimate the dollar amount of the out-of-pocket premium conditional on a positive amount. Log wage, firm size, industry, occupation, region, MSA, health insurance alternatives, and λ are the regressors which are common to both stages. We use education as an exclusion restriction in the cost sharing equation to identify the premium. While firm size, occupation, and industry are included in λ and in the estimated premium equation, the structural take-up equation is identified by excluding them.

[20] We exclude λ from the imputation because we expect price to be related to the take-up decision and λ is used as a regressor to estimate price. Inclusion of λ may otherwise result in a negative bias in the coefficient on price in the take-up equation. We use these imputed values for both takers and non-takers because we treat price as endogenous in the take-up equation.

[21] The out-of-pocket premium may be measured with error either because of reporting errors or because the amount of the out-of-pocket premium depends on the number of family members covered. To account for the latter, we control for the presence of children in the household in our premium imputation.

[22] If these firm characteristics affect offer and, through offer, the premium, the estimated effect of the premium on take-up may be biased. We estimated the take-up equation conditional on the offer to test for this possibility and found the premium estimate to be robust.

[23] Correlation from a bivariate probit estimation of the two offer equations is .14 (*p*-value=.02).

[24] We remove potential effects of assortative mating by instrumenting spouse's offer using spouse's personal and job characteristics. These instruments easily pass the over-identification test, as discussed above. Other unobservable characteristics, as well as unobserved tastes, may remain to introduce a positive correlation into the residuals of the two offer equations.

[25] These values are in the range found in other studies. See, for example, Short and Taylor (1989), Gruber and Poterba (1994), Marquis and Long (1995), Chernew et al (1997), and Blumberg et al (2001).

[26] The proportion of families receiving public insurance coverage for children in our sample is very small. SCHIP, the insurance program at the state level for children in low-income families, was not introduced until 1997 and thus is not included in our data.

[27] The mean weekly wage among husbands in our sample is $735; among wives, the mean is $494.

[28] The coefficient on the wage in both offer and take-up equations may be biased but the direction of the bias is indeterminate. Workers with stronger tastes for insurance are more likely to sort into jobs offering insurance and to take it, but are likely to be paid lower wages if there is a wage/benefit tradeoff; the bias in the wage coefficient in this case will be negative. If, however, workers with strong tastes for insurance have unobserved characteristics that are associated with higher wages, the bias will be positive. Because of the complexity of our model and because the existence of a wage/insurance trade-off is not the major focus of our analysis, we do not instrument for wages.