Obesity and Employer-Provided Health Insurance

비만으로 인한 건강보험리스크가 고용주 제공 민영건강보험의 가입에 미치는 영향 분석

Kim Dae-Hwan*
김 대 환

The rising prevalence of obesity may represent a substantial drain on employer-provided health care benefits. This study addresses whether obesity status affects a probability of employees' obtaining jobs that offer health insurance. Using two sub-samples (household heads and individuals who never married) from the 2003 wave of the Panel Study of Income Dynamics (PSID), we analyze men and women separately. We use a logit model to analyze the effect of workers' obesity status on the chance of having employer-provided health insurance and then utilize a non-linear decomposition technique that uses estimated coefficients from a sample of the non-obese to simulate the distribution of the obese employees. We find consistent results for the sub-sample of household heads and never married workers: obesity is negatively related to the prevalence of insurance for women, but not for men. Utilizing decomposition technique, we find that obesity sorts females into jobs that tend not to provide employment-based health insurance; however, no significant job-sorting effect of obesity for males is found.

Key words: body mass index, employer-sponsored, health insurance, logit, non-linear decomposition, obesity
학술진흥재단 분류 연구분야 코드: B051600

* 보험연구원 부연구위원(dhkim@kiri.or.kr)
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Ⅰ. Introduction

Although employer-provided health insurance is the dominant source of private health insurance coverage in the United States, it has been declining for decades due, in part, to medical cost inflation (Kronick and Gilmer, 1999; Enthoven and Fuchs, 2006). During the same decades, obesity rates have been increasing to levels that some regard as epidemic (Baum and Ruhm, 2007; Chou et al, 2004). As an example, using recent data for 1997-2003: 1) the real cost of medical care rose by 10.5% (Rashad and Sarpong, 2006); 2) the proportion of adults covered by employment-based health insurance fell 11 percentage points (Rashad and Sarpong, 2006); and 3) the prevalence of obesity among adults increased 4.4 percentage points (National Health Interview Survey, 2003). Moreover, health insurance expenditure is the largest non-wage outlay of total compensation and the fastest growing cost component for employers who continue to provide it, although health benefits provided by employers are tax favored (Meyer et al., 2003; U.S. Bureau of Labor Statistics, 1994).

Rapidly increasing obesity rates may be a significant drain on employer-provided health care benefits. Obese employees are estimated to cost employers $45 million annually in medical expenditures and work loss (Barrington and Rosen, 2008)[1]. Sturm's (2002) widely cited analysis estimates that regardless of insurance coverage, the obese generate 36% more in medical expenditures than the non-obese every year[2]. Also, obesity

1) Average health insurance premiums for employer-provided health insurance were $4,704 for single coverage and $12,680 for family coverage in 2008(Gary C. et al., 2008).

2) Sturm (2002) also estimates that in recent years, obesity is generating more medical costs than either smoking or excessive drinking.

may affect employers through greater productivity loss (Burton and Conti 1999) and higher absenteeism (Tucker and Friedman, 1998).

As a measure for obesity, body mass index (BMI) is defined as weight in kilograms divided by the square of height in meters (kg/m^2)[3] . Roughly 66% of American adults are currently either overweight ($25 \leq$ BMI<30, about 130 million people) or obese (BMI ≥ 30, more than 60 million people) and 5% of American adults are extremely obese (BMI ≥ 40) (Ogden et al., 2006)[4]. There is now also international concern as obesity rates grow abroad. The World Health Organization considers obesity to be one of the top 10 health risk conditions in the world and one of the top five in developed nations. Obesity is viewed as a risk factor for a number of fatal diseases and highly prevalent non-fatal ones: cancer, stroke, chronic obstructive pulmonary disease, diabetes, cardiovascular disease, musculoskeletal disorders, sleep apnea, and gallbladder disease (Finkelstein et al., 2004; Schulte et al., 2007). Obesity is also associated with a marked decrease in life expectancy: 40-year-old female nonsmokers were estimated to lose 7.1 years of life, and 40-year-old male nonsmokers were estimated to lose 5.8 years because of obesity (Peters et al., 2003).

Since health insurance provision for US employers is voluntary, employers would purchase health-insurance on behalf of employees if they believe that offering insurance increases profit (Buchmueller, 2000). Therefore, profit-maximizing employers would be reluctant to offer health insurance to obese workers who have higher expected medical expenditures causing higher

3) Alternatively, BMI can be calculated by dividing a person's weight in pounds by the square of their height in inches, multiplied by 703.

4) Definitions of overweight, obese, and extremely obese are based on the standard classifications recommended by the World Health Organization (WHO) and the US National Institutes of Health.

premiums, than their non-obese peers. Moreover, it is easy for employers to observe workers' obesity status unlike other risk factors such as smoking, drinking problems, or drug use. Despite the obvious economic implications, however, we are not aware of any economic studies that have addressed the association between obesity and employer-provided health insurance[5].

In this study, we use nationally representative sub-samples of adult workers aged 20-65 obtained from the 2003 wage of the Panel Study of Income Dynamics (PSID), to investigate whether obesity status affects employers' decision on providing health insurance and the ability of workers to obtain these jobs. The first sub-sample combines men with women. The second and third Sub-samples represent each gender. Separate analyses for men and women are useful for several reasons. First, obesity and absenteeism rates are higher for women than men, other things being equal (Finkelstein et al., 2004; Leigh, 1983). Second, historically, women were more likely to be covered by their husband's health insurance than vice versa. Third, wages and labor supply decisions are different for men and women (Alan, 1973). Fourth, working women and working obese women generate more annual medical costs than men and obese men, respectively (Finkelstein et al., 2005; Sindelar, 1982).

There are two additional unique aspects to this study. First, we develop a theoretical model showing that the employer offering health insurance has a strong incentive not to hire a high-risk person when her/his high-risk health condition can be observed. Second, we enrich the basic obesity and insurance model with a non-linear decomposition model that investigates insurance-related job segregation according to the obesity status. We find

5) Fong and Franks (2008) conducted a public health study. While useful, their study did not account for employers' desire to avoid hiring obese workers.

similar results in both the basic and the enriched models: 1) female obese workers are less likely to hold jobs that offer employer-sponsored health insurance than their non-obese counterparts; 2) no significant differences are found between male obese and non-obese workers.

The remainder of the paper is organized as follows. The previous literature and background are presented in the next section. In section 3, we discuss a theoretical model that illustrates the effect of high-risk health condition on the probability of obtaining employer-sponsored health insurance. In section 4, we provide a description of our econometric model for obesity, insurance and job segregation. In section 5, we discuss data and variables. Sections 6 and 7 analyze the estimates and their implications.

Ⅱ. Background and Literature Review

While there is a large body of literature that examines the effect of employer-provided health insurance on various health conditions and labor market outcomes such as worker turnover, absenteeism, productivity, and female labor supply, a limited number of studies investigate the reverse relationships. Olsen (1993) found that individuals in bad health are less likely to have health insurance in industries with a higher proportion of small firms. Kapur et al. (2005) distinguish between large and small firms to investigate whether health conditions affect either hiring new employees. Kapur and his coauthors create three variables indicating health-related risks: 1) count of medical conditions presented in family; 2) indicator for the presence of any medical condition in the family; and 3) an index of expected health costs based on the family's medical history. Their results suggest that unhealthy workers are less likely to be new hires and less likely to be

employed in small firms that offer insurance; however, they found no such evidence in large firms. Buchmueller (1995) found that high-risk individuals who describe their health as fair or poor, who report difficulty with physical tasks, or who have a work-related disability are less likely to receive employer-sponsored health insurance than their low-risk counterparts.

This study is different from previous literature. The main explanatory variable in most previous studies is self-evaluated health condition which is typically not observed by employers. However, the main explanatory variable of this paper, obesity status, is easily observed by employers, so there is no asymmetric information between employers and employees[6]. Also unlike previous literature, we conduct the analysis for each gender, separately.

Previous works have addressed the influence of obesity on several labor market variables, and the findings are similar. For example, obese workers earn lower wages relative to the non-obese (Averett and Korenman, 1996; Baum and Ford, 2004; Loh, 1993; Pagan and Davila, 1997; Register and Williams, 1990). One of the key explanations for the wage penalty for obese workers is that obese workers are more likely to suffer costly chronic diseases that lead to more expensive medical bills to be paid by employers who provide health insurance (Yang and Hall, 2007). Another consistent finding among wage penalty studies is that the wage gap between obese and non-obese women is greater than the gap between obese and non-obese men. This result may, in part, be due to greater weight discrimination against women than men (Pagan and Davila, 1997). This discrimination

6) After passage of the 1990 Americans with Disabilities Act (ADA), employers are not allowed to obtain information about employee's medical conditions except for firms with fewer than 15 employees (Kapur et al. 2005).

may reflect a stronger social stigma for excess weight among women or varying medical costs associated with obesity by gender (Muenning et al., 2006)[7]. As a result, it is possible that employers providing employment-based health insurance treat obese women differently not only from non-obese women but also from obese men.

Employers ultimately care about their total compensation costs—wages and fringe benefits. The largest fringe benefit is health insurance (Buchmueller, 2000). Some studies suggest that "the market" allows a trade-off of wages for benefits. Bhattacharya and Bundorf (2005) find evidence that firms offer relatively high wages without health insurance benefits to lower-risk, young workers and relatively low wages with health insurance benefits to higher-risk, middle-aged workers. However, when the full cost of health insurance cannot be passed on to high-risk workers in the form of wage reductions, offering health insurance increases the employer's total compensation costs (Buchmueller, 2000). When the "passed on" effect is no longer possible, firms may wish to hire only low-risk workers to increase profits (Bhattacharya and Bundorf, 2005).

Ⅲ. Theoretical Model

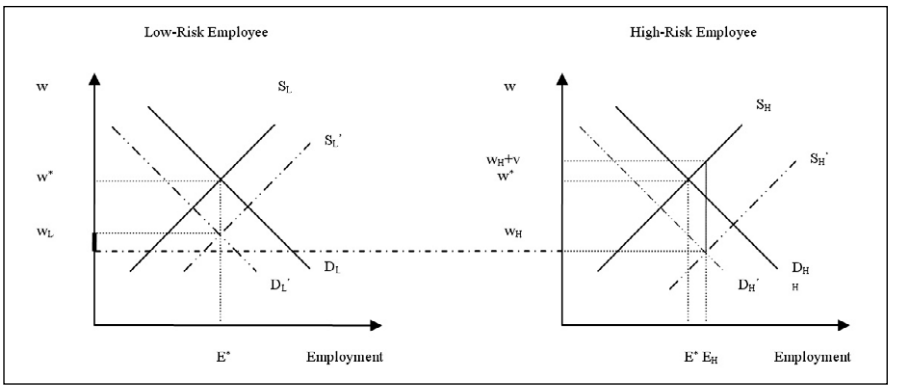
Our model illustrates the mechanisms of supply of and demand for employer-sponsored health insurance according to varying degrees of employer's information about employee's health condition.

7) The effect of obesity on the longevity, quality of life and the interplay of morbidity and mortality vary by both gender and age groups.

1. Employer-Provided Health Insurance under Asymmetric Information

First, we consider a case that the employee's health condition, e.g., self-evaluated health (e.g. excellent, good, fair, poor), is not observed by the employer. Figure 1 illustrates this situation.

〈Figure 1〉 Employer-provided Health Insurance under Asymmetric Information



Asymmetric information is a plausible assumption under the ADA and high-risk individual's pretense as a healthy person[8]. Without employer-sponsored health insurance, the initial equilibrium is at w^* and E^* for both low-risk employees and high-risk employees. The provision of employer-provided health insurance is costly to the employer and will therefore result in a parallel downward shift of the demand curve to D'. The vertical

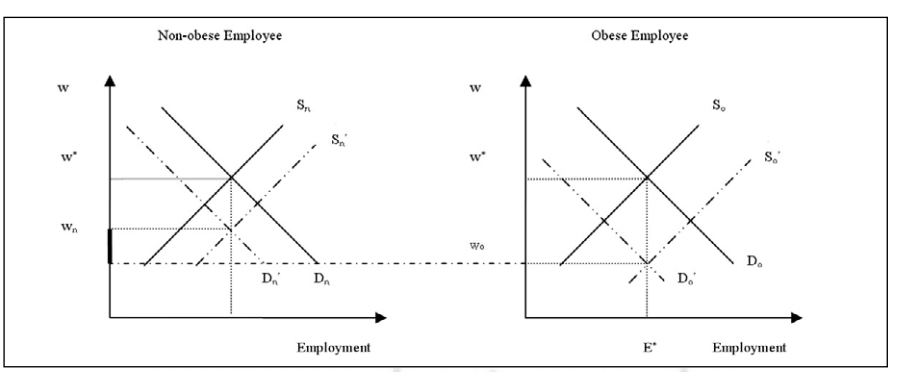
8) While ADA restricts employer inquires on employee health condition, the stipulations are vague and there are ways for the employer to determine the job applicants' health status. For example, employer inquiries on employee health conditions are allowed if they pertain to the applicants abilities to perform the job (Kapur et al. 2005). However, these inquiries are still costly for the employer.

difference between two demand curves in each separate diagram is the cost of providing insurance. For simplicity, it is assumed that the total costs of providing insurance evaluated by the employer are equal to the value of insurance evaluated by low-risk individuals. This is a reasonable assumption since the employer may consider everyone healthy under asymmetric information. However, because high-risk individuals value (v) the employer-provided health insurance more than low-risk individuals (Monheit and Vistnes 1999), the high-risk individuals' supply curve shifts out more than the low-risk individuals' supply curve and high-risk workers are willing to work at lower wages (w_H). High-risk individuals' total value on this job is w_H+v and employment level is E_H which is higher than the equilibrium employment level for healthy individuals.

2. Employer-Provided Health Insurance under Symmetric Information

Figure 2 illustrates the case that employee's health status, e.g., obesity, can be easily observed by employer without extra effort or costs.

〈Figure 2〉 Employer-provided Health Insurance under Symmetric Information



The initial equilibrium is the same as that under asymmetric information. The values of the employer-sponsored health insurance evaluated by low-risk and high-risk individuals under symmetric information are also the same as those under asymmetric information. The difference is that now the employer can observe employees' health conditions (obesity status) and the employer reacts differently according to the different costs of providing health insurance to individuals with different risks. The demand curve for obese individuals shifts downward by the expected costs of obesity which is the same as the value of the health insurance estimated by the obese employee. Therefore, the new equilibrium is at wage level w_o for obese employees, which should be lower than w_H for high-risk employees under asymmetric information. As a result, the wage gap between the high-risk employee (obese) and low-risk employee (non-obese) should be greater than that under asymmetric information.

The employer has two choices when hiring individuals with high expected medical costs. 1) The employer may require high-risk individuals to pay more than low-risk individuals in the form of higher health insurance premiums. However, HIPPAA prevents employers from asking a higher premium to high-risk individuals. 2) The employer can offset the higher expected medical costs by offering high-risk workers lower wages. But employers may find it difficult to tailor individual wages within the same job to individual health-related costs. In addition, employers may fear a discrimination lawsuit if wages vary by weight for the same job. Finally, employers may choose to decrease employment instead of decreasing wages for high-risk individuals. In any case, again, as shown in the figures above, the wage gap between the healthy and unhealthy groups is greater in the symmetric than the asymmetric information case. Thus employers have a stronger incentive not to hire obese individuals under symmetric than

asymmetric information. Moreover, this phenomenon may appear appaently in female labor market due to higher medical costs related with obese females or/and stronger social stigma against obese females than obese males.

Ⅳ. Econometric Model

1. Basic Econometric Model

Our econometric analysis addresses this question: compared to non-obese workers, are obese workers less likely to get a job that offers employer-provided health insurance? The basic model is as follows:

$$\Pr(EPHI=1)=G(\alpha+\beta*Obesity+X'_i\gamma), \quad (1)$$

where: $EPHI$ is an indicator variable that is equal to one if a worker is covered by employer-provided health insurance (EPHI) and zero otherwise; $Obesity$ is an indicator variable that is equalto one if a worker is obese; and X is a matrix of other variables that influence $EPHI$. An important assumption in order for β to reflect the true parameter in the population is that $Obesity$ is exogenous. If this is not the case, we should employ an econometric model that accounts for endogeneity. Since IRS non-discrimination rules limit the ability of firms to offer different fringe benefit packages to different groups of workers (Buchmueller and Valletta, 1996), β measures the probability of having jobs that offer employer-provided health insurance. We assume that G in the equation 1 is a logistic function.

2. Endogeneity

Genetic factors influencing body weight are not expected to be correlated with employers' decision on providing health insurance. However, obesity may be influenced by unobservable non-genetic social or economic factors, and thus may not be exogenous. If the non-genetic omitted factors jointly determine obesity status and employers' labor demand decision, the estimated obesity coefficient may be biased. It is difficult to think of channels through which individual unobserved characteristics influencing body weight might also determine employers' labor demand. However, negative stereotypes might be channels: obese people may be less motivated or care less about their future (have higher time preference) than non-obese people (Schwartz et al., 2003). This lack of motivation or high time preference may manifest itself in poor preparation for job interviews and this poor preparation (not obesity) would results in a disproportionate number of obese persons in "less desirable" jobs that do not offer health insurance.

Perhaps a more plausible form of endogeneity involves simultaneity, or reverse causality. It might be that having employer-provided health insurance influences obesity status for employees: the insurance might allow individuals to seek medical treatment for obesity. Although physicians and medical providers prescribe obesity treatment for patients, however, insurance reimbursement for obesity treatment is almost non-existent (Downey, 2002). Thus, EPHI is not likely to affect employees' obesity status. Moreover, even if individuals seek any medical treatment for obesity, physician-suggested treatments typically involve changes in weight-associated behaviors such as diet and exercise, rather than medication or surgery. Also, moral hazard could result in simultaneity. Employees with health insurance might visit a doctor more often than uninsured employees,

follow the doctor's advice, and become less obese. Yet it has been shown that such effect of physician counseling on exercise and diet is minimal (Ammerman et al., 1993; Wee et al., 1999). Moreover, a study from the RAND Health Insurance Experiment shows evidence that health insurance does not improve physical activity (Newhouse 1993, Chapter 6).

We therefore explored the possibility of endogeneity using a Hausman endogeneity test. First, we regressed *Obesity* on a set of covariates X and additional exogenous variables. Following Chou et al. (2004), we chose three variables at the state level— a number of fast food restaurants per person, a number of fitness places per person, and cigarette tax rates for instrument variables[9]. A growing body of work has highlighted the environmental contributions such as fast food to the obesity epidemic, since genetic factors cannot explain the rapid increase in the obesity rates as they did not suddenly change during the 1980s. Moreover, there should be different environmental contributors such as different density of fast food restaurants that can explain a large variation in the obesity prevalence across states (Maddock, 2003)[10]. Cigarette tax rates are included because smoking affects a person's metabolism and burns calories, and nicotine included in cigarettes is an appetite suppressant (U.S. Department of health and human services, 1996). Second, the obtained residual from the above obesity regression was used as an additional independent variable in a variation of equation 1 in which we regressed the indicator variable for a

9) Any combination of these additional exogenous variables produces the consistent results. Another test for validity of IVs is performed and we end up with the same similar result (Table 3).

10) Using the two largest fast food hamburger-based chains in the United States, Maddock(2004) utilized two different densities of fast food restaurants: the number of residents per fast food restaurant and square miles per fast food restaurant and argued that the different density of fast food restaurants can explain the different obesity rates across states.

worker's having employer-provided insurance on the residual, *Obesity*, and X. Finally, we performed a t-test on the coefficient of the residual variable and found it 0.720, which means that we failed to reject the null hypothesis that *Obesity* is exogenous at the conventional confidence level.

These Hausman test results that obeisty is exogenous suggest that the possible spurious correlation between obesity and error terms containing unobserved variables such as time preference or motivation was not present or already dealt with the addition of other covariates. There are explanations for these Hausman test results, at least in the samples that exclude self-employed persons. One explanation is that the stererotype that the obese are less motivated than the non-obese may not be true in our samples. Another explanation is that the rich set of explanatory variables in the PSID, such as education, work experience, health status, and especially wages, performs well as a proxy for time preference or motivation.

3. Non-Linear Decomposition

Our non-linear decomposition model posits that the probability an individual i works in job that offers health insurance (*EPHI*) depends on all explanatory variables X used in the basic model above, except obesity status.

$$Pi(EPHI=1)=F(X'_i\delta), \tag{2}$$

where F is a function taking only values strictly between zero and one: $0<G<1$, for all real numbers X. We assume the unknown function G is logistic.

$$P_i^n = \frac{\exp(X_i^{n'}\delta^n)}{1+\exp(X_i^{n'}\delta^n)} \quad (3)$$

where n indicates non-obesity.

To estimate the coefficients in equation 3, we use only the non-obese sample. We then use the estimated coefficients from equation 3 ($\hat{\delta}$) to predict the probability that the obese obtain the jobs that offer insurance.

$$P_i^o = \frac{\exp(X_i^{o'}\hat{\delta}^n)}{1+\exp(X_i^{n'}\hat{\delta}^n)} \quad (4)$$

where o indicates obesity.

Equation 4 estimates the expected number of obese employees who would be employed by firms that offer insurance in labor markets without obesity-related discrimination. That is, we estimate the employer distribution of the obese workers as if they were treated as non-obese in the labor market. We test this on three samples: men and women combined; men only; women only.

We expect that the simulated probability of having jobs with insurance for the obese would be higher than the actual probability for the obese and the size of the difference between the simulated probability and actual probability would be greater in female labor market due to higher medical costs related with obese females than males or/and stronger social stigma against obese females than obese males.

That is, if the non-obese and the obese have the same socioeconomic background, marital status, health condition, personal characteristics, work experience, human capital and so on, both groups would have similar probabilities of being employed by firms offering health insurance. If they do not, discrimination occurs. Discrimination can be measured by the difference

between the simulated and the actual probability for the obese.

Ⅴ. Data and Variables

1. Data and Dependent Variable

We use the 2003 wave of the Panel Study of Income Dynamics (PSID). The PSID, which began in 1968, is a longitudinal study of a representative sample of U.S. residents including men, women, and children and the family units in which they live. The 2003 PSID consists of 7822 family-level observations with 3197 variables available and 22,290 individual-level observations with 41 variables available. Since the PSID data set includes a rich set of job and personal characteristics, family and socioeconomic backgrounds, along with information on the type of health insurance, weight and height, it is possible to better control for job and worker heterogeneity.

To rule out spurious correlations and lessen potential endogeneity, we placed several restrictions on the sample. Since we focused on employer-provided health insurance, we restricted the sample to working-age persons 20-65 and omitted students, retirees, the self-employed and prisoners. We recognize that many persons over age 65 who work also qualify for Medicare and Social Security and this significantly complicates the analysis of employer-sponsored health insurance. Pregnant women were eliminated since BMI measures are not appropriate for them. Finally, in one sample, we restricted data to only full-time working heads of household reasoning that spouses, partners and others are more likely to be covered by the head's insurance and less likely by their own employer, if any. However, the head of household in the PSID is generally the adult male. If the family is a married

couple, the PSID classifies the husband as head unless he is severely disabled. Because of this historical definition, we analyzed another sample: individuals aged 20-65 who are single and employees (not self-employed). Another reason for employing the unmarried sample is that PSID does not provide information about whether the head's EPHI is from her/his own employer or her/his spouse. Thus examining unmarried individuals help rule out spurious correlations between obesity and having EPHI.

After further eliminating observations with missing information, we have 3880 (2782 males and 1098 females) household heads and 3466 (1222 males and 2244 females) unmarried individuals. We create a dichotomous dependent variable, EPHI, which is equal to one if the respondent says "employer-provided health insurance" on the following question: "What kind of health insurance or health care coverage do you have?"; EPHI is zero otherwise. Roughly 25% of respondents in the 20-65 age sample of household heads are not covered by employer-provided health insurance. About 40% of single respondents are not covered by employer-provided health insurance.

2. Independent Variables

Because the model is in reduced form, the estimated obesity coefficient reflects both supply side (employer) and demand side (employee) effects. Thus, we employ a rich set of variables that influence both supply of and demand for labor and employer-provided health insurance. Table 1 presents the independent variables together with their definitions and descriptive statistics. Using the self-reported weight in pounds and height in inches and feet, we first create BMI for each individual. Then, following the

conventional measure recommended by the WHO and the US National Institutes of Health, we create a dichotomous obesity variable that is equal to one if BMI is over 30, and zero otherwise. Roughly 27% of the household heads in the sample is obese, and they are less likely to be covered by insurance than the non-obese 〈Table 1〉.

The control variables can be broadly classified into three groups. One contains sociodemographic variables: age, age squared, gender, individual education level, marital status[11], region of residence[12], race, residence in SMSA, and the number of dependents[13]. We include age and age squared because employees are more prone to illness as they age and because employers would be more reluctant to offer an insurance package to aged workers due to the relatively higher current and expected medical costs. We include individual human capital[14] because more educated workers would be more likely to receive better fringe benefits. The number of children is also included since it may affect employees' desire to obtain insurance and employers concern that additional dependents might increase insurance premiums. In Table 1, the mean values indicate that non-obese workers have higher post-secondary education levels than obese workers, and whites are less obese than other race/ethnic categories. The mean values for other sociodemographic variables such as age, gender, SMSA, and the number of dependents appear similar for the obese and the non-obese.

The second group involves variables related to the labor market: years of work experience, experience squared, respondent's occupation

11) Dummy variables indicate various marital statuses with single persons as the referent group.
12) East is the referent group.
13) Marital status and number of dependents are not included in the single sample.
14) Two dummy variables indicate having high school degree and college degree with no-degree as the referent group.

type[15], hourly wage rate, labor union-membership status, and 17 industry dummies with agriculture as the referent group. These variables are generally regarded as important determinants of labor demand.

We include hourly wage as a proxy for firm size or quality of jobs.[16] Large firms are more likely to offer insurance benefits, in part, due to the law of large numbers in insurance markets. Insurance risks decrease as a number of people in the insurance pool increases (National Center for Health Statistics, 1997). Large firms also demand high-quality workers than small firms, which may explain a firm-size wage premium (Liu and Wu, 2007). Finally, wages are correlated with obesity (Pagan and Devilia, 1997). On average, the non-obese have higher wages than the obese in Table 1. The average wages with EPHI and without EPHI are 14.02 and 23.78, respectively and wage difference is statistically significant at the conventional level. That is, unobservable factors of firms such as paid sick

15) The occupation dummy (white-collar) equals one if job is management occupations, business operations, financial specialists, computer and mathematical occupations, architecture and engineering occupations, architecture and engineering occupations, physical and social science, social service occupations, legal occupations, or education and library occupations, arts, design, entertainment, sports and media occupations, healthcare practitioners and technical occupations, and zero otherwise.

16) Offer rates of EPHI varies with firm characteristics.

Characteristics		Firms with EPHI	Firms without EPHI
Size	Less than 25 employees	43.2%	56.8%
	More than 100 employees	80.7%	19.3%
Industry	Manufacturing	83.6%	16.4%
	Wholesale & retail	64.8%	35.2%
	Personal Services	67.1%	32.9%
Earnings	More than $50,000 per year	92.4%	7.6%
	Less than $10,000 per year	30.8%	69.2%
Unionization	Union Workers	96.5%	3.5%

Source : Fronstin P., "Employment-based health benefits : trends in access and coverage", *EBRI Issue Brief,* 2005 August. Data are in 2002.

leave, paid leave to visit doctors, paid vacation, and a pension plan may be correlated both with wages and EPHI and may affect employees' job choices. Thus, without controlling for wages, the estimated obesity coefficient could be biased.

Previous studies indicate that the provision of insurance coverage varies widely based on industry, occupation, and union status. For example, workers in agriculture, construction, retail trade, and service industries are less likely to gain insurance than workers in goods-producing (manufacturing) industries (Wiatrowski, 1995). In addition, union workers are more likely than non-union workers to have insurance. We therefore include dummy variables for 17 industry categories, occupations types (blue or white-collar), and union status. A higher proportion of obese workers are unionized and have non-white-collar jobs 〈Table 1〉.

Years of work experience and experience squared are included because skilled workers with more work experience are more likely to have higher productivity and thus more likely to get a preferred job, other things being equal. For example, employers may prefer obese workers with more work experience to unskilled non-obese workers. On average, non-obese workers have 0.188 years of more work experience 〈Table 1〉.

The third group of covariates includes individuals' health status. Respondents in the PSID are asked to answer the following question: "Would you say your health in general is excellent, very good, good, fair, or poor?" We create a dichotomous variable, "Healthy," which is equal to one if the respondent answers "excellent," "very good," or "good," and zero otherwise[17]. Individuals who are in poor health would strongly prefer jobs that offer employer-sponsored health insurance. Healthy respondents are less likely to be obese and more likely to have insurance 〈Table 1〉.

17) Using PSID, Meer et al. (2003) used the same definition for "Healthy."

〈Table 1〉 Descriptive Statistics of Variables
: Definitions, Means, and Standard Deviations in Household Head Sample

Variable	Definition	Full Sample N=3880		Obese N=1056		Non-obese N=2824	
EPHI	=1 if covered by employer-provided health insurance	0.752	(0.43)	0.714	(0.45)	0.766	(0.42)
Obesity	=1 if BMI ≥ 30	0.272	(0.45)	1	(0)	0	(0)
Age	Age of respondent (in years)	39.58	(11.1)	39.979	(10.8)	39.433	(11.2)
Age Square	Age squared	1690.3	(909)	1714.9	(891)	1681.0	(916)
Gender	=1 if male	0.717	(0.45)	0.666	(0.47)	0.737	(0.44)
Healthy	=1 if respondent is healthy	0.904	(0.29)	0.848	(0.36)	0.925	(0.26)
High School degree	=1 if has high school degree	0.521	(0.50)	0.568	(0.50)	0.503	(0.50)
College degree	=1 if has college degree	0.275	(0.45)	0.211	(0.41)	0.299	(0.46)
Married	=1 if married	0.510	(0.50)	0.507	(0.50)	0.511	(0.50)
Divorced	=1 if divorced	0.170	(0.38)	0.157	(0.36)	0.175	(0.38)
Widow	=1 if widow	0.016	(0.13)	0.013	(0.11)	0.017	(0.13)
Separated	=1 if separated	0.055	(0.23)	0.062	(0.24)	0.052	(0.22)
Midwest	=1 if lives in midwest	0.256	(0.44)	0.244	(0.43)	0.260	(0.44)
South	=1 if lives in south	0.395	(0.49)	0.460	(0.50)	0.371	(0.48)
West	=1 if lives in west	0.194	(0.40)	0.154	(0.36)	0.209	(0.41)
White	=1 if White	0.625	(0.48)	0.519	(0.50)	0.664	(0.47)
Latino	=1 if Latino	0.051	(0.22)	0.055	(0.23)	0.050	(0.22)
Asian	=1 if Asian	0.015	(0.12)	0.004	(0.06)	0.019	(0.14)
Other races	=1 if other races	0.084	(0.28)	0.073	(0.26)	0.088	(0.28)
SMSA	=1 if lives in a city with population over 100,000	0.446	(0.50)	0.439	(0.50)	0.448	(0.50)
Dependents	Number of children	0.940	(1.14)	1.045	(1.18)	0.901	(1.12)
Experience	working experience (in years)	6.969	(8.20)	6.832	(8.15)	7.02	(8.22)
Experience Square	Working experience squared	115.78	(233)	113.07	(232)	116.79	(233)

Variable	Definition	Full Sample N=3880		Obese N=1056		Non-obese N=2824	
White-collar	=1 if white-collar	0.294	(0.46)	0.241	(0.43)	0.314	(0.46)
Wage	the hourly wage rate	18.944	(19.5)	17.832	(23.2)	19.46	(18.0)
Unionism	=1 if union member	0.130	(0.34)	0.144	(0.35)	0.125	(0.33)
Mining	=1 if working in mining industry	0.007	(0.09)	0.007	(0.08)	0.008	(0.09)
Utilities	=1 if working in utilities industry	0.015	(0.12)	0.020	(0.14)	0.013	(0.11)
Construction	=1 if working in construction industry	0.078	(0.27)	0.064	(0.25)	0.083	(0.28)
Manufacture	=1 if working in manufacturing industry	0.180	(0.38)	0.171	(0.38)	0.183	(0.39)
Wholesale	=1 if working in wholesale trade industry	0.042	(0.20)	0.035	(0.18)	0.045	(0.21)
Retail	=1 if working in retail trade industry	0.101	(0.30)	0.120	(0.33)	0.093	(0.29)
Transportation	=1 if working in transportation industry	0.066	(0.25)	0.077	(0.27)	0.062	(0.24)
Information	=1 if working in information industry	0.033	(0.18)	0.042	(0.20)	0.030	(0.17)
Finance	=1 if working in finance industry	0.041	(0.20)	0.029	(0.17)	0.046	(0.21)
Real estate	=1 if working in real estate industry	0.017	(0.13)	0.014	(0.12)	0.018	(0.13)
Profession Service	=1 if working in professional work industry	0.043	(0.20)	0.032	(0.18)	0.046	(0.21)
Management Service	=1 if working in management industry	0.044	(0.20)	0.047	(0.21)	0.042	(0.20)
Education service	=1 if working in educational service industry	0.081	(0.27)	0.080	(0.27)	0.081	(0.27)
Healthcare Service	=1 if working in health care industry	0.104	(0.31)	0.128	(0.33)	0.095	(0.29)
Art Service	=1 if working in arts and recreation industry	0.020	(0.14)	0.014	(0.12)	0.022	(0.15)
Food service	=1 if working in food service industry	0.061	(0.24)	0.055	(0.23)	0.063	(0.24)
All other service	=1 if working in other services industry	0.041	(0.20)	0.040	(0.20)	0.042	(0.20)

Note: 1) Standard deviations are in parenthesis.
2) East is the referent group for region, single is the referent group for marital status, black is the referent group for race, and agriculture is the referent group for industrial category.

Ⅵ. Results

1. Results from Basic Model

1.1. Results from Sample of Men and Women Combined

Table 2 presents results of a logit regression explaining the log-of-the-odds of having employer-provided health insurance. Marginal effects and odds ratios are also presented in the second and third columns. For example, the estimated odds ratio of 3.133 for a college degree can be interpreted as follows: having a college degree increases the odds of being covered by employer-sponsored health insurance by a factor of 3.133 compared to persons without a college degree.

Results in Table 2 indicate that obesity significantly reduces the propensity to be employed with health insurance. There are two possible explanations for this result. It might be that employers who offer employment-based health insurance are sensitive to expensive expected future medical costs associated with obesity. Second, obese workers may face discrimination in the labor market.

Individual health status does not affect the likelihood of having a job providing employer-sponsored health insurance. This might be because our indicator for individual health is based on self-reported health status, which is not easily observed by employers. This is noteworthy that obesity is accounted for in the regression, separately. Presumably, the asymmetric information problem would prevail for other health conditions. Employees would know more about their health than employers.

As expected, employees who receive higher wages are also more likely to receive a health insurance package from their employers. Again, this can be

interpreted as a firm- size effect or "good" job effect. More skilled workers measured by education level and work experiences are more likely to have insurance. It is also confirmed that unionized and white-collar workers more often have insurance than do their counterparts. Married workers are more likely to have a job with insurance; but an additional child decreases the probability of having employer-sponsored health insurance.

White and Asian workers are more likely to get a job with insurance. It appears that insurance is more prevalent in some industries that, in general, offer relatively high wages (e.g. information, finance, professional service). The insignificant regional disparity[18] is consistent with Wiatrowski (1995).

〈Table 2〉 Effect of obesity on employer-provided health insurance : Household Head

Independent Variables	Dependent Variable: employer-provided health insurance			
	Logit Coefficient and (t-statistics)		Marginal Effect	Odds Ratio
Obesity	-0.223	(-2.32)**	-0.031	0.800
Age	0.045	(1.39)	0.006	1.046
Age square	-0.0005	(-1.35)	-7.3E-05	0.999
Gender	0.118	(0.98)	0.016	1.126
Healthy	-0.007	(-0.05)	-0.001	0.993
High School Degree	0.788	(7.53)***	0.109	2.198
College Degree	1.142	(7.32)***	0.131	3.133
Married	0.862	(6.17)***	0.118	2.367
Divorced	0.241	(1.67)*	0.031	1.272
Widow	-0.541	(-1.64)	-0.087	0.582

18) Regional dummies are jointly insignificant at the conventional confidence level (F=1.38).

Independent Variables	Dependent Variable: employer-provided health insurance			
	Logit Coefficient and (t-statistics)		Marginal Effect	Odds Ratio
Separated	0.076	(0.41)	0.010	1.079
Midwest	0.094	(0.62)	0.013	1.098
South	-0.138	(-0.96)	-0.019	0.871
West	-0.131	(-0.81)	-0.018	0.877
White	0.278	(2.53)**	0.039	1.321
Latino	0.208	(0.65)	0.026	1.231
Asian	1.334	(2.65)***	0.115	3.796
Other races	-0.766	(-2.65)***	-0.127	0.465
SMSA	0.165	(1.67)*	0.022	1.179
Dependents	-0.073	(-1.76)*	-0.010	0.930
Experience	0.147	(8.18)***	0.020	1.158
Experience square	-0.004	(-6.02)***	-0.001	0.996
White-collar	0.425	(3.07)***	0.054	1.529
Wage	0.032	(3.42)***	0.004	1.032
Unionism	0.879	(4.84)***	0.096	2.408
Mining	1.292	(2.13)**	0.112	3.640
Utilities	1.976	(2.71)***	0.139	7.215
Construction	0.393	(1.45)	0.048	1.481
Manufacture	1.802	(6.76)***	0.169	6.062
Wholesale	1.282	(3.97)***	0.116	3.602
Retail	1.061	(3.99)***	0.108	2.890
Transportation	1.329	(4.47)***	0.121	3.778
Information	1.643	(4.42)***	0.132	5.170
Finance	1.464	(4.30)***	0.125	4.323
Real estate	1.438	(3.45)***	0.120	4.212
Professional service	1.153	(3.25)***	0.109	3.167

Independent Variables	Dependent Variable: employer-provided health insurance			
	Logit Coefficient and (t-statistics)		Marginal Effect	Odds Ratio
Management service	0.867	(3.01)***	0.089	2.379
Education service	1.172	(3.76)***	0.114	3.230
Healthcare	0.955	(3.48)***	0.100	2.598
Art service	0.621	(1.76)*	0.069	1.861
Food service	0.258	(0.93)	0.032	1.294
All other service	0.467	(1.55)	0.055	1.595

Note : 1) In parentheses: t-statistic based on robust standard errors.
2) Intercepts are not shown.
3) * significant at 10%; ** significant at 5%; *** significant at 1%.
4) N=4942, LR chi2(42)=1753.92

〈Table 3〉 First Stage Regression

Independent Variables	Dependent Variable: Obesity	
	Logit Coefficient and (t-statistics)	
Number of Fast Food Stores	0.130	(3.40)***
Number of Fitness Places	-0.061	(-1.32)
Cigarette Tax	0.092	(1.98)**

Note : 1) In parentheses: t-statistic based on robust standard errors.
2) Table 3 results are from including all other independent variables but coefficients from other variables are not shown. Intercepts are not shown.
3) * significant at 10%; ** significant at 5%; *** significant at 1%.
4) N=1390, LR chi2(41)=555.85
5) Anderson canon. Corr. LR statistic (Identification/IV Relevance Test) : 11.42, Chi-sq P-val = 0.003
6) Sargan statistic (overidentification test of all instruments) : 0.436, Chi-sq P-val = 0.5092

1.2. Results from Separate Samples by Gender

Table 4 and Table 5 report results from separate regressions by gender. Concerning women in Table 4, obesity significantly decreases the probability of having a job with insurance by 0.12 〈Table 4〉, and the negative effect is statistically significant at the 1% significance level.

〈Table 4〉 Effect of obesity on employer-provided health insurance : Female Head

Independent Variables	Dependent Variable: employer-provided health insurance			
	Logit Coefficient and (t-statistics)		Marginal Effect	Odds Ratio
Obesity	-0.530	(-3.27)***	-0.115	0.589

Note : 1) In parentheses: t-statistic based on robust standard errors.
2) Table 4 results on covariates age through "all other service" available from authors. Intercepts are not shown.
3) * significant at 10%; ** significant at 5%; *** significant at 1%.
4) N=1390, LR chi2(41)=555.85

For men in Table 5, however, obesity does not have a statistically significant effect, although it has the expected negative sign.

〈Table 5〉 Effect of obesity on employer-provided health insurance: Male Head

Independent Variables	Dependent Variable: employer-provided health insurance			
	Logit Coefficient and (t-statistics)		Marginal Effect	Odds Ratio
Obesity	-0.054	(-0.42)	-0.006	0.947

Note : 1) In parentheses: t-statistic based on robust standard errors.
2) Table 5 results on covariates age through "all other service" available from authors Intercepts are not shown.
3) * significant at 10%; ** significant at 5%; *** significant at 1%.
4) N=3552, LR Chi2(41)=1083.59

The actual effect of obesity might be much greater than that the estimated one. For example, several studies have indicated that the increase in uninsured workers may have resulted from employees' rather than employers' decisions. The non-obese would have relatively weak preferences for insurance in part because they have lower expected medical expenditures, while the obese would have stronger preferences. Therefore, non-obese employees might voluntarily turn down employer-sponsored insurance coverage (Cooper and Shone, 1997; Farber and Levey, 2000). In fact, take-up rates of EPHI by employees are positively related with firm size, hours of work, wages, and education level and male workers have higher take-up rates than female workers (Fronstin, 2005).

For both female and male workers, human capital and work experience are significant determinants of having jobs that offer health insurance. Interestingly, however, concerning female workers, the type of industries seems not to be important factor[19]. On the other hand, for male workers, the type of industries seems to be the most influential determinants. Labor union membership is a significant determinant only in the male sample, but occupation type (white-collar) and the number of dependents are significant determinants only in the female sample. The latter result is consistent with literature indicating that women more often than men provide care for sick children by taking days off from work (Leigh, 1983). Having an additional child decreases female workers' ability to obtain jobs with insurance by 3.5 percentage points.

We analyze the same model for only the female sample with various specifications, and the results are presented in Table 6 in columns 1 through

19) The set of industrial dummies is jointly statistically significant at the 5% confidence level.

6. Being obese significantly reduces the ability to obtain jobs with health insurance under all the specifications for women. For men, however, the results are not statistically significant.

〈Table 6〉 Effect of obesity on employer-provided health insurance : Female Head

Independent Variable	Dependents Variable: employer-provided health insurance					
	1	2	3	4	5	6
Obesity	-0.61(-4.00)***	-0.60(-3.90)***	-0.56(-3.59)***	-0.54(-3.41)***	-0.535(-3.33)***	-0.53(-3.27)***
Marital Status	No	Yes	Yes	Yes	Yes	Yes
Dependent	No	No	Yes	Yes	Yes	Yes
Races	No	No	No	Yes	Yes	Yes
Wage	No	No	No	No	Yes	Yes
Occupation (white-collar)	No	No	No	No	No	Yes

Note : 1) Controlling for individual health changes the results very little.
2) In parentheses: t-statistic based on robust standard errors.
3) Intercepts are not shown.
4) * significant at 10%; ** significant at 5%; *** significant at 1%.

2. Results from Non-Linear Decomposition

The effect of obesity using the non-linear decomposition is presented in Table 7 and Table 8. The results are consistent with those from the basic model. The simulated probability of holding a job with insurance resembles the actual probability much more closely for the non-obese than for the obese. That is, if there were no obesity-related discrimination, a similar proportion of the obese and the non-obese would have jobs that offer health insurance.

〈Table 7〉 Actual and predicted employer distributions of obese and non-obese workers : Female Head

	Actual		Simulated
	Non-obese	Obese	Obese
Employer distributions: Jobs with employer-provided health insurance	0.656	0.564	0.645
Difference between actual and Simulated Probability for the obese		-0.089	

〈Table 8〉 Actual and predicted probabilites of obese and non-obese workers : Male Head

	Actual		Simulated
	Non-obese	Obese	Obese
Employer distributions: Jobs with employer-provided health insurance	0.805	0.789	0.798
Difference between actual and Simulated Probability for the obese		-0.006	

Our interest lies in the differences between the actual and simulated probabilities of the obese. The simulated probability is larger than the actual probability for the female obese sample, but there is no such disparity in the male sample. Obese females are underrepresented in jobs that offer insurance. The magnitudes of the differences are similar to the estimated marginal effect of obesity in the basic model for both the female and male

samples. For the female sample, in Table 7, about 12.6%[20] fewer obese females than simulated by the sample belong to firms that offer employer-provided health insurance. These results are consistent with previous obesity-related studies on wages and occupational distribution, suggesting discrimination is more pervasive against obese women than men (Muenning et al., 2006; Pagan and Davila, 1997). However, those results can be explained differently. Since working women and working obese women generate more annual medical costs than men and obese men, respectively, the difference in the simulated probability and actual probability of having EPHI is greater in the female samples.

3. Results from the Sample of Never Married Persons

Table 9 reports the effect of obesity on the probability of having a job providing insurance in the sample of unmarried persons.

〈Table 9〉 Effect of obesity on employer-provided health insurance : Single

Independent Variables	Dependent Variable: employer-provided health insurance					
	Full sample		Female		Male	
Obesity	-0.277	(-2.28)**	-0.382	(-2.50)**	-0.038	(-0.18)

Note : 1) In parentheses: t-statistic based on robust standard errors clustered at household-level. Intercepts are not shown.
2) Table 9 results on covariates age through "all other service" available from authors Intercepts are not shown.
3) * significant at 10%; ** significant at 5%; *** significant at 1%.
4) column 1: N=3466, Wald chi2=370.91, column 2: N=1222, Wald chi2=180.08, column 3: N=2244, Wald chi2=242.58

20) (0.645-0.564)/0.645=0.126

The results from the employer selection model with single women and men are presented in Tables 10 and 11, respectively. In the analyses with never married persons, the standard errors and test statistics are adjusted for cluster correlations at the household-level.

〈Table 10〉 Actual and predicted probabilites of obese and non-obese workers : Single Female

	Actual		Simulated
	Non-obese	Obese	Obese
Employer distributions: Jobs with employer-provided health insurance	0.457	0.357	0.433
Difference between actual and Simulated Probability for the obese		-0.076	

〈Table 11〉 Actual and predicted occupational distributions of obese and non-obese workers : Single Male

	Actual		Simulated
	Non-obese	Obese	Obese
Employer distributions: Jobs with Employer-provided Health Insurance	0.483	0.489	0.498
Difference between Actual and Simulated Probability for the obese		-0.009	

The key results from both the basic model and the non-linear

decomposition model are similar to those from the analyses with the sample of household heads. Discrimination against obese females appears more pervasive than that against obese males, and obese women sort into jobs that do not provide insurance. However, it is notable that the industry category appears to be less important in determining the likelihood of having a job with insurance for never married men than male household heads. It is also noteworthy that never married individuals are more severely underrepresented than the heads of household in jobs that offer health insurance. This may be due to the demand-side effect. That is, never married individuals may not have a strong incentive to find jobs with insurance because they are relatively younger and healthier than the household heads, and they have no dependents.

Ⅶ. Discussion and Conclusion

This paper examined the obesity effect on having jobs that provide employer-provided health insurance for a sample that combines men and women as well as for separate samples of men and women obtained from the 2003 PSID, using both logit and non-linear decomposition models. The employee's health condition used in this study, obesity, differs from employee's self-reported health conditions studied in previous literature because asymmetric information regarding employee's obesity status between employer and employee is minimal. Our findings are consistent with those in other obesity literature: the discrimination against obese women is more pervasive than that against obese men. Obesity status sorts only women into jobs that do not offer employer-sponsored health insurance even after controlling for individual health status. If employers were

responsive to the obesity-attributable high costs only, we should have found a significant negative coefficient in the male sample as well. We therefore conclude that our results suggest higher medical costs for female workers and obese female workers than their male counterparts or/and discrimination against obese women but not men.

Other interesting results are that for female workers, numbers of dependents and occupation type appear to be important determinants in employment in firms offering employment-based health insurance. For the male household heads, however, the industry category appears to be the most prominent contributors.

However, concerns and caveats remain. Our finding that employers screen out the obese is not conclusive, but suggestive. Considering the adverse selection that workers with high expected medical costs may prefer jobs that offer health insurance and low-risk workers who have weak preferences for health insurance sort into jobs without coverage (Monheit and Vistnes, 1999), it would be appropriate to interpret the negative effect of obesity on the likelhihood of obtaining employer-sponsored health insurance as a dominant supply side effect. However, if the obese discount the future more heavily than the non-obese (Zhang and Rashad, 2008) and thus have weak preferences for insurance, the estimated negative effect is attributed to the demand side. Therefore, whether obesity reduces the likelihood of obtaining employer-sponsored health insurance might stem from both the supply and demand side. In addition, obesity may not be obvious to employers if prospective employees "slim down" prior to the job interview. Measurement errors may exist since weight information is provided by respondents. However, as Chou et al. (2004) demonstrate, self-reported weight is highly correlated with actual weight. Another concern is that PSID does not provide information about employers. In general, however, firms with EPHI

are big and also offer higher wages and other fringe benefits relative to firms without EPHI. Thus, employing wages would work suitably as a proxy for general quality of firms. Finally, our choice of IVs may also be endogenous variables. For example, fast food restaurants could locate themselves in places more obese people live. Finding policy variables that could affect individuals' weight and utilizing them as instrument variables would rule out endogeneity of obesity. Employing a different data set providing with county level information would be useful to lessen endogeneity of obesity as well.

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요 약

본 연구의 기본 목적은 근로자의 건강리스크가 건강보험을 제공하는 직장에서 근무하고 있을 가능성에 미치는 영향을 알아보는 것으로 이론분석과 함께 미국의 Panel Study of Income Dynamics 자료를 이용하여 실증분석하였다. 미국의 경우 대부분의 근로자들이 고용주를 통해 민영건강보험(Employer-Provided Health Insurance: EPHI)에 가입하고 있다. 현재 미국 고용주들의 지출비용 중 가장 큰 비중을 차지하는 것이 임금과 근로자를 위한 의료비용(건강보험료 포함)이기 때문에 고용주(특히 EPHI를 제공하는 고용주)들은 건강리스크가 높은 근로자들을 고용하려 하지 않을 것이다. 그러나 특수직을 제외하고는 고용 시 근로자의 건강상태를 확인하는 것은 금지되어 있으며 동일 사업장에서 EPHI를 근로자의 건강리스크 수준에 따라 선별적으로 제공하는 것도 금지되어 있다. 이렇게 근로자의 건강상태에 대한 정보의 비대칭성(Asymmetric Information)이 존재하는 상황에서 고용주가 근로자의 건강상태를 가늠할 수 있는 방법이 근로자의 비만여부의 고려이다. 즉, 근로자의 비만여부는 특별한 건강검진 과정을 거치지 않고서도 고용주가 쉽게 판단할 수 있는 건강리스크의 대리변수(Proxy for Health Condition)로 사용될 수 있다. 이러한 논리에 근거하여, 비만 근로자가 건강보험을 제공하는 직장에서 근로하는 가능성을 실증분석함으로써 건강리스크 수준에 따른 건강보험(EPHI) 소유여부를 규명하였다.

EPHI를 제공하는 고용주는 건강리스크가 높은 근로자를 고용하려 하지 않는 반면, 건강리스크가 높은 근로자는 EPHI를 제공하는 고용주를 선호할 것이다. 이렇게 근로자의 건강리스크 수준에 따라 EPHI의 공급자와 수요자의 행태가 다르게 나타나며 그 중심에는 정보의 비대칭성 문제가 존재하게 된다. 본 연구에서는 근로자의 건강리스크에 대한 정보의 비대칭성이 근로자와 고용주 사이에 존재하는지 여부에 따라 노동시장에서 발생할 수 있는 결과를 이론적인 모델로 분석하였다. 분석결과 근로자의 건강리스크에 대해 정보의 비대칭성이 없는 경우(예, 비만)에는 비만 근로자가 EPHI를 제공하는 기업에 고용될 가능성이 정보의 비대칭성이 존재할 경우보다 낮게 나타났다.

또한 비만 노동자들이 EPHI를 제공하는 직장에서 근무하고 있을 가능성을 실증분석한 결과 비만인들이 EPHI를 제공하는 직장에서 근무하는 비율이 정상 체중의 근로자들보다 낮게 나타났다. 그리고 이러한 현상은 남성이 아닌 여성 비만 근로자에게 주로 나타났는데, 이는 남성 비만자보다 여성 비만자의 의료비용이 높다는 점과 체중과 관련한 부정적인 인식(Stigma)이 남성보다는 여성에게 강하게 나타나는 사회적 현상이 반영된 결과로 해석된다.

※ 국문 색인어: 건강리스크, 건강보험, 비만, 정보의 비대칭성