Price Elasticity of Demand in Employer-Provided Self-Insured Health Plans

Iwona Kicinger[1] and Robin Hanson[2]

Department of Economics

George Mason University

Fairfax, VA 22030

[1] Ph.D. student, Department of Economics, 4400 University Drive, Fairfax, VA 22030, Phone: 703-341-9869, E-mail: ikicinge@gmu.edu (Corresponding author)

[2] Associate Professor of Economics, Department of Economics, MSN 1D3, Carow Hall, Fairfax VA 22030-4444, http://hanson.gmu.edu, Phone: 703-993-2326, Fax: 703-993-2323, E-mail: rhanson@gmu.edu

Price Elasticity of Demand in Employer-Provided Self-Insured Health Plans

Abstract

This paper studies the price elasticity of demand in the employer-provided self-insured health plans. The price of self-insurance is defined as the "loading fee" that mainly refers to the administrative costs of insurance that are recognized as its implicit price. Further, the administrative costs of self-insured health plans are expressed as a fraction of benefits claims. The performed empirical analyses estimate the price elasticity of demand for self-insured health plans to be approximately equal to -0.13 in all the models specified, except those with interaction terms. When model specifications are extended by two interaction effects, the price elasticity of demand is estimated to be approximately equal to -0.36. The measures of the price elasticity of demand for self-insured health plans accord well with estimates of other types of health insurance that found the price elasticity of health insurance to be inelastic.

Keywords: price elasticity; demand; employer-provided health insurance; self-insured health plans; labor market

1. Introduction

The demand for health care, its specific services and its responsiveness to price has been long studied in the economic literature (Ringel, Hosek et al. 2002). In particular, the issue of the price responsiveness of demand for health insurance is critical in analyzing the effectiveness and relevance of various health insurance policies proposed over the years (Chernew, Frick et al. 1997; Blumberg, Nichols et al. 2001). These health policy proposals have been largely designed to decrease the growing number of uninsured people in the US, which is estimated to include approximately over 43 million (Hoffman and Schlobohm 2000; Rhoades, Vistnes et al. 2002). Moreover, "the degree of responsiveness to price or insurance coverage is important because, other things equal, services that are more elastic should be less insured" (Haas-Wilson, Cheadle et al. 1989). Similarly, the most dominant form of providing health insurance coverage nowadays in the US through the employment is also critically conditional on health plans' price sensitivity (e.g., employers relate their decisions to premium costs, as shared by employees and employer) (Abraham, Vogt et al. 2002).

The extensive work up to date on the price elasticity of the demand for health insurance coverage encompasses the whole variety of empirical studies that differ from each other with respect to the data sources, methodology, as well as empirical and experimental methods used. This further results in "no definitely established range of price elasticities [of health plan choice] in the literature" (Royalty and Solomon 1999). However, in general, the estimates of the price elasticity are found to be inelastic across studies with

their mid-estimate of -0.17 (Ringel, Hosek et al. 2002)[3]. On the other hand, specific health care services are estimated to be more price sensitive relative to price estimates for health care in general.[4]

This paper focuses on the price elasticity of demand in the context of self-insured/funded health coverage within employer-sponsored health plans. Employer provided self-insurance is defined here as health coverage where the employer does not contract with an insurance company to assume the financial risk (as opposed to conventional/traditional health plans), but instead it assumes internally all or part of the financial risk associated with paying potential medical claims. Hence, it acts as its own health insurance firm, suggesting that it pays for its employees' medical claims out of its own pockets.

Specifically, in this study, we seek to establish whether employers' demand for self-funded coverage is price responsive and to determine the degree to which employers face elastic or inelastic demand for this type of health plan. Moreover, we attempt to compare the obtained measures of the price elasticity of self-insured health plans to previous literature on the subject across various types of health insurance. In particular, the methodology used in this study draws upon the methodology used by Phelps (2002) who defines the price of insurance as "the 'loading fee' of the insurance company above expected benefits" that predominantly refers to the administrative costs of insurance. Hence, the administrative costs associated with operating self-funded health coverage are

[3] There are, however some studies they found elastic estimates with respect to the price, such as the work by Royalty and Solomon (1999) that will be analyzed in more detail later in the paper.
[4] For the literature review of empirical studies of the price elasticity of demand for special types of health care, refer to Ringel and Hosek (2002).

recognized as its implicit price. Further, following Thorpe (1992), the administrative costs of self-insured health plans are expressed as a fraction of incurred benefits claims in order to capture the administrative spending more appropriately.

As such, this paper extends earlier work to a new setting of self-insured health plans. The motivation for that is the prevalent role of self-insurance in the employer's health benefits provision (Henderson 1999; Park 2000; Employee Benefit Research Institute (EBRI) 2008). In fact, approximately 55 percent, or 50 million, employees and their dependents are offered self-funded group health coverage through their workplace that represents over one-half of all private insurance (Henderson 1999; Employee Benefit Research Institute (EBRI) 2008). Self-insurance has become predominantly pronounced in larger firms (Henderson 1999; Park 2000; Employee Benefit Research Institute (EBRI) 2008). Specifically, in 2006 approximately 89 percent of workers received self-insured health benefits in companies with 5,000 or more employees (Employee Benefit Research Institute (EBRI) 2008). However, some smaller firms choose to self-insure as well (Henderson 1999) and it is evaluated that they (e.g., companies with an employment below 100) represent one-half of all self-insuring firms[5] (Thompson 1993).

The dominant role of self-insurance offered through the workplace is typically explained by its costs advantages, as compared to not self-insured health plans, which mainly results from several exemptions and flexibility features it enjoys. In particular, those exemptions are in the context of state insurance premiums taxes and compliance with

[5] Self-Insurance Institute of America recommends practicing self-funded health plans to any business, regardless of its size. On the other hand, the National Business Coalition on Health advocates self-insurance for firms employing between 100 and 300 workers as a minimum.

varying state mandates (Self-Insurance Institute of America; Thompson 1993; Acs, Long et al. 1996; Henderson 1999; Claxton, Gil et al. 2005).[6] In addition, other exemptions refer to holding reserve requirements, mandated benefits' provision, and consumer protection requirements (Acs, Long et al. 1996; Claxton, Gil et al. 2005). Flexibility features, on the other hand, are associated with the plan design (Self-Insurance Institute of America; Thompson 1993; Claxton, Gil et al. 2005) and helping employers treating their employees more equally with respect to health benefits offered, especially when they are located in several states (Self-Insurance Institute of America; Marquis and Long 1999). That way, self-funding employers have more control over their cash flows. Thus, the relevance of self-insured coverage offered through the workplace provides a rationale for additional investigation with respect to its demand responsiveness. As such, the subject under examination isn't just important for public policy makers but it is also highly relevant for employers and employees.

In what follows, we first briefly discuss empirical literature on the price elasticity of the demand in health insurance mostly with the focus on employer-provided health coverage. Next, research questions guiding this study are presented in a more detail and are followed by a discussion of an analytical setup for investigating the price elasticity of the demand for self-insured health plans. The empirical section also introduces the dataset and the methodology used. Further, descriptive statistics and empirical results are reported and analyzed in more detail. Finally, the results obtained in the empirical

[6] Thus, self-insured plans are overseen only on the federal level by the Department of Labor. However, self-insurance may lead to a greater risk if more claims than anticipated need to be paid.

analyses are summarized and followed by a brief discussion of possible directions of future research.

2. Background

In order to understand the need for a new study of health plan elasticities, let us turn our attention to a brief discussion of the variety of estimated elasticities in the existing work with respect to subjects examined and their major findings. Appendix A provides an overview of such major studies that investigated the price elasticity of demand for health insurance plans with respect to the context studied, data sources, and empirical as well as experimental techniques applied.

Large number of empirical studies on the price elasticity of demand for health insurance comes from studies investigating employees' enrollment decisions when faced with a choice among multiple health plans offered by an employer (e.g., the demand responsiveness for various health plans to their price changes) (Holmer 1984; Merrill, Jackson et al. 1985; Neipp and Zeckhauser 1985; Welch 1986; Marquis and Phelps 1987; Feldman, Finch et al. 1989; Short and Taylor 1989; Barringer and Mitchell 1994; Hosek, Bennett et al. 1995; Cutler and Reber 1998; Abraham, Vogt et al. 2002). In those papers, consumers are presumed to assess health plans available to them based on the expected utility they gain from them. The evidence resulting from this literature typically implies that health plan choice is determined by the price of insurance, as well as by cost sharing arrangements, income, health status, and some demographic characteristics.

On the other hand, other research on the demand for health insurance coverage focuses the price elasticity by studying a particular health plan, which typically relates to varied or constant coinsurance rates (Manning, Newhouse et al. 1987; Marquis and Phelps 1987; Manning, Newhouse et al. 1988; Newhouse and the Insurance Experiment Group 1993; Royalty and Solomon 1999). In general, the price elasticity estimates in both a health plan choice setting and a particular health plan environment are far from uniform (Figure 1 illustrates the variety of obtained estimates across the literature). In fact, they vary largely from each other depending on the data source, methodology, and econometric techniques applied. Overall, the range of the price elasticities estimated here is as low in absolute value as -0.01 to -0.02 if using the revised estimates in Barringer and Mitchell (1994) (whereas in their original publication, these estimates range from -0.1 to -0.2). On the other hand, according to Royalty and Solomon (1999), the highest bound of the price elasticities was as high in absolute value as -1.0 to -1.8 (if using the logit estimation method) or -3.7 to -6.2 (if using the fixed effects estimation) whereas Feldman, Dowd et al. obtained slightly different estimates within the high bound, such as -5.82 for family coverage and -3.91 for single coverage (1997)[7]. It should also be emphasized here that the results mentioned above (Feldman, Dowd et al. 1997; Royalty and Solomon 1999) represent two studies to the authors' knowledge that found that employees were price-elastic with respect to their demand for coverage. That further implies that most of the empirical work concluded that the price elasticity of demand for health insurance is less than one suggesting that employees are insensitive to the price changes of health insurance.

[7] Refer to Appendix A for more details on how these measurements were calculated, their general contexts, and the methodology used.

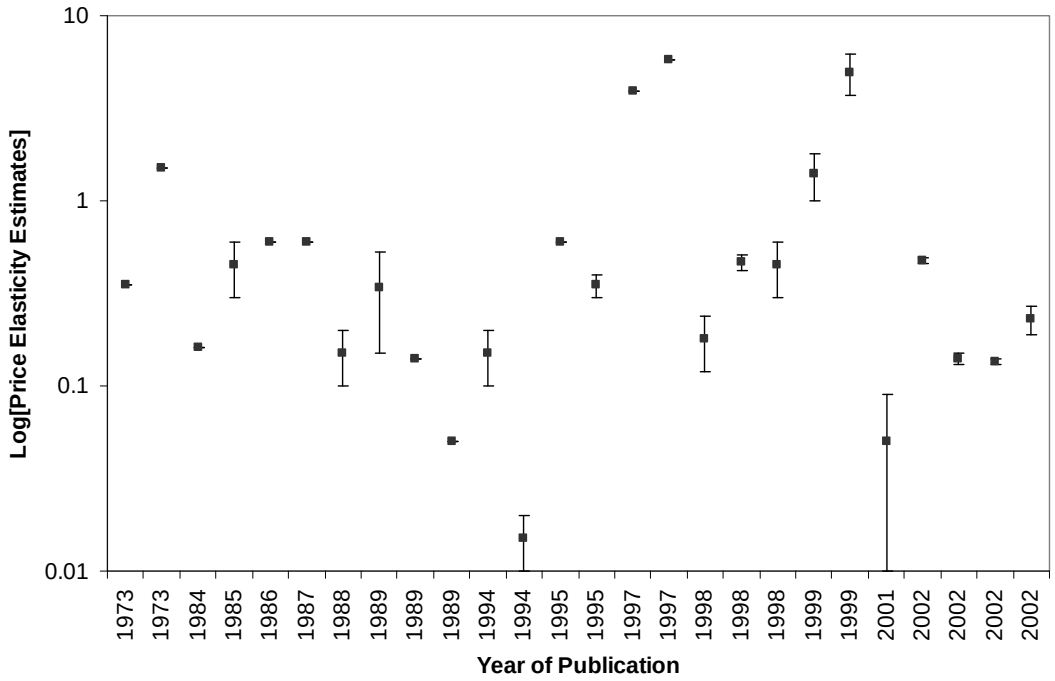

Figure 1: Representative Estimates of the Price Elasticity of Demand of Health Insurance in Existing Literature

Moreover, the interactions of the price elasticity of demand and income (Phelps and Newhouse 1972; Beck 1974; Newhouse and Phelps 1976; Manning and Phelps 1979; Manning, Morris et al. 1980; Newhouse 1981) and age (Royalty and Solomon 1999) have been also examined in the previous literature. The variation of the price elasticity with income would imply that the rich are less sensitive to the price than the poor, which was found to be the case in Beck (1974) who used the Canadian dataset. However, empirical analyses that used the US data concluded either the contrary effect (e.g., the poor less sensitive to price than the rich) or the problem with inconclusive data (Phelps and Newhouse 1972; Newhouse and Phelps 1976; Manning and Phelps 1979; Manning, Morris et al. 1980; Newhouse 1981). On the other hand, Royalty and Solomon (1999) found the evidence that the price elasticity also depends on the age of an individual. Specifically, they concluded that older employees are less price sensitive than their younger counterparts.

3. Research Questions and Hypotheses

As already pointed out, the main purpose this paper is to measure the price elasticity of self-insured health plan(s) and to compare their resulting estimates to those in the previous literature. Further, since it may be expected that the price elasticity of demand may vary with income (Phelps and Newhouse 1972; Newhouse and Phelps 1976; Manning and Phelps 1979; Manning, Morris et al. 1980; Newhouse 1981) and age (Royalty and Solomon 1999), the interactions between those variables and the price elasticity are also considered. Thus, the fundamental research questions and the corresponding hypotheses to be examined in this paper are listed in Table 1.

Table 1: Major Research Questions and Hypotheses Investigated in this Paper

	Research Question (RQ)	*Research Hypothesis (RH)*
1.	What is the price elasticity of demand in self-insured health plan(s), and how does it relate to other estimates across studies?	According to the most of the previous literature findings, the price elasticity is hypothesized to be in an inelastic range of the demand.
2.	Does the price elasticity of demand vary with income? If yes, then what is the direction of this variation (e.g., are the poor/ rich more sensitive to the price than the rich/ poor?)	Based on the previous empirical evidence from the US, no variation or the opposite effect (e.g., the rich are more price sensitive to the price than the poor) is expected (Phelps and Newhouse 1972; Newhouse and Phelps 1976; Manning and Phelps 1979; Manning, Morris et al. 1980).
3.	Does the price elasticity of demand depend upon the age and if yes, then what is the direction of this variation?	The price elasticity of demand is hypothesized to vary with age. In fact, it is expected to be higher in absolute value for younger people (Royalty and Solomon 1999).

4. Empirical Analysis

4.1. Data Source

The empirical analysis was conducted using the 1987 National Medical Expenditure Survey (NMES), Household Survey, Employment-Related Coverage module (United States Department of Health and Human Services. Agency for Health Care Policy and Research 1992) sponsored by the Agency for Health Care Policy and Research in the U.S. Department of Health and Human Services. The 1987 NMES Employment-Related Coverage dataset represents a stratified random sample of the civilian non-institutionalized population of the United States and it's unique for the purposes of this study, as it breaks private health insurance information into self-insured and not self-insured plans.

The original NMES sample covers 165 geographic areas as primary sampling units that represent 127 distinct geographic regions, in which around 15,000 households were interviewed on their health insurance during 1987 (U.S. Department of Health and Human Services Agency for Health Care Policy and Research 2001). After interviewing households, 11,422 employers (with the response rate of 85.5%), 353 unions (with the response rate of 76.7%), and 745 insurance companies (where 75.6% of them responded) were contacted in order to verify the information on the plan, including enrollment, premiums, and payment sources (U.S. Department of Health and Human Services Agency for Health Care Policy and Research 2001).

Employers that assumed financial liability for claims or expenses covered under their health insurance plans were considered self-insured (U.S. Department of Health and Human Services Agency for Health Care Policy and Research 2001). Further, before the data were recorded to the final dataset, the information collected on self-insured plans was subjected to rigorous automated checking routines. Those respondents whose data failed those checks were contacted again in order to verify the data provided by them.

4.2. Subset Construction

The analytical part utilizes a person-level sample of the 1987 NMES dataset that is constructed by selecting only the subset of employees covered by self-insured employer-sponsored health plans. That also implies that employees whose coverage consisted of multiple plans where at least one plan one was self-insured and at least one plan wasn't self-insured weren't included in the examination. Further, incomplete records, such as observations denoted as "don't know", "refused", "never will know", "not ascertain", or "inapplicable" were excluded from the analysis. As such, the final number of observations applied in the empirical investigation considered 385 individuals.

4.3. Methodology

This section discusses the measure of the output variable and the choice of explanatory variables used. It also examines the model specification and empirical methods applied in the analytical part.

4.3.1. Output Variable

Most observational studies (Rosett and Huang 1973; Newhouse 1981; Holmer 1984; Merrill, Jackson et al. 1985; Welch 1986; Short and Taylor 1989; Barringer and Mitchell 1994; Hosek, Bennett et al. 1995; Feldman, Dowd et al. 1997; Royalty and Solomon 1999; Blumberg, Nichols et al. 2001) typically use premium data or insurance claims as a measure of the demand for health care (e.g. expenditures or physical units of utilization) in their empirical analyses. Expenditures and insurance claims as the measures of the quantity of health insurance have some advantages as well as disadvantages. On one hand, some criticize that they don't provide any explicit welfare interpretation. On the other hand, they also enjoy some advantages, as compared to other measures, such as (Newhouse 1981):

1) It isn't ambiguous with respect to specifying the change in price, as the data usually include the information on the variation in coinsurance and deductible rates.
2) In the case of employer-based health insurance, which generally include large employers, as measured by the number of their employees, insurance is exogenous (e.g., any self-selection bias is minimized).
3) Utilization varies within a small group, which implies that the obtained estimates provide an appropriate representation of the market.

Similarly, also researchers who studied the determination of the quantity of insurance in employer-based health plans typically used premium data (Cantor, Long et al. 1995; Long and Marquis 1999; Dranove, Spier et al. 2000; Gruber 2000; Marquis and Long

2001). In particular, as the employer contribution constitutes the greatest portion of the total premium in employer-provided health coverage, they applied the employer share toward total annual premium as a legitimate approximation of the measure of health insurance.

Hence, this paper follows the methodology used in the above mentioned literature with respect to quantifying health insurance coverage. In other words, in this study the quantity of insurance held is considered in terms of the employer's contribution to employee's total annual premium. However, since self-insured coverage doesn't have any premium per se that is typical for traditional insurance; therefore, its suitable equivalent is considered here to be the employer's total funding/expenditure of self-insured medical and hospital plans which doesn't include administrative costs associated with them.

4.3.2. Price Explanatory Variable

The major variable of interest in our study is the price of employer's self-funded health coverage. In general, the price of insurance can't be defined as a premium because the premium itself contains average expense that the insurance holder would have to incur anyway (Phelps 2002). On the other hand, the price of insurance may be defined as "any markup above those expected benefits that the insurance company adds" or "the 'loading fee' of the insurance company above expected benefits" (Phelps 2002). More specifically, the "loading fee" includes the insurer's costs related to risk bearing and administration of insurance (e.g., processing claims, making appropriate payments that

also depend upon the number and complexity of claims submitted). In other words, if the price of insurance would be equal to expected benefits then it would be "actuarially fair" insurance (e.g., that would not charge for risk bearing and/or overhead costs), which would not be realistic because the conduct of insurance companies' operations is also associated with some costs, especially administrative costs. In fact, the cost of administering the US health care system is significant, as it was assessed to be between $96.8 billion and $120.4 billion, which is approximately one-fourth of total health care spending annually (Goodman and Musgrave 1994).

This study follows the methodology used by Phelps (2002) with respect to defining the price of insurance as "the loading fee" that mostly relates to the administration costs of insurance. Hence, in our specific context of self-insured health plans, the administrative costs associated with operating this type of health plans are recognized as their implicit price. Moreover, in order to determine a more adequate level of administrative spending, the administrative costs of self-insured coverage are expressed as a fraction of total benefits claims. This measure is also used in the literature, for example by Thorpe (1992). In other words, the price of self-insurance is defined as the ratio of average administrative costs to total benefits claims per employee. In fact, administrative costs related to self-insured coverage[8] are substantial, as they are estimated to range between 5 to 12 percent of incurred benefits claims (Thorpe 1992), depending on employers and the type of services purchased.

[8] Administrative costs in self-insurance typically contain claims processing, claims review, accounting, computing, and consulting.

4.3.3. Applied Models and Techniques

The empirical analysis uses ordinary least squares (OLS)[9]. Specifically, the lognormal model is applied, as it's suggested by the variance stabilization techniques such as the Box-Cox and the coded groups' methods. The methods used here as well as robust standard errors also imply that heteroskedasticty isn't an issue here (Draper and Smith 2001; Wooldridge 2002). This type of the model is also consistent with the literature that indicates that medical expenditures typically are best approximated by a lognormal distribution (Browne 1992).

Thus, the outcome measure in the demand equation for insurance was selected to be the natural log of the amount of insurance ($Log(I_i)$) that is provided by the employer towards employee's i health coverage, which is specified as the employer's total funding/expenditure of self-insured medical and hospital plans. The major variable investigated in this paper is the price, which is expressed in the logarithmic form. Other characteristics of demand for insurance that are controlled for are the following: the union membership in an establishment of a person's employment, demographic and geographic information of policy holders, and employers' characteristics (see Table 1 for the descriptive statistics of independent variables).

[9] We acknowledge that there may be a potential endogeneity problem of workforce composition in our data. Instrumental variables estimation could be used to test the presence of endogenous selection and to control for possible reverse causation. However, due to lack of adequate instruments in our data, we were not able to use this technique. Hence, our empirical analysis is based only on the OLS estimation whereas a potential endogeneity issue is acknowledged. On the other hand, some previous studies claimed that "insurance is exogenous or […] any self-selection is minimal" (Newhouse 1981) in employer-based health insurance, as it usually includes large employer groups. Thus, even though we were not able to address this issue in our empirical analysis, our results should not be biased because our data pertain mostly to large employers.

However, in order to test the sensitivity of the obtained results, five specifications of the model were chosen:

- [I] OLS results with the price, union effect, demographic, geographic, total employment (e.g. all single variables except for the employer's organization type that will be used in the model [V]), and two interaction terms with the price elasticity (e.g., the most comprehensive specification of the model);
- [II] OLS output with the price and unions as explanatory variables;
- [III] OLS results with the price, unions, and demographic independent variables;
- [IV] OLS results with the price, unions, demographic, and geographic control variables;
- [V] OLS outcomes with the price, union effect, demographic, geographic, and employer specific explanatory variables (e.g. all single variables).

Thus, the applied specifications of the model could be expressed in the following ways:

[I] $\text{Log}(I_i) = \alpha+\beta_1 \log(\text{PRICE})+\beta_2\text{UNION} +\beta_2\text{DEMOGRAPHIC} +\beta_3\text{GEOGRAPHIC} +\beta_5\text{Totalemployment}+ \beta_6\text{INTERACTIONS} +\mu,$

[II] $\text{Log}(I_i) =\alpha+\beta_1 \log(\text{PRICE})+\beta_2\text{UNION} +\mu,$

[III] $\text{Log}(I_i) = \alpha+\beta_1 \log(\text{PRICE})+\beta_2\text{UNION} +\beta_3\text{DEMOGRAPHIC} +\mu,$

[IV] $\text{Log}(I_i)= \alpha+\beta_1 \log(\text{PRICE})+\beta_2\text{UNION} +\beta_3\text{DEMOGRAPHIC}+\beta_4\text{GEOGRAPHIC}+\mu,$

[V] $\text{Log}(I_i) = \alpha+\beta_1 \log(\text{PRICE})+\beta_2\text{UNION} +\beta_3\text{DEMOGRAPHIC} +\beta_4\text{GEOGRAPHIC} +\beta_5\text{EMPLOYER}+\mu,$

where I_i=employer expenditure towards policy holder's (PH's) self-insured health coverage

In particular, the price of insurance is defined here as the ratio of average administrative cost per employee to total claims incurred per employee. Since the price is usually a positive dollar amount and as such it may be expressed in a logarithmic form. However, since relatively few observations take on the value 0 (exactly 11 observations), log(Price+0.01) is used here as an acceptable approximation[10].

Among other control variables, the union variable is expressed as a ratio of all employees who are members of a union at a particular establishment. Further, the demographic control variables consist of sex (as a binary variable with 1 if male), age (expressed in years), including its squared term (to allow for a diminishing character of age), and race (Hispanic, Black, White whereas White is an omitted control variable), as well as income variables. Since the data set doesn't provide any exact information on insurance beneficiaries' earnings, the income level is approximated by some indicative variables. Specifically, those income proxies include the proportion of the total number of employees earning below \$5/hour[11] and dichotomous information on other employee fringe benefits (such as paid vacation, paid sick leave, life insurance and retirement plan).

Next, the vector of geographic variables takes into account four main regions according to the U.S. region specification (Northeast, Midwest, South, and West, with West as an

[10] 0.01 is used here instead of a larger number such as 1 in order to obtain more variation in the data and not to change considerably the values of the price variable.
[11] \$5/hour could be understood here as a cut for the minimum hourly wage in 1987.

omitted control variable). On the other hand, the other group of explanatory variables is the vector of employer's control variables that includes establishment size (numeric) in the logarithmic form[12], and the employer organization form (such as for profit, non-profit, government and other, where the last one is an omitted variable).

Moreover, following the literature (Phelps and Newhouse 1972; Newhouse and Phelps 1976; Manning and Phelps 1979; Manning, Morris et al. 1980; Royalty and Solomon 1999), two interaction terms between the price elasticity are also considered in the examination in order to test for its variations with the income and the age. Finally, μ stands for the unobservable error associated with an individual.

4.4. Empirical Results

4.4.1. Descriptive Statistics

Table 2 presents summary statistics of all variables also including the dependent variable used in the analysis as well as their descriptions. Frequency tables of categorical variables are listed in Appendix B.

The sample applied in the empirical analysis considers 385 individuals who are covered by self-insured health coverage through their employment and reside in various geographic regions in the U.S. at the last round in 1987. The medium age of the policy holder was approximately 40-41 years. On average 55% of policy holders were males and 45% were females. The racial composition of the analyzed subset includes 17% Blacks,

[12] Since the number of employees takes typically large integer values, the logarithmic form of the establishment size is acceptable here (Wooldridge, 2006).

9% Hispanics, and 74% Whites. In terms of the income level, on average 22% of employees receiving health insurance benefits earned below $5/hour. In the case of fringe benefits, 99% of workers were offered paid vacation, 90% of them were provided with paid sick leave, 98% of policy holders obtained life insurance, and 88% of them were given retirement plan benefits through their workplace.

On the other hand, in terms of geographic regions of employees' place of residence, 14% of them resided in the Northeast, 29% lived in the Midwest, 41% lived in the South, and 16% resided in the West.

Next, with respect to the employer specific control variables, the study sample included establishments with the mean of about 1,130 employees with the smallest firm size of one person and the largest one of 10,000 individuals. On average, 74% of all establishments under examination were for profit type, 12% represented for non-profit, 13% were government, and the remaining 1% represented other organizational form(s).

Finally, the employer funding of self-insured health plans that is used in constructing the dependent variable has the mean of about $2,130 that ranges from about $315 as the minimum to $11,250 as the maximum expenditure.

Table 2: Descriptive Statistics of Variables in Self-Insured Health Plans

Variable	*Mean*	*Std Dev*	*Minimum*	*Maximum*	*Description*	*Format*
Price						
ADM. COSTS/TOTAL CLAIMS	0.11	0.62	0	11.64	Average administrative costs per person within an establishment as a fraction of total claims incurred	Proportion
Demographic						
AGE	40.06	13.997	17	83	Age in the last round in 1987	Years
MALE	0.55	0.50	0	1	Policy holder (PH) sex	1 if MALE, 0 if FEMALE (omitted)
BLACK	0.17	0.37	0	1	Policy holder (PH) gender	Relative to WHITE
HISPANIC	0.09	0.29	0	1	Policy holder (PH) gender	Relative to WHITE
WHITE	0.74	0.44	0	1	Policy holder (PH) gender	Referenced variable
LOW INCOME	0.22	2.56	0	50.28	Proportion of the total number of employees earning less than $5.0./hr	Proportion
PAID VACATION	0.99	0.11	0	1	Paid vacation offered by the employer	1 if YES, 0 if NO (omitted)
PAID SICK LEAVE	0.90	0.30	0	1	Paid sick leave offered by the employer	1 if YES, 0 if NO (omitted)
LIFE INSURANCE	0.98	0.13	0	1	Life insurance offered by the employer	1 if YES, 0 if NO (omitted)
RETIREMENT PLAN	0.88	0.33	0	1	Retirement plan offered by the employer	1 if YES, 0 if NO (omitted)
Geographic					The U.S. Census region of the PH's residence	

NORTHEAST	0.14	0.34	0	1	Northeastern region	WEST (omitted)
MIDWEST	0.29	0.45	0	1	Midwestern region	WEST (omitted)
SOUTH	0.41	0.49	0	1	Southern region	WEST (omitted)
WEST	0.16	0.37	0	1	Western region	Omitted variable
Employer						
FOR PROFIT	0.74	0.44	0	1	Employer organization type is for profit	GOVERNMENT (reference)
NON- PROFIT	0.12	0.32	0	1	Employer organization form is non-profit	GOVERNMENT (reference)
OTHER	0.01	0.11	0	1	Employer organization form is other	GOVERNMENT (reference)
GOVERNMENT	0.13	0.33	0	1	Employer organization type is state/local government	Referenced category
TOTALEMP	1,129.92	1,577.06	1	10,000	Total number of employees at a particular location of an establishment	Numeric
EMPLOYER FUNDING OF SELF-INSURED HEALTH PLANS	2,129.76	1,793.55	315.25	11,250	Average employer funding of self-insured hospital and medical plans per person within a particular establishment	Numeric ($) (used in the construction of the dependent variable)
Union Membership						
UNION	22.74	30.66	0	95	Union membership as a percentage of all employees at an establishment	Percentage
Number of Observations	385					

Note: PH=Policy Holder

4.4.2. Discussion

Table 3 reports the empirical outcomes from OLS that include the estimated parameters, p-values and standard errors of the demand of insurance equations for self-insured health coverage. It also lists the OLS coefficients of the log-level model as converted to exact percent differences, when appropriate[13].

4.4.2.1. Price Elasticity Estimates

The major focus of this study is an empirical examination of the responsiveness of demand to changes in price. As such, the predominant variable under examination here is the price variable. The specified log-linear demand model allows us to interpret the price variable directly in terms of the elasticity measure (which assumes the constant price elasticity across all illness events).

According to the obtained results, the estimate of the price elasticity of demand for self-insured health plans (RQ1) is approximately -0.13 in models [II]-[V] (see Table 3 for exact measures in each of the models), which provides a relatively robust result across all the models specified in the analysis that don't include interaction terms with the price elasticity[14]. These estimates can be also expressed in the form of ranges of estimates in order to make our results comparable across other studies' findings (see Table 4 for specific ranges of the price elasticities). Thus, the range for the price elasticity of

[13] The OLS results are converted to the percent differences by using the following general formula: $\%\Delta\hat{}=100*(\exp^{\beta*\Delta x}-1)$ which in case of $\Delta x=1$ takes the form of: $\%\Delta\hat{}=100*(\exp^{\beta}-1)$ (β stands for regression estimates). The OLS outputs list the percent differences for one unit change in independent variables.

[14] OLS results with the price variable only (not reported in Table 3) resulted in the price elasticity of -0.124 (or the range of the price elasticity between -0.220 and -0.027).

demand is estimated to range approximately from -0.22 to -0.04 (in models [II]-[V]). In fact, the measures obtained for these models (e.g, the range between -0.22 and -0.04) correspond to a lower range of earlier estimates (Figure 2 provides such a comparative illustration), such as to those estimated by: Holmer (1984), Manning, Newhouse et al. (1987), Manning, Newhouse et al. (1988), Feldman, Finch, et al. (1989), Short and Taylor (1989), Newhouse and the Insurance Experiment Group (1993), Barringer and Mitchell (1994), Liu and Christianson (1998), Blumberg, Nichols, et al. (2001), and Abraham, Vogt, et al. (2002).

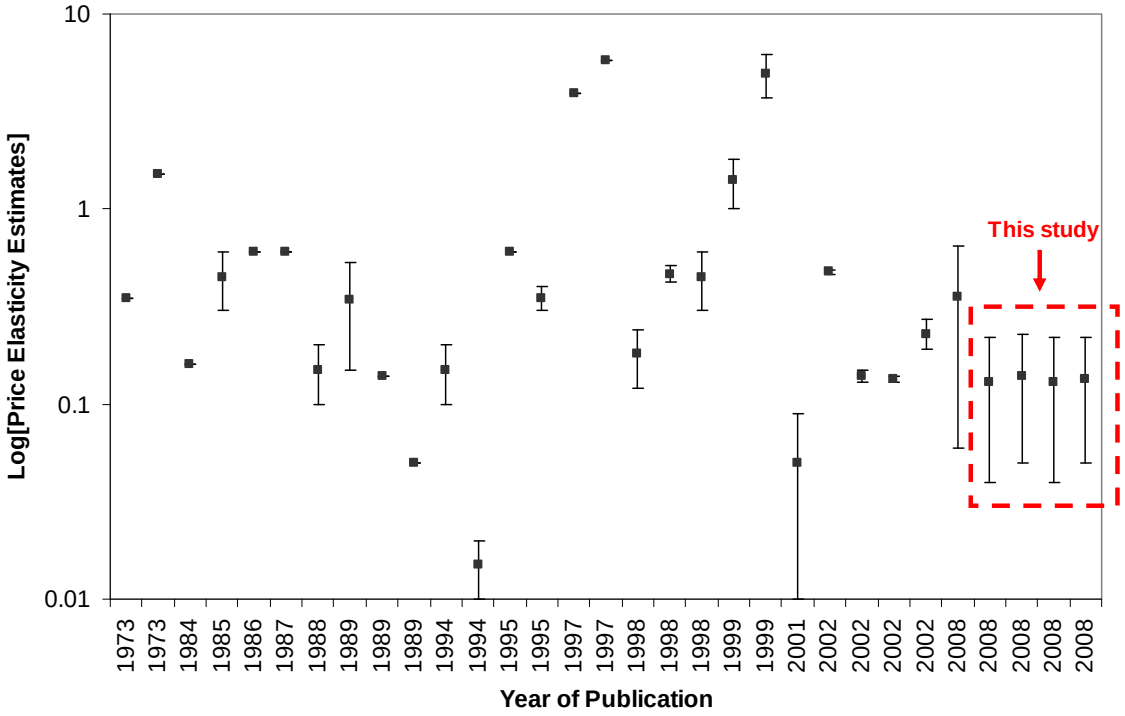

Figure 2: Estimates of the Price Elasticity of Demand of Self-Insurance vs. Other Health Plans in the Existing Literature

On the other hand, the model specification extended by two interaction effects (model [I]) (RQ1) predicts the price elasticity of demand of -0.36, which is higher in the absolute value than the earlier provided measures. Correspondingly, the range for the price elasticity of demand in model [I] is estimated to fall between -0.65 and -0.06. Those

measures are also consistent with earlier studies, such as those estimated by: Rosett and Huang (1973), Neipp and Zeckhauser (1985), Feldman, Finch, et al. (1989), Marquis and Long (1995), and Cutler and Reber (1998).

Hence, as hypothesized earlier, the obtained estimates of the price elasticity of demand for self-insured health plans in all the models specified accord well with most of the previous literature, which also found that the price elasticity of demand for health insurance was less than 1 in absolute terms[15]. In other words, these estimates of the price elasticity of demand in self-insured health plans fall well within the range of previous results that were obtained in the case of health insurance in general, or in the case of specific health plans other than self-insured coverage (such as HMOs). The similarity of our results doesn't only provide a relevant re-confirmation for those earlier measures, but it also demonstrates that the demand responsiveness to changes in price for self-insured health plans doesn't differ from estimates of other types of health insurance.

Moreover, the included interaction terms of the price elasticity with the income and the age (in model [I]) provide other relevant implications. In particular, the variation between the price elasticity of demand and income (RQ2) is not statistically significant. This effect corresponds to the findings by others who used US data (Phelps and Newhouse 1972; Newhouse and Phelps 1976; Manning and Phelps 1979; Manning, Morris et al. 1980; Newhouse 1981) and concluded that the data were inconclusive. On the other hand, the interaction effect between the price elasticity and the age (RQ3) is

[15] Two studies known to the author: by Feldman, Dowd et. al (1997) and Royalty and Solomon (1999) may be considered here as exceptions because they concluded that the price elasticities were above 1 in absolute terms.

approaching the statistical significance (it is only statistically significant at the 10% significance level). The direction of this relationship is positive, which may suggest that older employees are more price sensitive than their younger counterparts, which is the opposite to what was concluded by Royalty and Solomon (1999).

4.4.2.2. Other Demand Factors

In terms of other factors affecting the firm's offerings of self-insured health plans, some demographic characteristics of policy holders are relevant. In particular, female-male differentials are highly statistically significant across all model specifications (p_{value}=0.000) and their estimate is positive. This may suggest that males are provided with higher amounts of insurance than females by about 34-35% (depending on the model variation). This effect, however, doesn't account for education differences, which may also lead to a higher estimate. Further, our empirical findings imply a statistically significant and positive impact of race. Specifically, our data suggest that Hispanics are offered higher quantities of self-insurance than Whites by approximately 38-40%. On the other hand, in terms of income proxies, based on our analysis only retirement benefit turns out to be statistically significant and its effect is negative in all model variations used (e.g., the proportion of employees earning below $5/hr as well as paid vacation, paid sick leave and life insurance benefits don't have any statistical significance). However, the age effect isn't of a statistical significance in any of the models.

On the other hand, the results obtained don't provide enough evidence to suggest that geographical variations affect the employer offer decisions in any significant way. In

other words, the Northeastern region is statistically significant (p_{value}<0.112) and it has a negative impact, as compared to the Western region, however, this result isn't robust across the models (e.g., it's statistically significant only in one model specification, Model I). Similarly, according to our empirical findings none of employer specific characteristics (e.g., the organizational type and the size of the company) and has proven to be of a statistical significance.

Further, the union membership, is very statistically significant in each of outputs reported (p_{value}<0.001). Moreover, this relationship is positive, which implies that a higher proportion of union members as employees of a company results in a higher quantity of insurance by approximately 0.6-0.8%. This finding is also consistent with the theoretical predictions stating that unions as a form of democratic organizations consume more insurance (Hanson 2005) and also consistent with the earlier empirical conclusions (Marquis and Long 2001; Buchmueller, Dinardo et al. 2002).

Table 3: OLS Results in Self-Insured Health Plans (Dependent Variable: Quantity of Self-Insurance)

Independent Variables:	***Model I***		***Model II***		***Model III***		***Model IV***		***Model V***	
	Coeff. ***(%)***	**P_{value}** ***(robust std. error)***	**Coeff.** ***(%)***	**P_{value}** ***(robust std. error)***	**Coeff.** ***(%)***	**P_{value}** ***(robust std. error)***	**Coeff.** ***(%)***	**P_{value}** ***(robust std. error)***	**Coeff.** ***(%)***	**P_{value}** ***(robust std. error)***
PRICE										
Ln(Price)	-0.355 (-29.88%)	0.017** (0.148)	-0.134 (-12.54%)	0.003*** (0.046)	-0.138 (-12.89%)	0.002*** (0.045)	-0.132 (-12.37%)	0.004*** (0.045)	-0.135 (-12.63%)	0.003*** (0.045)
INTERACTIONS										
Ln(Price)*Low Income	-0.095 (-9.06%)	0.765 (0.318)								
Ln(Price)*Age	0.006 (0.60%)	0.072* (0.004)								
DEMOGRAPHIC										
AGE	0.004 (0.40%)	0.775 (0.014)			-0.012 (-1.19%)	0.295 (0.012)	-0.012 (-1.19%)	0.306 (0.012)	-0.011 (-1.09%)	0.356 (0.012)
AGE^2	0.0002 (0.02%)	0.161 (0.0001)			0.0002 (0.02%)	0.206 (0.0001)	0.0002 (0.02%)	0.203 (0.0001)	0.0002 (0.02%)	0.244 (0.0001)
MALE	0.298 (34.72%)	0.000*** (0.062)			0.301 (35.12%)	0.000*** (0.062)	0.292 (33.91%)	0.000*** (0.062)	0.288 (33.38%)	0.000*** (0.064)
BLACK	0.023 (2.33%)	0.794 (0.087)			-0.004 (-0.40)	0.960 (0.080)	0.018 (1.82%)	0.831 (0.084)	0.012 (1.21%)	0.887 (0.087)
HISPANIC	0.323 (38.13%)	0.004*** (0.113)			0.339 (40.35%)	0.003*** (0.113)	0.328 (38.82%)	0.004*** (0.114)	0.322 (37.99%)	0.005*** (0.114)
LOW INCOME	-0.269 (-23.59%)	0.764 (0.893)			-0.002 (-0.20%)	0.389 (0.002)	-0.002 (-0.20%)	0.493 (0.003)	-0.002 (-0.20%)	0.614 (0.003)
PAID VACATION	-0.330 (-28.11%)	0.175 (0.243)			-0.308 (-26.51%)	0.177 (0.228)	-0.329 (-28.04%)	0.173 (0.241)	-0.300 (-25.92%)	0.246 (0.258)

PAID SICK	0.133	0.206			0.129	0.218	0.136	0.198	0.129	0.236
LEAVE	(14.22%)	(0.105)			(13.77%)	(0.105)	(14.57%)	(0.106)	(13.77%)	(0.109)
LIFE	-0.062	0.707			-0.115	0.487	-0.107	0.508	-0.083	0.629
INSURANCE	(-6.01%)	(0.165)			(-10.86%)	(0.166)	(-10.15%)	(0.162)	(-7.96%)	(0.172)
RETIREMENT	-0.213	0.035**			-0.193	0.052*	-0.208	0.034*	-0.188	0.043*
PLAN	(-19.18%)	(0.1005)			(-17.55%)	(0.099)	(-18.78%)	(0.098)	(-17.14%)	(0.093)
GEOGRAPHIC										
NORTHEAST	-0.254	0.023**					-0.240	0.033	-0.234	0.039
	(-22.43%)	(0.112)					(-21.34%)	(0.112)	(-20.86%)	(0.113)
MIDWEST	-0.134	0.169					-0.146	0.133	-0.132	0.172
	(-12.54%)	(0.098)					(-13.58%)	(0.097)	(-12.37%)	(0.097)
SOUTH	-0.128	0.167					-0.124	0.182	-0.120	0.198
	(-12.01%)	(0.093)					(-11.66%)	(0.093)	(-11.31%)	(0.093)
EMPLOYER										
FOR PROFIT									0.060	0.493
									(6.18%)	(0.088)
NON-PROFIT									0.068	0.563
									(7.04%)	(0.117)
OTHER									-0.137	0.771
									(-12.80%)	(0.469)
ln(TOTALEMP)	0.011	0.550							0.006	0.737
	(1.11%)	(0.018)								(0.019)
UNION										
UNION	0.006	0.000***	0.008	0.000***	0.006	0.000***	0.006	0.000***	0.006	0.000***
	(0.60%)	(0.001)	(0.80%)	(0.001)	(0.60%)	(0.001)	(0.60%)	(0.001)	(0.60%)	(0.001)
INTERCEPT	6.883	0.000	6.877	0.000	7.417	0.000***	7.575	0.000***	7.378	0.000***
		(0.604)		(0.134)		(0.410)		(0.435)		(0.499)
Observations		385		385		385		385		385
R-squared		0.266		0.153		0.248		0.258		0.260

Notes: * Significant at the 10% statistical significance level; ** Significant at the 5% statistical significance level; *** Significant at the 1% statistical significance level; PH=Policy Holder; 2 tail test; The OLS results reported as the percent differences apply to for $\Delta x=1$ and are calculated by applying the following formula: $\%\Delta\hat{} = 100*(\exp^{\beta} - 1)$;
OLS results with the price variable only (not reported in the above table) resulted in the price elasticity of -0.124;

Table 4: Ranges of Estimates for the Price Elasticity of Demand in Self-Insured Health Plans across all Model Specifications

Price Elasticity *(95% Conf. Interval)*	***Model I***	***Model II***	***Model III***	***Model IV***	***Model V***
Ln(Price)	-0.645 to -0.064	-0.224 to -0.044	-0.227 to -0.049	-0.220 to -0.043	-0.224 to -0.047
Ln(Price)*Low Income	-0.721 to 0.531				
Ln(Price)*Age	-0.001 to 0.013				

Notes: OLS results with the price variable only (not reported in the above table) resulted in the range of the price elasticity between -0.220 and -0.027;

5. Conclusions

This study investigated empirically the price elasticity of demand in self-insured health benefits provided by the employer. As such, this paper examined the price elasticity of demand in the new setting of self-insurance that was further compared to existing measures of the price elasticity across various types of health insurance available in the literature.

Based on the results of conducted empirical analyses, we concluded that the estimate of the price elasticity of demand for self-insured health plans was approximately equal to -0.13 (range between -0.22 and -0.04). These results were relatively robust across all the models specified, excluding the models with interaction terms. On the other hand, the model specifications extended by two interaction effects predicted the price elasticity of demand to be approximately equal to -0.36 (range between -0.65 and -0.06). This value was higher in absolute terms than the previously identified measures for the models without interaction terms.

The obtained estimates of the price elasticity of demand for self-insured health plans in all the models specified accord well with most of the previous literature, which also found the price elasticity of demand for health insurance to be inelastic. The similarity of our results not only provided a relevant re-confirmation for those earlier measures, but it also demonstrated that the demand responsiveness to changes in price for self-insured health plans didn't differ from estimates of other types of health insurance. Moreover,

the magnitude of the price elasticity suggests that there is no place for price competition in the health insurance market.

In terms of other factors affecting the firm's decisions to provide self-insurance, the following factors were identified to have a positive impact: gender (male), race (Hispanic), and unionization. On the other hand, our data suggested that the provision of a retirement plan benefit by the employer predicts a lower level of self-funded coverage.

The future research may extend these analyses by considering several additional factors, such as other labor market characteristics: education and direct income information to as opposed to its approximations used in this study. Provided appropriate data, the instrumental variable estimation could also be applied to test and control for a potential endogeneity problem that could be compared against the benchmark OLS model.

References:

Abraham, J. M., W. B. Vogt, et al. (2002). Hosehold Demand for Employer-Based Health Insurance. NBER Working Paper 9144. Cambridge, National Bureau of Economic Research**:** 40.

Acs, G., S. H. Long, et al. (1996). "Self-Insured Employer Health Plans: Prevalence, Profile, Provisions, and Premiums." Health Affairs **15**(2): 266-278.

Barringer, M. W. and O. S. Mitchell (1994). "Workers' Preferences among Company Provided Health Insurance Plans." Industrial and Labor Relations Review **48**(1): 141-152.

Beck, R. G. (1974). "The Effects of Co-Payment on the Poor." Journal of Human Resources **9**(1): 129-142.

Blumberg, L. J., L. M. Nichols, et al. (2001). "Worker Decisions to Purchase Health Insurance." International Journal of Health Care Finance and Economics **1**(3-4): 305-325.

Browne, M. J. (1992). "Evidence of Adverse Selection in the Individual Health Insurance Market." The Journal of Risk and Insurance **59**(1): 13-33.

Buchmueller, T. C., J. Dinardo, et al. (2002). "Union Effects on Health Insurance Provision and Coverage in the United States." Industrial and Labor Relations Review **55**(4): 610-627.

Buchmueller, T. C. and P. J. Feldstein (1997). "The Effect of Price on Switching Among Health Plans." Journal of Health Economics **16**: 231-247.

Cantor, J., S. H. Long, et al. (1995). "Private Employment-Based Insurance in Ten States." Health Affairs **14**: 199-211.

Chernew, M., K. Frick, et al. (1997). "The Demand for Health Insurance Coverage by Low-Income Workers: Can Reduced Premiums Achieve Full Coverage?" Health Services Research **32**(4): 453-470.

Claxton, G., I. Gil, et al. (2005). Employer Health Benefits. 2005 Annual Survey. Menlo Park, Chicago, The Kaiser Family Foundation and Health Research and Educational Trust**:** 1-140.

Cutler, D. M. and S. J. Reber (1998). "Paying for Health Insurance: the Trade-Off between Competition and Adverse Selection." Quarterly Journal of Economics **113**(2): 433-66.

Dranove, D., K. E. Spier, et al. (2000). "Competition Among Employers Offering Health Insurance " Journal of Health Economics **19**: 121-140.

Draper, N. R. and H. Smith (2001). Applied Regression Analysis. New York, John Wiley & Sons.

Employee Benefit Research Institute (EBRI) (2008). ERISA Pre-emption: Implications for Health Reform and Coverage. EBRI Issue Brief #314

Feldman, R., B. Dowd, et al. (1997). "The Effect of Premiums on the Small Firm's Decision to Offer Health Insurance." The Journal of Human Resources **32**(4): 635-658.

Feldman, R., M. Finch, et al. (1989). "The Demand for Employment-Based Health Insurance Plans." Journal of Human Resources **24**(1): 115-42.

Finkelstein, A. (2002). "The Effect of Tax Subsidies to Employer-Provided Supplementary Health Insurance: Evidence from Canada." Journal of Public Economics **84**(3): 305-39.

Goodman, J. C. and G. L. Musgrave (1994). Patient Power: The Free-Enterprise Alternative to Clinton's Health Plan. Washington, DC, Cato Institute.

Gruber, J. (2000). Health Insurance and the Labor Market Handbook of Health Economics. A. J. Culyer and J. P. Newhouse. Amsterdam, Elsevier. **1A:** 645-706.

Haas-Wilson, D., A. Cheadle, et al. (1989). "Demand for Mental Health Services: An Episode of Treatment Approach." Southern Economic Journal **56**(1): 219-232.

Hanson, R. (2005). "Adverse Selection in Group Insurance: The Virtues of Failing to Represent Voters." Economics of Governance **6**(2): 139-157.

Henderson, J. W. (1999). Health Economics and Policy. Cincinnati, Ohio, South-Western College Publishing.

Hoffman, C. and A. Schlobohm (2000). Uninsured in America, a chart book, Kaiser Commision on Medicaid and Uninsured.

Holmer, M. (1984). "Tax Policy and the Demand for Insurance." Journal of Health Economics **3**(3): 203-221.

Hosek, S. D., B. W. Bennett, et al. (1995). The Demand for Military Health Care: Supporting Research for a Comprehensive Study of the Military Health-Care System. Santa Monica, California, RAND**:** 145.

Liu, C.-F. and J. B. Christianson (1998). "The Demand for Health lnsurance by Employees in a Voluntary Small Group lnsurance Program." Medical Care **36**(3): 437-443.

Long, S. H. and M. S. Marquis (1999). "Comparing Employee Health Benefits in the Public and Private Sectors, 1997." Health Affairs **18**(6): 183-193.

Manning, W. G., C. N. Morris, et al. (1980). A Two-Part Model of the Demand for Medical Care: Preliminary Results from the Health Insurance Study. The World Congress on Health Economics.

Manning, W. G., J. P. Newhouse, et al. (1988). Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment. Santa Monica, RAND Corporation**:** 117.

Manning, W. G., J. P. Newhouse, et al. (1987). "Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment." The American Economic Review **77**(3): 251-77.

Manning, W. G. and C. E. Phelps (1979). "The Demand for Dental Care." Bell Journal of Economics **10**(2): 503-520.

Marquis, M. S. and S. H. Long (1995). "Worker Demand for Health Insurance in the Non-group Market." Journal of Health Economics **14**: 47-63.

Marquis, M. S. and S. H. Long (1999). "Recent Trends in Self-Insured Employer Health Benefits." Health Affairs(May/June): 161-166.

Marquis, M. S. and S. H. Long (2001). "Employer Health Insurance and Local Labor Market Conditions." International Journal of Health Care Finance and Economics **1**: 273-292.

Marquis, M. S. and C. E. Phelps (1987). "Price Elasticity and Adverse Selection in the Demand for Supplementary Health Insurance." Economic Inquiry **25**(2): 15.

Merrill, J., C. Jackson, et al. (1985). "Factors That Affect the HMO Enrollment Decision: A Tale of Two Cities." Inquiry **22**(4): 388-395.

Neipp, J. and R. Zeckhauser (1985). Persistence in the Choice of Health Plans. Advances in Health Economics and Health Services Research. R. M. Scheffler and L. F. Rossiter. Greenwich, CT, JAI Press. **6:** 47-72.

Newhouse, J. P. (1981). The Demand for Medical Care Services. A Retrospect and Prospect. Santa Monica, RAND Corporation**:** 30.

Newhouse, J. P. and C. E. Phelps (1976). New Estimates of Price and Income Elasticities. The Role of Health Insurance in the Health Services Sector. R. N. Rosett. New York, National Bureau of Economic Research (Universities-National Bureau Conference Series No. 27).

Newhouse, J. P. and the Insurance Experiment Group (1993). Free for All? Lessons from the RAND Health Insurance Experiment Cambridge, Harvard University Press.

Park, C. H. (2000). "Prevalence of Employer Self-Insured Health Benefits: National and State Variation." Medical Care Research and Review **57**(3): 340-360.

Phelps, C. E. (2002). Health Economics. Boston, Addison Wesley.

Phelps, C. E. and J. P. Newhouse (1972). "Effects of Coinsurance: A Multivariate Analysis." Social Security Bulletin **35**(6): 20-29.

Rhoades, J., J. Vistnes, et al. (2002). The Uninsured in America: 1996-2000. MEPS Chartbook No.9. AHRQ Pub. 02-0027. Rockville, MD, Agency for Healthcare Research and Quality

Ringel, J. S., S. D. Hosek, et al. (2002). The Elasticity of Demand for Health Care: A Review of the Literature and Its Applications to the Military Health System. Santa Monica, RAND Corporation.

Rosett, R. N. and L. F. Huang (1973). "The Effect of Health Insurance on the Demand for Medical Care." Journal of Political Economy **81**: 281–305.

Royalty, A. B. and N. Solomon (1999). "Health Plan Choice: Price Elasticities in a Managed Competition Setting " The Journal of Human Resources **34**(1): 41.

Self-Insurance Institute of America. "Self-Insured Group Health Plans." Retrieved October 27, 2008, from http://www.siia.org/i4a/pages/index.cfm?pageid=3339.

Short, P. F. and A. K. Taylor (1989). "Premiums, Benefits, and Employee Choice of Health Insurance Options." Journal of Health Economics **8**: 293-311.

Thompson, R. (1993). "Going, Going, ... Gone?" Nation's Business **81**(7): 24.

Thorpe, K. E. (1992). "Inside the Black Box of Administrative Costs." Health Affairs(Summer): 41-55.

U.S. Department of Health and Human Services Agency for Health Care Policy and Research (2001). National Medical Expenditure Survey, 1987:Policyholders of Private Insurance: Premiums, Payment Sources, and Types and Source of Coverage [Public Use Tape 15]. Vol. 1: Questionnaires, Data Collection Methods, and Other Attachments. Michigan.

United States Department of Health and Human Services. Agency for Health Care Policy and Research (1992). National Medical Expenditure Survey, 1987: Policyholders of Private Health Insurance: Premiums, Payment Sources, and Type and Source of Coverage [Public Use Tape 15] [Computer File]. National Medical Expenditure Survey

Series. Rockville, MD, U.S. Dept. of Health and Human Services, Agency for Health Care Policy and Research [producer], 1992.
Inter-university Consortium for Political and Social Research [distributor], 1993.

Welch, W. P. (1986). "The Elasticity of Demand for Health Maintenance Organizations." The Journal of Human Resources **21**(2): 252-266.

Wooldridge, J. M. (2002). Econometric Analysis of Cross Section and Panel Data. Cambridge, Massachusetts, The MIT Press.

Appendix

Appendix A: Major Studies on the Price Elasticity of Demand for Health Insurance

No.	Study	Data Source	Context	Price Elasticity
1.	Neipp and Zeckhauser (1985)	2 Boston-area firms, 1984/85	Employees were offered a choice between health plans	-0.30 to -0.60
2.	Feldman, Finch, et al. (1989)	17 Minneapolis firms, 1984	Change in a plan enrollment resulting from a change in premium by distinguishing between two different types of HMOs : independent practice associations (IPA's) and prepaid group practices (PGP's)[16]	-0.15 to -0.53 (nested logit)
3.	Buchmueller and Feldstein (1997)	10,952 University of California (UC) employees who were provided with a health plan choice, 1993	Employees' response to a change in employer's premium share (FFS versus PPO)	$7 increase in premium leads 25% of UC employees to switch to a less expensive plan
4.	Cutler and Reber (1998)	Harvard University employees	The percentage change in PPO enrollment (versus HMO) as a result of a change in out-of-pocket premium paid by the employee	-0.3 to -0.6 (logistic regression)
5.	Marquis and Phelps (1987)	The RAND Health Insurance Experiment	Change in enrollment of supplemental insurance as a demand response to a 1 percent increase in premium	-0.6

[16] IPA's usually have contracts with independent providers, whereas PGP's use the physician services delivered by a specific group practices. Hence, IPA's offer a greater choice of physicians than PGP's do (Royalty and Solomon, 1999).

6.	Manning, Newhouse et al., (1987) & (1988) & Newhouse, and the Insurance Experiment Group (1993)	The RAND Health Insurance Experiment	A constant coinsurance policy case by applying three different methods: 1) episodes of health/treatment approach (instead of annual expenditures approach); 2) an indirect utility function to total annual expenditures; 3) average coinsurance rates	-0.1 to -0.2 for constant coinsurance across all methods[17]
7.	Rosett and Huang (1973)	Cross-sectional dataset of Consumer Expenditures conducted by the Bureau of Labor Statistics, 1960	Change in enrollment as a result of a 1 percent increase in premium when: 1) an out-of-pocket price is equal to 20 percent of market price; 2) an out-of-pocket price is equal to 80 percent of market price	1) -0.35 2) -1.5
8.	Holmer (1984)	Survey data of a sample of federal government	Employees offered a choice between health plans	-0.16
9.	Welch (1986)	The Bureau of Labor Statistics annual survey data on the employee benefits plans	When faced with a choice between HMO and a conventional insurer such as Blue Cross (e.g. the long-run price elasticity of demand for HMOs is estimated based on mean out-of-pocket premium)	-0.6 (logit)
10.	Short and Taylor (1989)	Cross-section data from National Medical Care Expenditure Survey	Change in probability of enrollment in: 1) "high option"[18] FFS[19] versus "low option" FFS resulting from a 1 percent increase in net premium;	1) -0.14 (logit)

[17] Exact estimates for all three techniques used are as follows:
1) 0.14 to 0.20 for 0-25% coinsurance rate; and 0.14 to 0.43 for 25-95% coinsurance rate;
2) -0.18 for 25-95% coinsurance rate;
3) in the case of 0-16% average coinsurance rate: 0.10 for all care and 0.13 for outpatient care;
in the case of 16-31% average coinsurance rate: 0.14 for all care and 0.21 for outpatient care;

		(NMCES), 1977	2) HMO relative to FFS resulting from a 1 percent increase in net premium	2) -0.05 (logit)
11.	Royalty and Solomon (1999)	Panel dataset on Stanford University employees, 1993-95	Change in percentage enrollment as a response to a 1 percent increase in premium	1) -1.0 to -1.8 (logit) 2) -3.7 to -6.2 (fixed effects)
12.	Barringer and Mitchell (1994)	Cross-section data on payroll benefits from single company in the US, 1989	Change in enrollment (its fraction) in traditional FFS versus prepaid plans as a result of a 1 percent increase in premium among employees offered a choice between plans	1) -0.1 to -0.2 (logit) 2) -0.01 to -0.02 (revised estimates[20])
13.	Hosek, Bennett et al. (1995)	Military beneficiaries	Change in enrollment probability to select the civilian plan (such as FFS, PPO or HMO) resulting from a 1 percent increase in premium	-0.6 (OLS)
14.	Marquis and Long (1995)	The Current Population Survey (CPS), the Survey of Income and Program Participation (SIPP), and prices for a standard insurance in various geographic regions	Decisions to purchase private insurance by working families that weren't offered employment-based health plans (the case of the non-group insurance market)	-0.3 to -0.4
15.	Feldman, Dowd et al. (1997)	The Robert Wood Johnson Foundation (RWJF) Health Insurance Survey of 2,000 small firms in Minnesota,	The small firms' decision to offer health insurance studies with the major focus on the role of premiums in their decision making process	1) -3.91 for single coverage; 2) -5.82 for family coverage (probit)

[18] The high option is understood as the health plan associated with the higher premium.

[19] FFS stands for fee-for-service plans, which are also known as indemnity plans. FFS are typically the most expensive among health plans; however, they also provide the most freedom and flexibility to their policy holders.

[20] These revised estimates were obtained by Royalty and Solomon in the direct communication with the study's authors: Barringer and Mitchell (Royalty and Solomon, 1999).

		1993		
16.	Liu and Christianson (1998)	Two telephone surveys, Healthcare Group of Arizona HCGA health plans administrative files, and enrollment application forms, 1993	653 potential employees in small firms were offered the option of two health and 447 of them selected one of the two plans (small employees' case)	1) -0.12 to -0.24 for employees with prior insurance; 2) -0.42 to -0.51 for employees without prior insurance (logit)
17.	Blumberg, Nichols, et al. (2001)	Cross-sectional dataset from the Medical Expenditure Panel Survey (MEPS), 1996	Two potential sources of coverage in one household: take up decision if the spouse is also offered insurance at his/her workplace	-0.09 to -0.01
18.	Finkelstein (2002)	Cross-section data from the Canadian General Social Surveys (GSS), 1991 and 1994	The effect of a change in tax subsidy to employer-provided supplementary health insurance in Quebec, Canada as compared to other provinces not affected by the tax change	-0.46 to -0.49 (difference-in-difference method)
19.	Abraham, Vogt, et al. (2002)	Cross-section data from the Medical Expenditure Panel Survey (MEPS), 1996	Household demand for three types on health plans provided by employers, including HMOs, PPOs, and FFSs. The analysis is based on a classification of health plans with respect to their provider organizational structure such as exclusive provider organization (EPOs), any provider organizations (ANY), and a mixture of the above (MIX).	1) -0.13 to -0.15 for ANY; 2) -0.13 to -0.14 for EPOs; 3) -0.19 to -0.27 for MIX; (logit)

Appendix B**:** Frequency Tables of Categorical Variables

Variable	*Value*	*Frequency*	*Percent*	*Cumulative Percent*
Demographic				
MALE	0	173	44.82	43.82
	1	213	55.18	100.00
FEMALE	0	213	55.18	55.18
	1	173	44.82	100.00
BLACK	0	322	83.42	83.42
	1	64	16.58	100.00
HISPANIC	0	351	90.93	90.93
	1	35	9.07	100.00
WHITE	0	99	25.65	25.65
	1	287	74.35	100.00
PAID VACATION	0	5	1.30	1.30
	1	381	98.70	100.00
PAID SICK LEAVE	0	38	9.84	9.84
	1	348	90.16	100.00
LIFE INSURANCE	0	7	1.81	1.81
	1	379	98.19	100.00
RETIREMENT PLAN	0	48	12.44	12.44
	1	338	87.56	100.00
Geographic				
NORTHEAST	0	333	86.27	86.27
	1	53	13.73	100.00
MIDWEST	0	274	70.98	70.98
	1	112	29.02	100.00
SOUTH	0	227	58.81	58.81
	1	159	41.19	100.00
WEST	0	324	83.94	83.94
	1	62	16.06	100.00
Employer				
FOR PROFIT	0	100	25.91	25.91
	1	286	74.09	100.00
NON- PROFIT	0	340	88.08	88.08
	1	46	11.92	100.00
OTHER	0	381	98.70	98.70
	1	5	1.30	100.00

GOVERNMENT	0	337	87.31	87.31
	1	49	12.69	100.00