THE REALLOCATION OF COMPENSATION IN RESPONSE TO HEALTH INSURANCE PREMIUM INCREASES[*]

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ABSTRACT

This paper examines how compensation packages change when health insurance premiums rise. We use data on employee choices within a single large firm with a flexible benefits plan—an increasingly common arrangement for medium and large firms. In these companies, employees explicitly choose how to allocate compensation between cash and various benefits such as retirement, medical insurance, life insurance, and dental benefits. We find that a $1 increase in the price of health insurance leads to 52-cent increase in health insurance expenditures. Approximately 2/3 of this increase is financed through reduced wages and 1/3 through other benefits.

INTRODUCTION

Many companies have redesigned their benefits plans to require employees to pay the full marginal cost (pre-tax) of more expensive plans. Such 'fixed subsidy' schemes have been discussed for over two decades (Enthoven 1978), but have gotten more attention recently as health insurance premiums escalate. These schemes are more efficient if workers have different tastes for health insurance, and research has shown that employee insurance choices are quite responsive to these arrangements (Buchmueller and Feldstein 1996; Cutler and Reber 1998).

What is less clear is how the total compensation package changes when health insurance premiums rise. If the price elasticity of demand for health insurance is less than one—and the evidence suggests it is—then workers will increase expenditures on health insurance as their share of premiums rise. But if labor supply and demand remains fixed, then total compensation should not change, just its composition into health insurance, wages, and other benefits (Smith and Ehrenberg 1983). This paper examines whether employees finance increased health insurance expenditures by reducing current income (essentially wages) or other benefits (life insurance, disability insurance, and other benefits) in the short-term.

We know of no other work looking at the effects of rising health insurance premiums on the structure of compensation, although there is evidence on the tradeoff between wages and fringe benefits. Some of this research tries to estimate the substitution between benefits and wages using data aggregated at the firm or industry level (Woodbury 1983). These estimates are somewhat limited because the fringes are often allocated as part of a collective bargaining agreement or a less explicit process based on worker preferences that calls into question the underlying assumptions of flexible wages and costless mobility (Freeman 1981; Goldstein and Pauly 1976). Others have tried to estimate the relationship with employee-level data from

multiple firms. The implausible result that wages and benefits do not tradeoff—holding productivity fixed—are best explained as bias due to unobserved heterogeneity (Smith & Ehrenberg 1983). Other work exploits natural experiments or time-series variation. Gruber and Krueger (1990) find that firms facing higher worker's compensation premiums passed on approximately 85% of the costs to employees in the form of lower wages. Gruber (1994) finds that all of the costs increases associated with state and federal mandated maternity benefits in the late 1970's and early 1980's were passed on to the female population in the form of lower wages. A similar type of cost shifting appears to occur with employee Social Security payroll taxes, which could be interpreted as reducing wages to finance retirement benefits (Brittain 1971; Vroman 1974; Hamermesh 1979).

In this paper, we examine employee compensation decisions during a three-year period when health insurance premiums were rising rapidly. The data come from a single large firm with a flexible benefits plan wherein employees explicitly choose how to allocate compensation between cash wages and other benefits, such as health insurance, retirement, life insurance, and dental benefits, and these decisions are recorded for each employee. Such cafeteria-style plans cover 13% of workers in medium and large firms, and the proportion is growing, so they are also interesting to study in their own right (BLS 1999). Under such an arrangement, higher health insurance premiums must induce changes in the composition of total compensation–either in lower after-tax wages or in decreased contributions to other benefits—and we observe these tradeoffs. The results suggest that about two-thirds of the premium increase is financed out of cash wages and the remaining one-thirds is financed by a reduction in benefits.

DATA

The original data set consists of three years (1989-1991) of earnings and benefit information for employees under age 65 at a single U.S. company.[1] We use data from the three-year period of 1989-1991; a period characterized by large premium increases well above the rate of inflation similar to the rapid premium growth situation in 2000-2001, as shown in Figure 1. Our study focuses on a sample of single employees who signed up for a health insurance plan[2]. Families are excluded because we have no information on the health insurance opportunity sets of spouses, and how those might change over time. These employees are geographically dispersed across 47 states. The data also include a limited set of demographic controls such as age and sex. Since we analyze changes in employees' allocation decisions relative to the previous years, we restrict our attention to employees with at least two years of data – resulting in an analysis sample of 7,896 employee-year observations.

Table 1 presents descriptive statistics for the sample. Total compensation averaged $27,412. Approximately 2.3% of compensation ($623) went towards the purchase of health insurance, 1.1% ($286) went towards purchase of other benefits within the cafeteria plan and the remaining compensation was taken as wages. Benefits appear low as a fraction of total compensation because our benefits and compensation measures do not include legally mandated benefits such as Social Security and workers' compensation, nor do they include the employer contributions towards health insurance and retirement.

[INSERT TABLE 1 HERE]

[1]These data were obtained from a benefits consulting firm. The terms of the data release preclude us from providing detail about the company.

[2] We excluded a small number of single employees (222) who did not enroll in the employers health plan despite a free catastrophic health plan option. Most likely these employees had other outside insurance options.

Employees in this firm were given a menu of benefit options. To finance these benefits each employee was also given a completely fungible credit allocation that depends on salary and job tenure. However, the credit allocation does not determine expenses on benefits as employees can make additional pre-tax deductions from their salaries or wages to finance benefits. In addition, employees can also choose to cash –out most of their credit allocation.

[INSERT TABLE 2 HERE]

Table 2 shows the mean, standard deviation and probability of contributing, for each benefit component of total compensation in 1990. Employees spend their total compensation on wages, health insurance, dental insurance, life insurance, disability insurance, health care savings account,[3] retirement plan, accident insurance, survivor insurance, and life insurance to cover dependents. Some of these components are rarely used, and the contributions are small. Rather than estimate models for all of them, we aggregate these into three broad categories – wage, health insurance and other benefits. Although the benefits in the "other benefits" category are diverse they are conceptually related in that most of them are insurance products that involve forgoing current consumption (in terms of premiums) for future and uncertain payouts.

Table 3 shows the enrollment in each year for the different health insurance plans offered by the firm. The company offers two types of health insurance plans: fee-for-service (FFS) plans and HMOs. Table 3 shows that within the FFS class, there are three types of plans: a catastrophic plan with a deductible of 5% of salary, a low option plan with deductibles of $300 for individuals, and a high option with deductibles of $150. The other plans consist of 43 HMOs nationwide, with each employee's available options depending on state of residence and year.

[INSERT TABLE 3 HERE]

[3]An employee can deposit funds free of income taxes in a health care savings account to reimburse qualifying health care expenses. Unused funds left in the account at the end of the year are forfeited.

As with most employers, this company contributes towards the purchase of these plans. Unlike many employers, however, the amount does not vary by plan choice, but depends only on the number of beneficiaries. By not contributing more generously to more expensive plans, the employer makes employees face the full marginal cost of more generous coverage (on a pre-tax basis). The employer's 'fixed subsidy' is equal to the premium for the catastrophic plan.

[INSERT TABLE 4 HERE]

Table 4 shows the variation in the copremiums—the amount of total premium paid by the employee—across plans. HMO copremiums rose faster in absolute and percentage terms from 1989 to 1990. From 1990 to 1991, the premiums in the low-deductible FFS plan rose faster than the HMO premiums, but the HMO premiums still increased substantially. The drop in enrollment in both types of plans (shown in Table 3) during that period may reflect these premium increases. Table 4 also shows that HMO premiums vary considerably over this period, sometimes falling as much as 26% or increasing by 34% year-to-year. We exploit this considerable variation to identify our models.

METHODS

We model how the allocation of total compensation varies with an increase in costs of health insurance for employees. That is, we want to know the responsiveness of each component of total compensation (wages, health insurance expenditures, other benefits) to changes in health insurance prices for employees. The key challenge is to measure changes in the price of health insurance for employees.

Ideally, a measure of increase in the price of health insurance would show the difference in the costs of obtaining a reference level of utility due to a new vector of health insurance

copremiums. However, the problem with constructing this "true price index" is that utility is not measurable. To circumvent this problem alternative estimates of price changes calculate the difference in costs of obtaining a fixed basket of goods at a new vector of prices. Two well-known indices are the Laspeyres price index that measures the difference in costs of purchasing the base year basket of goods and the Paasche price index that measures the difference in costs of purchasing the current year basket of goods. Although these fixed weight indices are easy to calculate they induce some bias in the measurement of cost changes. Most importantly, these indices ignore the possibility of substitution among goods due to changes in relative prices. For example, employees might switch to cheaper health plans in response to changes in the relative price of health plans (This is true in our data as shown in Tables 3 and 4). Thus using base year enrollment in different health plans as weights for the price index will overstate the true increase in the cost of health insurance. Fisher (1922) proposed an index that is the geometric mean of the Laspeyres and Paasche price index. The Fisher price index has much lower substitution bias and other desirable properties compared to other fixed weight price indices (Diewert 1976). In particular it closely approximates the true cost index if preferences are homothetic. Due to its desirable properties most statistical agencies around the world including the Bureau of Economic Analysis at the US Commerce Department have started using the Fisher index to measure changes in prices and quantities (Boskin et al. 1998). We also use the Fisher price index to measure changes in prices.

Since HMO plan options and copremiums vary with the state we create separate indices for each state in our data. If the vector $P_{s,t} = \left(P_{1,s,t}, P_{2,s,t}, .., P_{j,s,t}, .., P_{J,s,t}\right)$ represent the insurance copremiums for each of the J health plans offered in each state s in year t and the vector

$Q_{s,t} = \left(Q_{1,s,t}, Q_{2,s,t}, .., Q_{j,s,t}, .., Q_{J,s,t}\right)$ represents the percentage of employees enrolled in each of the J health plans in state s in year t, then the Fisher index for state s in year t is defined as[4]:

$$(1) \qquad Fisher_{s,t} = \sqrt{\left(\frac{P_{s,t}.Q_{s,89}}{P_{s,89}.Q_{s,89}}\right)\left(\frac{P_{s,t}.Q_{s,91}}{P_{s,89}.Q_{s,91}}\right)}$$

Finally we create a price of insurance variable for each state s in year t ($Price_{s,t}$) by multiplying the Fisher index for each state-year with the average copremiums in that state in 1989. This essentially rescales the unit-less Fisher index to 1989 copremium dollars in each state and thus makes our regressions results easy to interpret.

$$(2) \qquad Price_{s,t} = Fisher_{s,t} * \left(P_{s,89}.Q_{s,89}\right)$$

We estimate separate employee fixed-effects models for each component of total compensation. Essentially, an employee fixed-effects model controls for employee-specific time invariant unobservables (such as preferences for insurance) and primarily uses variation in employee choices and prices overtime to identify parameter estimates. Models that ignore these fixed effects will produce biased estimates if the employee-specific unobservables are correlated with our explanatory variables. If i and t subscript the employee and year then our empirical model can be summarized by the following equations:

$$(3) \qquad Wage_{i,t} = \alpha_i^{wage} + \delta^{wage} Price_{i,t} + \beta^{wage} X_{i,t} + \varepsilon_{i,t}^{wage}$$

$$(4) \qquad Benefit_{i,t} = \alpha_i^{benefit} + \delta^{benefit} Price_{i,t} + \beta^{benefit} X_{i,t} + \varepsilon_{i,t}^{benefit}$$

$$(5) \qquad Health\ Insurance_{i,t} = \alpha_i^{health} + \delta^{health} Price_{i,t} + \beta^{health} X_{i,t} + \varepsilon_{i,t}^{health}$$

$$(6) \qquad Total\ Compensation_{i,t} = Wage_{i,t} + Benefit_{i,t} + Health\ Insurance_{i,t} \quad \forall i,t$$

[4]The base year is 1989 and 1991 is the current year

Where, α^k represents the employee fixed effects for benefit *k*, δ^k measures the increase in expenditures on wage or benefit *k* due to a one dollar increase in the price of health insurance, and similarly the vector β^k measures the changes in benefit *k* due to changes in other covariates *X* in our model. Equations (6) is an accounting identity and states that expenditures on wages, health insurance and other benefits add up to the total compensation of the employee. Equation (6) along with the three behavioral equation (3), (4) and (5) also implies that $\sum_k \delta^k = 0$. That is, given that total compensation is fixed, any change in health insurance expenditures due to rising health insurance prices must be financed entirely by changes in benefits or wages.

To better illustrate our results we also compute the expenditure elasticity of each benefit category *k* with respect to the health insurance price at the mean benefit allocations in 1989.

$$(7) \qquad \xi^k = \frac{\delta^k * \bar{P}_{89}}{\bar{E}^k_{89}}$$

Here ξ^k measures the percentage change in expenditures on benefit *k* due to a one percent change in the price of health insurance, δ^k is the parameter estimate from equations (3) to (5), $\bar{P}_{89}$ is the mean health insurance price in 1989 and $\bar{E}^k_{89}$ is the mean expenditure on benefit *k* in 1989.

This model assumes that price increases are exogenous—essentially, that price changes reflect shocks to insurance supply for this firm. Thus we are tracing out movements along a demand curve. These price differences could, in theory, reflect shifts in employee insurance demand within this firm, perhaps due to changes in health status. In this instance, we would be comparing equilibria when both supply and demand shifted and hence biasing our price-elasticities. Fortunately, this is unlikely to be the case. The price increase we see at this firm

mirrors economy-wide trends. According to Congressional Budget Office testimony, 1990 and 1991 witnessed double-digit rates of premium growth in two of the largest purchasing groups—the Federal Employee Health Benefits Program, and the California Public Employees Retirement System—as well as for all employers based on surveys by Hay/Huggins, Foster Higgins, KPMG Peat Marwick, and the Bureau of Labor Statistics (Antos 1997).

RESULTS

The parameter estimates from models (3) to (5) are presented in the Table 5. The results show that a $1 increase in the price of health insurance leads to a 52 cents increase in health insurance expenditures. This 52 cent increase in health insurance expenditures is financed by a 37 cents reduction in take home wages and a 15 cents reduction in other benefits. Thus approximately 70% of the increase in health insurance expenditures due increase in prices is financed by wage reductions. Put in elasticity terms (Table 6), each 100% increase in the price of health insurance leads to a 50% increase in health insurance expenditures, a 1% decrease in take home wages, and a 28% decrease in other benefits.

DISCUSSION

Our results suggest that employees facing an increase in the price of health insurance respond by lowering their level of insurance coverage. However, employees do not completely substitute away from health insurance, in fact increases in prices lead to increases in health insurance expenditures. These results accord well with the previous literature, which also found that the price elasticity of demand for health insurance was less than 1.0 (Buchmueller and Feldstein 1996; Cutler and Reber 1998).

Increases in expenditures on health insurance are accommodated by reducing both the take-home income and other benefits such as life insurance, disability insurance, dental insurance and retirement benefits. Thus, our results suggest that rising health insurance prices not only reduce resources for current consumption but also lower insurance purchases against a variety of risks. If health insurance prices continue to rise and individuals continue to reduce their purchase of health insurance and other insurance products that might leave them vulnerable to health, mortality, disability and other significant risks in the long run.

Our results also show that when employees are given the choice of absorbing premium increases through salary reductions or limiting expenditures on health and other benefits, they primarily choose to reduce take-home pay. This choice might reflect the advantage to employees of retaining non-taxed compensation in the form of benefits, and instead reducing taxable income. This suggests, that employers who trade off wage increases for increases in health insurance premiums are reallocating compensation in a way that workers have shown they prefer when they are provided options within flexible spending plans.

REFERENCES

Antos, Jospeh R. 1997. Congressional Budget Office Statement, *Premium Increases in the Federal Employees Health Benefits Program*, Subcommittee on Civil Service, Committee on Government Reform and Oversight, U.S. House of Representatives, October 8, 1997.

Boskin, Michael J., Ellen R. Dulberger, Robert J. Gordon, Zvi Griliches, and Dale W. Jorgenson. 1998. "Consumer Prices, the Consumer Price Index, and the Cost of Living." *Journal of Economic Perspectives,* Vol. 12, No. 1, pp. 3-26.

Brittain, John A. 1971. "The incidence of social security payroll taxes." *American Economic Review,* Vol. 61, pp. 110-25.

Buchmueller, Thomas C., and Paul J. Feldstein. 1996. "Consumer's Sensitivity to Health Plan Premiums: Evidence from a Natural Experiment in California." *Health Affairs,* Vol. 15, No. 1, pp. 143-51.

Bureau of Labor Statistics. 1999. Employee Benefits in Medium and Large Private Establishments. News Release, January 7, 1999.

Cutler, David M., and Sarah J. Reber. 1998. "Paying for Health Insurance: The Trade-off Between Competition and Adverse Selection." *Quarterly Journal of Economics,* Vol. 113, No. 2, pp. 433-66.

Diewert, W. Erwin. 1976. "Exact and Superlative Index Numbers." *Journal of Econometrics*, Vol. 4 (May), pp. 115-45.

Enthoven Alain C. 1978. "Consumer-Choice Health plan (second of two parts). A national-health-insurance proposal based on regulated competition in the private sector." *New England Journal of Medicine,* Vol. 298, No. 13, pp. 709-20.

Fisher, Irving. 1922. *The Making of Index Numbers*. Boston: Houghton Miffin.

Freeman, Richard B. 1981. "The Effect of Unionism on Fringe Benefits." *Industrial & Labor Relations Review,* Vol. 34, No. 4, pp. 489-509.

Goldstein, Gerald S., and Mark V. Pauly. 1976. "Group Health Insurance as a Local Public Good." In Robert Rosset, ed., *The Role of Health Insurance in the Health Services Sector*. New York, NY: National Bureau of Economic Research, pp. 73-110.

Gruber, Jonathan. 1994. "The Incidence of Mandated Maternity Benefits." *American Economic Review,* Vol. 84, No. 3, pp. 622-41.

Gruber Jonathan, and Alan B. Krueger. 1990. "The Incidence of Mandated Employer-provided Insurance: Lessons From Workers' Compensation Insurance. National Bureau of Economic Research." Working paper 3557, Cambridge, Mass. *Industrial Labor Relations Review,* Vol. 46, pp. 22-37.

Hamermesh, Daniel. 1979. "New estimates of the incidence of the payroll tax." *Southern Economic Journal,* Vol. 45, pp. 1208-19.

Smith, Robert S., and Ronald G. Ehrenberg. 1983. "Estimating Wage-Fringe Trade-Offs: Some Data Problems." In Jack E. Triplett, ed., *The Measurement of Labor Cost*. NBER Studies in Income and Wealth, Vol. 48. Chicago, IL, University of Chicago Press, pp. 347-69.

Vroman, Wayne. 1974. “Employer payroll tax incidence: empirical tests with cross-country data.” *Public Finance,* Vol. 24, pp. 184-99.

Woodbury, Stephen A. 1983. “Substitution Between Wage and Nonwage Benefits.” *American Economic Review,* Vol. 73, pp. 166-82.

Table 1. Descriptive Statistics

(N=7,896 employee-years)

Variable	Mean	Std. Dev.	Minimum	Maximum
Age	35.1	10.8	18	64
Tenure (years)	6.1	6.5	0	44
Female	0.70	0.45	0	1
Health Insurance Benefit[a]	$623	$236	0	$1,428
Other Fringe Benefits[a]	$286	$280	0	$5,335
Net Wages[a]	$26,504	$11,582	$6,593	$109,303
Total Compensation[a,b]	$27,412	$11,733	$7,277	$110,994

Notes:

[a]All amounts are in 1989 constant dollars.

[b]Total compensation includes wages, health insurance and other benefits.

Table 2. Employee Expenditures on Benefits in 1990

(N=2,934)

Benefit Category	Mean	Std Dev	% Making Contribution
Components of Total Compensation			
Health Insurance	633	221	100
Other Benefits	289	267	94
Life Insurance	38	116	34
Long-Term Disability	70	66	72
Accident Insurance	13	21	50
Dependent Life Insurance	1	1	1
Survivor Insurance	0	0	0
Retirement	11	58	6
Health Care Expense Acct	33	165	7
Dental Insurance	123	71	76
Wages	26,289	11,451	100

Notes: All amounts are in 1989 constant dollars. Total compensation includes wages, health insurance and other benefits.

Table 3. Employee Insurance Choices, 1989 to 1991

Plan Type	Deductible	Percent Choosing Plan: 1989	1990	1991
FFS				
Catastrophic	5% of salary	6.1	8.8	15.0
High Deductible	$300	8.5	10.0	13.6
Low Deductible	$150	42.6	39.3	34.0
HMO*		42.8	41.9	37.4
Number of Employees		2,545	2,934	2,417

Notes:
* There are 43 different HMOs offered—we do not break out enrollment by each plan as we do for FFS.

Table 4. Variation in Employee Copremiums

Type of Plan	Number of Plans	Co-Premium, 1989	Co-Premium, 1990 (% Increase 89-90)	Co-Premium, 1991 (% Increase 90-91)
FFS/5% of Salary	1	0	0	0
FFS/$300	1	$490	$521	$525
			(6.3%)	(0.8%)
FFS/$150	1	$630	$705	$812
			(11.91%)	(15.1%)
HMO[a]	43	$661	$750	$825
			(13.5%)	(10.0%)
HMO Co-Premium Range[b]		$489 to $946	$455 to $1,110 (-26% to 34%)	$549 to $1,428 (-6% to 29%)

Notes

[a] The HMO copremium for each employee-year observation is calculated as the average copremium for enrolling in an HMO in that year for the employees state of residence. The HMO copremium reported is average copremium across all employees.

[b] This row shows the range of copremium and percent increase from previous years for the HMO plans.

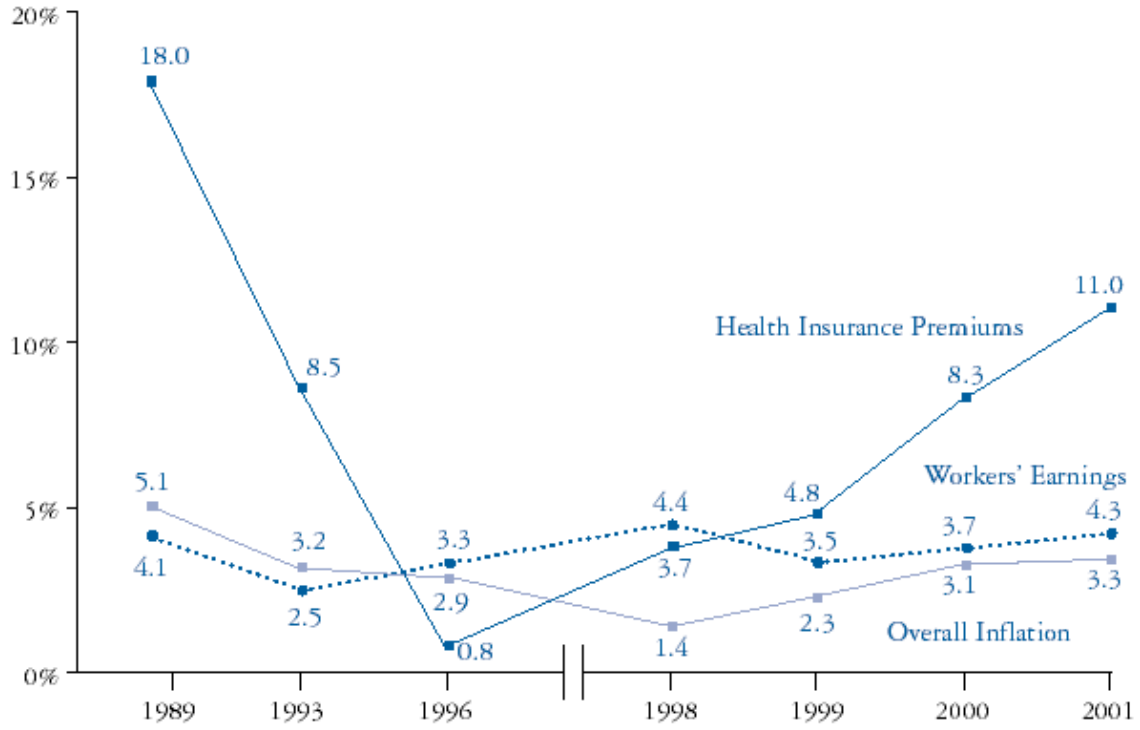
Table 5. Employee Fixed-Effect Model of Increase in Health Insurance Price on Allocation of Total Compensation

	Wages		Other Benefits		Health Insurance Expenditures	
Variable	*Coefficient*	*t-statistic*	*Coefficient*	*t-statistic*	*Coefficient*	*t-statistic*
Price	-0.37	-3.04	-0.15	-1.86	0.52	6.25
Age	-16.97	-0.56	108.83	5.33	-91.86	-4.43
Age Square	0.06	0.36	-0.95	-8.73	0.89	8.09
Tenure	49.07	1.84	-64.49	-3.57	15.43	0.84
Total Compensation	0.99	413.22	0.01	4.61	0.01	3.36
Intercept	-97.66	-0.12	-1,963.97	-3.64	2061.63	3.76

Table 6. Expenditure Elasticity of Wages, Other Benefits and Health Insurance

	Expenditure Elasticity		
	Estimate	*Std Error*	*t-statistic*
Wages	-0.0083	0.0027	-3.04
Other Benefits	-0.2870	0.1543	-1.86
Health Insurance	0.5136	0.0821	6.25

Figure 1. Increases in Employer Health Insurance Premiums Compared to Increases in Overall Inflation and Workers' Earnings, 1989-2001



Source: Exhibit 3.3 from "Trends and Indicators in the Changing Health Care Marketplace: 2002 – Chartbook," http://www.kff.org/content/2002/3161/marketplace2002_finalc.pdf, The Henry J. Kaiser Family Foundation 2002.