NBER WORKING PAPER SERIES

THE EFFECT OF TAX PREFERENCES ON HEALTH SPENDING

John F. Cogan
R. Glenn Hubbard
Daniel P. Kessler

Working Paper 13767
http://www.nber.org/papers/w13767

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
January 2008

Respectively, Leonard and Shirley Ely Senior Fellow, Hoover Institution, Stanford University; Dean and Russell L. Carson Professor of Finance and Economics (Graduate School of Business) and Professor of Economics, Columbia University, and Research Associate, National Bureau of Economic Research; and David S. and Ann M. Barlow Professor in Management (Graduate School of Business) and Senior Fellow (Hoover Institution), Stanford University, and Research Associate, National Bureau of Economic Research. We would like to thank Joe Antos and Michael Smart for helpful comments. Kessler gratefully acknowledges support from the National Institute on Aging. Contact authors at fkessler@stanford.edu.

The Effect of Tax Preferences on Health Spending
John F. Cogan, R. Glenn Hubbard, and Daniel P. Kessler
NBER Working Paper No. 13767
January 2008
JEL No. H2,I1

ABSTRACT

In this paper, we estimate the effect of the tax preference for insurance on health spending based on the Medical Expenditure Panel Surveys from 1996-2005. We use the fact that Social Security taxes are only levied on earnings below a statutory threshold to identify the tax preference's impact. Because employer-sponsored health insurance premiums are excluded from Social Security payroll taxes, workers who earn just below the Social Security tax threshold receive a larger tax preference for health insurance than workers who earn just above it. We find a significant effect of the tax preference, consistent with previous research.

John F. Cogan
Hoover Institution
Stanford University
Stanford, CA 94305
cogan@hoover.stanford.edu

R. Glenn Hubbard
Graduate School of Business
Columbia University, 101 Uris Hall
3022 Broadway
New York, NY 10027
and NBER
rgh1@columbia.edu

Daniel P. Kessler
Graduate School of Business
Stanford University
518 Memorial Way, Room L241
Stanford, CA 94305
and NBER
fkessler@stanford.edu

I. Introduction

The tax preference for employer-sponsored health insurance, under which employer contributions to employee health insurance are deductible to the employer and non-taxable to the employee, is perhaps the most salient feature of postwar health policy in the United States. By making health spending in general, and insured health spending in particular, appear less costly than they are, the tax preference gives employees the incentive to take compensation as health insurance rather than cash. This incentive has had two main effects. First, it has increased insurance coverage, particularly coverage through employers (see Jonathan Gruber, 2002, for a review of work identifying this effect). Second, it has distorted the quantity and type of health insurance that people choose in a manner that has increased health spending. At the most basic level, the tax preference increases demand for insured health services by reducing their price relative to other goods and services. However, the tax preference also induces people to choose health plans with lower deductibles and coinsurance rates, which in turn increases spending because of the moral hazard inherent in health insurance. Although economists differ about the consequences of the first effect for social welfare, virtually all since Martin Feldstein's (1973) seminal article have agreed that the second has contributed to the inefficiency of the U.S. health system.

Assessments of the magnitude of the effect of the tax preference on health spending have therefore been at the center of health policy debates for more than 30 years. Yet, for two reasons, no study has convincingly identified this key parameter. First, because health services are a normal good and income taxation is progressive, disentangling the effect of the tax preference from the direct effect of income is difficult;

any misspecification of the relationship between income and health spending leads to bias in the estimate of the effect of interest. Second, because researchers only observe imperfectly measured proxies for the true post-tax price for insurance, estimates of the effect of the tax preference from existing research are biased toward zero.

In this paper, we use the fact that Social Security taxes are only levied on earnings below a statutory threshold to identify the tax preference's impact. Because employer-sponsored health insurance premiums are excluded from Social Security payroll taxes, workers who earn just below the Social Security tax threshold receive a larger tax preference for health insurance than workers who earn just above it. By comparing health care spending of individuals in families with workers just above the payroll tax threshold with that of individuals in families with workers who are just below it, we can identify the effect of the tax preference for insurance.

Based on data from the Medical Expenditure Panel Surveys Household Component (MEPS-HC) from 1996-2005, we estimate a significant impact of the tax preference for insurance on health spending, consistent with results in the previous literature. The paper proceeds in the next four sections. Section II reviews previous work concerned with estimating the effect of tax policy on health spending. Although this work has clearly shown that tax incentives affect spending, it has not directly estimated the effect of interest. Section III describes our methodological approach, discusses the data we use for our analysis, and presents tabular results which show evidence of a large impact of the Social Security payroll tax on health care spending. People in families with a holder of employer-sponsored insurance who earns just above the tax threshold spend 24 percent less on average than people in families with an

employer-sponsored-insurance policyholder who earns just below the tax threshold. Section IV embeds the payroll tax in a more general framework for analyzing the impact of tax policy on health care spending and provides an estimate of the tax preference's impact. Section V makes some concluding observations.

II. Effects of Tax Preferences on Health Spending: Previous Research

As Mark Pauly's (1986) classic review highlights, conventional estimates of the effects of tax policy on health spending suffer from two sources of potential bias. First, because the true relationship between income and health spending is unknown, and marginal tax rates rise with income, estimates of the effect of the tax rate on insurance policy choice, and in turn spending, are necessarily sensitive to researchers' functional form assumptions. Any misspecification of the direct effect of income on the demand for insurance leads to bias in the estimated effect of the tax rate. Second, because researchers only observe proxies for the post-tax price of insurance, and these proxies measure the true post-tax price with error, estimates of the effect of the tax rate are biased toward zero. As Pauly points out, these problems are of more than theoretical concern. The wide range of early estimates of the tax-subsidy elasticity, -0.14 to -1.9, reflect the failure of traditional approaches to deal robustly with these sources of bias.

More recent research has taken two novel approaches to address this shortcoming. One arm of this research uses theoretical models to simulate the effects of tax policy based on (arguably unbiased) empirical estimates of the price elasticity of demand for health services.[1] William Jack and Louise Sheiner (1997) use this parameter as an input

[1]The most comprehensive study of the elasticity of demand for health services remains the RAND Health Insurance Experiment, which found that a one percent increase in the out-of-pocket price led to a 0.2

to a theoretical model in which consumers choose insurance contracts and then face random health shocks. They calculate how much health spending would be reduced by repeal of the tax preference under various assumptions about individuals' coefficient of relative risk aversion. They also propose conditions under which extending the tax preference to out-of-pocket spending can actually reduce health spending. Jonathan Gruber (2002) uses a simulation model that highlights the role of firms' offering decisions to show how spending and employer coverage would change in response to complete and partial repeal of the tax preference. John Cogan, Glenn Hubbard, and Daniel Kessler (2005) show that the effect of the tax preference for insurance on health spending can be written as the product of two parameters: elasticity of demand for health services, and the effect of the tax preference on the coinsurance rate.[2] They use the simulation results from Jack and Sheiner (1997) and Martin Feldstein and Bernard Friedman (1977), along with empirical estimates of the price elasticity of demand, to provide a range of estimates of the effect of repealing the tax preference.

A second arm of this research seeks to estimate the effects of tax policy directly. Michael Smart and Mark Stabile (2005) examine the consequences of the Canadian Medical Expense Tax Credit (CMETC), which allows taxpayers to claim a credit for 17 percent of medical expenses in excess of $1,637 (2000 tax year) or 3 percent of net income, whichever is smaller. Qualifying expenses include both insurance premiums and out-of-pocket spending on hospital and physician services, prescription drugs, and long-term care. They find evidence of moderate to large tax-price elasticities of demand for

---

percent decline in spending (Willard Manning *et al*., 1987; Joseph Newhouse 1993). In a more recent study using observational data, Matthew Eichner (1998) found that a one percent increase in the price led to approximately a 0.7 percent decline in spending.

[2] For simplicity, we use the term "coinsurance rate" to refer to all cost-sharing -- that is, payments made under an insurance policy's deductible and its copayment schedule.

health services, between -0.7 and -1.0. William Jack, Arik Levinson, and Sjamsu Rahardja (2006) find that firms that offer flexible spending accounts (FSAs) that enable their employees to set aside pretax income to cover out-of-pocket health spending have average coinsurance rates of 21 percent, as compared to 14 percent at firms that do not offer FSAs.

While these analyses have contributed significantly to understanding about the effects of tax policy, none has provided an empirical estimate of the consequences of the tax preference for insurance. Although studies in the first set have quantified the effect of interest, they measure the effect of tax policy only through untested assumptions about how the tax preference affects coinsurance rates. Estimates of the price elasticity of demand for health services capture the effect of the tax preference on the extensive margin, but not on the intensive margin, through its influence on coinsurance rates.

Although studies in the second set require far fewer modeling assumptions, none of them has specifically identified effect of the tax preference. The estimates of Smart and Stabile, which are the closest to the effect of interest, differ from it in several ways. On the one hand, the CMETC only applies to spending on products and services that are not already covered by publicly financed basic provincial health insurance. Because uncovered services may be more discretionary in nature, the elasticity of spending on them may be larger than the elasticity of spending on all health care. On the other hand, the CMETC applies to both insured and out-of-pocket spending; the tax preference in the U.S. applies only to insured spending. Thus, the U.S. tax preference would tend to induce people to shift to health insurance plans with less coinsurance, whereas the

CMETC would not.[3] This effect, in turn, would increase moral hazard and increase health spending, which implies that the elasticity of spending with respect to the CMETC would be smaller than the elasticity of spending with respect to a tax preference for insurance.

III. The Basic Approach and Data

To estimate the impact of the tax preference on health care spending, this paper uses the fact the Social Security program limits the annual amount of wage earnings that are subject to payroll taxation. Under the Social Security program, employers and employees each pay a 6.2 percent payroll tax on earnings below the maximum taxable wage (the "wage base"). The wage base is set by law and is automatically adjusted each year by the average growth in Social-Security covered wages. (Table 1 reports the wage base for each of our sample years 1996-2005.) For workers who earn below the wage base, earnings are subject to payroll taxes while employer-sponsored health insurance premiums are not. This tax treatment of earnings creates, therefore, a 12.4 percent tax preference for insurance for these workers. For workers who earn above the wage base, neither earnings in excess of the threshold nor employer-sponsored health insurance premiums are subject to the payroll tax. For these workers there is, on the margin, no payroll tax preference for health insurance. In principle, by comparing health care spending of individuals in families with a employer-sponsored insurance policyholder who earns just below the maximum taxable wage to spending by individuals with a

[3] Smart and Stabile show that, in practice, the CMETC does not affect the demand for insurance on the intensive margin.

policyholder who earns just above this threshold, we can identify the impact of the tax preference on health care spending.

Data

We use data from the MEPS-HC from 1996-2005. For each individual in the sample, the MEPS-HC reports the amount of spending on health care services, wage earnings, and various demographic and economic information. The MEPS-HC (through the person-round-plan file) also links each individual with employer-sponsored health insurance to the worker who holds the policy that is the source of coverage. We limit our sample to individuals covered all year through the same full-year worker who holds a full-year employer-sponsored health insurance policy. Since in any given year only about 15 percent of all workers have earnings that exceed Social Security's maximum taxable wage, our sample pools together ten years of annual MEPS samples to obtain as many observations on high-wage workers as possible.

Results Using Sample Means

Because health care is a normal good, we expect, all else held constant, that health care spending would rise with wages. But if the tax preference provided by the Social Security payroll tax significantly affects health care spending, its impact should be manifested in lower health care spending among individuals in families in which the policyholder earns just above the payroll tax threshold relative to individuals in families in which the policyholder earns just below the threshold. Thus, if we array individuals according to the earnings of their family's policyholder, we would expect to observe a

monotonic relationship between earnings and health care spending across the earnings spectrum, except around the Social Security payroll tax threshold.

Table 2 groups individuals in the 1996-2005 pooled MEPS by the earnings of their family's policyholder, expressed as a percentage of the Social Security wage base in their sample year. The table reports the average health care spending level (in constant 2004 dollars) of all individuals within each wage interval. As the table shows, health care spending generally rises with the earnings level of the family's policyholder. Individuals in families with a policyholder earning less than 70 percent of the Social Security wage base spend on average $1,953 per year in 2004 dollars. As the wage and salary income of a family's policyholder increases, so does each member's health spending, up to 90-100 percent of the wage base ($2,406 per year).

However, individuals in families with a policyholder earning 100-110 percent of the wage base spend 23.7 percent less on average -- $1,836 per year -- than their counterparts in families with a policyholder earning 90-100 percent of the wage base. This reduction is highly suggestive of a large impact of the payroll tax preference on health care spending. The fact that as the wage and salary income of a family's policyholder increases beyond 100-110 percent of the wage base, health spending begins rising again, to $2,110 for persons in families in which the policyholder earns more than 130 percent of the taxable threshold lends further support to the hypothesis that the drop in health care spending just above the Social Security tax threshold is the result of the tax preference.

Figure 1 presents two breakdowns of the difference in spending between individuals in families with a policyholder just above and just below the Social Security

tax threshold. The top panel of the figure shows that individuals in families in which a policyholder earns 90-100 percent of the wage base spend less on both inpatient and outpatient services (although not on outpatient dental and vision services, which are traditionally not covered by insurance) than individuals in families with a policyholder earning 100-110 percent of the wage base. The bottom panel shows that all of the difference in spending between the two groups occurs at the upper tail of the spending distribution. Individuals who spend at least $10,000 account for all of the difference between the two groups both because there are more of them (3.9 percent of the 90-100 percent group, as compared to 3.1 percent of the 100-110 percent group) and because they spend more, conditional on spending at least $10,000 ($17,946, as compared to $26,837).

Economic theory suggests two reasons for the observed outcome. First, because of their smaller tax subsidy for insurance, individuals above the Social Security threshold have an incentive to choose health plans with higher coinsurance rates. Second, individuals above the threshold also have an incentive to choose managed care rather than traditional fee-for-service plans. The value of managed care lies in its ability to help individuals control costs, and controlling these costs is more valuable to individuals who do not receive the payroll tax subsidy (i.e., those above the Social Security threshold). Unfortunately, the MEPS-HC data do not contain information on coinsurance rates. However, they do contain information on use of managed care.

Table 3 reports data on the use of managed care, by earnings of the family's policyholder, analogous to Table 2. The first column of the table shows that the share of individuals reporting coverage by an HMO or "gatekeeper"-based insurance policy

generally falls with earnings (from 65.0 percent in families with a policyholder earning less than 70 percent of the wage base to 59.8 percent in families with a policyholder earning more than 130 percent of the wage base), except around the 90-100 percent/100-110 percent cutpoint. Individuals in families with a policyholder earning 100-110 percent of wage base are slightly more likely to report coverage by an HMO or gatekeeper policy (65.3 percent) as compared to individuals in families with a policyholder earning 90-100 percent of the wage base (63.4 percent). The share reporting coverage by a PPO or POS plan generally rises with income, but exhibits no substantive difference around the 90-100 percent/100-110 percent cutpoint. The share reporting insurance that never contained any managed care provisions also rises with income, but it does decline between the 90-100 percent and 100-110 percent groups.[4]

Table 4 shows that differences in the characteristics of individuals and families are unlikely to explain the differences in spending. The table compares the characteristics from families in which the policyholder earns 90-100 percent of the Social Security taxable wage threshold to the characteristics from families in which the policyholder earns 100-110 percent of the threshold. As the table shows, the characteristics are quite similar, except for income and their total marginal federal tax rate (federal personal income tax rate plus Medicare and Social Security). Individuals in the higher-income group come from families with only slightly more educated policyholders (15.3 years, as opposed to 15.1 years). The occupation, industry, age, gender, and marital status distributions show no systematic differences that would explain the observed differences in health care spending between the two groups.

[4] For two reasons, we interpret this evidence only as suggestive. First, the differences are not statistically significant, and second, a two-percentage-point difference in policy type can not fully explain the differences in spending in table 2.

The total family income of families whose policyholder earns just below the taxable earnings threshold is 8.0 percent ($8,130) lower than family incomes whose policyholder earns just above the threshold. This difference is not surprising, but, importantly, rules out the likelihood that higher family incomes among families in the lower wage group generated by non-wage sources or other family member earnings explain their higher health care spending levels.

The marginal federal tax rate of families whose policyholder earns just above the payroll tax threshold exceeds the tax rate of the lower-wage group by 12.1 percentage points, only slightly less than the amount of the Social Security tax rate differential.[5] This outcome rules out differences in marginal tax rates from sources other than Social Security as an explanation for the observed difference in health care spending.

IV. Estimating the Link Between Tax Preferences and Health Spending

As discussed above, we analyze individuals $i = 1,\ldots, N$ covered by full-year employer-sponsored health insurance. Each individual is a member of a family $j = 1,\ldots, J$ that consists of a policyholder who works outside the home for wages or salary, and that person's spouse and/or children, if s/he has them. An individual has characteristics X_{ijt} that include age, gender, and marital status. We define age as a series of indicator variables denoting whether the individual is a newborn, age 19-34, age 35-44, age 45-54, or age 55-64 (age 1-18 is omitted group). A family has characteristics Z_{jt} that include the number of covered family members and the educational attainment, occupation, and industry of the policyholder. We define educational attainment as a series of indicator

[5] We compute the marginal federal tax rate by assuming each family takes the standard deduction. We cannot compute the total (federal plus state) tax rate because the MEPS does not have information on the state of residence.

variables denoting whether the policyholder is high school educated, has some college education, or is a college graduate (less-than high school education is omitted group); occupation is an indicator variable for whether the policyholder is a professional or technical worker (all other occupations are omitted group); we define industry as a series of indicator variables for whether the policyholder is employed in agriculture or mining, construction, manufacturing, financial and business services, or public administration (all other industries are omitted group). Finally, we characterize each family by its total income, Y_{jt}, and the wage and salary income of its policyholder, W_{jt}.

Models

Our models specify health spending H_{ijt} as a function of the characteristics of individuals and families, X_{ijt} and Z_{jt}; a function of family income and the wage and salary of the family's policyholder, $g(Y_{jt}, W_{jt})$; the after-tax price of health services $(1 - \tau_{jt})$,[6] where τ_{jt} is family j's marginal federal income tax rate, including Social Security and Medicare taxes; a family-specific error term η_{jt}; and an individual-specific error term ε_{ijt}:

$$H_{ijt} = \theta_t + \lambda(1 - \tau_{jt}) + X_{ijt}\beta + Z_{jt}\gamma + g(Y_{jt}, W_{jt}) + \eta_{jt} + \varepsilon_{ijt} . \quad (1)$$

For the reasons discussed above, simple OLS estimates of (1) are likely to be inconsistent. Because τ_{jt} depends on Y_{jt} and W_{jt}, any misspecification of $g(Y_{jt}, W_{jt})$ would mean that τ_{jt} would be correlated with either η_{jt} and ε_{ijt} or both. We therefore write each family's marginal federal tax rate τ_{jt} as a function of the characteristics of the individuals in the family; the family's characteristics; a function $h(Y_{jt}, W_{jt})$ of the family's income; and an error term μ_{jt}:

$$\tau_{jt} = \alpha_t + X_{jt}\zeta + Z_{jt}\xi + h(Y_{jt}, W_{jt}) + \mu_{jt} . \quad (2)$$

[6] We normalize the before-tax price of insured health services to unity.

To estimate (1) by instrumental variables, we impose the exclusion restriction that individuals in a family with a policyholder earning 90-100 percent of the Social Security wage base have health spending that is the same in expectation as individuals in a family with a policyholder earning 100-110 percent of the wage base, conditional on household income and all other family and individual characteristics. We implement this identification strategy with two alternative specifications of (1) and (2). The first specification assumes that *g(.)* and *h(.)* are cubic functions of income:

$$g(Y_{jt}, W_{jt}) = \pi_1 Y_{jt} + \pi_2 Y_{jt}^2 + \pi_3 Y_{jt}^3 + \rho_1\omega_{1jt} + \rho_2\omega_{2jt} + \rho_3\omega_{3jt} + \rho_5\omega_{5jt} + \rho_6\omega_{6jt} + \rho_7\omega_{7jt},$$

and

$$h(Y_{jt}, W_{jt}) = \sigma_1 Y_{jt} + \sigma_2 Y_{jt}^2 + \sigma_3 Y_{jt}^3 + \upsilon_1\omega_{1jt} + \upsilon_2\omega_{2jt} + \upsilon_3\omega_{3jt} + \upsilon_4\omega_{4jt} + \upsilon_5\omega_{5jt} + \upsilon_6\omega_{6jt} + \upsilon_7\omega_{7jt},$$

where $\omega_{1jt} = 1$ if the wage and salary income of the policyholder is less than 70 percent of the Social Security wage base (and zero otherwise); $\omega_{2jt} = 1$ if it is 70-80 percent of the Social Security wage base; $\omega_{3jt} = 1$ if it is 80-90 percent of the wage base; $\omega_{4jt} = 1$ if it is 100-110 percent of the wage base; $\omega_{5jt} = 1$ if it is 110-120 percent of the wage base; $\omega_{6jt} = 1$ if it is 120-130 percent of the wage base; and $\omega_{7jt} = 1$ if it is more than 130 percent of the wage base (wage and salary income equal to 90-100 percent of the wage base is the omitted group).

The second specification writes (1) and (2) in log form:

$$ln(H_{ijt}) = \theta_t + \lambda ln(1 - \tau_{jt}) + X_{ijt}\beta + Z_{jt}\gamma + g'(Y_{jt}, W_{jt}) + \eta_{jt} + \varepsilon_{ijt}, \qquad (1')$$

and

$$ln(1 - \tau_{jt}) = \alpha_t + X_{jt}\zeta + Z_{jt}\xi + h'(Y_{jt}, W_{jt}) + \mu_{jt}, \qquad (2')$$

where *g'(.)* and *h'(.)* are log functions of income:

$g'(Y_{jt},W_{jt}) = \pi_1 ln(Y_{jt}) + \rho_1\omega_{1jt} + \rho_2\omega_{2jt} + \rho_3\omega_{3jt} + \rho_5\omega_{5jt} + \rho_6\omega_{6jt} + \rho_7\omega_{7jt}$,

and

$h'(Y_{jt},W_{jt}) = \sigma_1 ln(Y_{jt}) + \upsilon_1\omega_{1jt} + \upsilon_2\omega_{2jt} + \upsilon_3\omega_{3jt} + \upsilon_4\omega_{4jt} + \upsilon_5\omega_{5jt} + \upsilon_6\omega_{6jt} + \upsilon_7\omega_{7jt}$.

We also present results from two reduced-form models, to investigate the effect of our excluded instrument on health spending:

$$H_{ijt} = \theta_t + X_{ijt}\beta + Z_{jt}\gamma + h(Y_{jt},W_{jt}) + \eta_{jt} + \varepsilon_{ijt}\,, \tag{3}$$

and

$$ln(H_{ijt}) = \theta_t + X_{ijt}\beta + Z_{jt}\gamma + h'(Y_{jt},W_{jt}) + \eta_{jt} + \varepsilon_{ijt}\,. \tag{3'}$$

Results

Table 5 presents OLS estimates of σ and υ from equation (3) and (3'), i.e., estimates of the effect of a family's policyholder's earnings interval on health spending, relative to individuals in families in which a policyholder earns 90-100 percent of the Social Security wage base. Column (1) of the table presents estimates from a model analogous to equation (3) that includes only time-fixed effects; column (2) presents estimates from equation (3); and column (3) presents estimates from equation (3'). The results in the table show that the simple differences from Table 2 are not the result of differences in the background characteristics of individuals or families. Controlling for a cubic in family income and a wide range of individual and family characteristics has virtually no effect on the difference in spending between individuals in a family in which a policyholder earns 100-110 percent versus 90-100 percent of the Social Security wage base. The results in the table also show that the simple differences from Table 2 are

statistically significantly different from zero at least at the 5 percent level, both in levels and in logs, even after allowing for within-family correlation of errors.

Table 6 presents instrumental variables estimates of the effect of the tax preference for insurance on health spending from equation (1) and (1'). In all specifications, increases in the tax preference increase spending on health services by individuals in families with full-year employer coverage. At the average level of health spending and the average tax rate, the estimates in columns (1) and (2) translate into elasticities of -1.566 and -1.429 (with heteroscedasticity-consistent grouped standard errors 0.510 and 0.463, respectively). These estimates are somewhat larger than the elasticity of -0.949 we estimated from the log specification in column (3). All elasticities are statistically significantly different from zero at least at the 5 percent level of significance.

These estimates are very similar to those found by previous researchers, even though they are not directly comparable. Smart and Stabile (2005) found tax-price elasticities of demand for health services in Canada for the period 1986-2000 of between -0.7 and -1.0. Using a simple simulation model, Cogan, Hubbard, and Kessler (2005) calculate an elasticity of health spending with respect to the tax preference for insured spending of -0.86.

Table 7 presents results from six alternative specifications of model (1') to investigate the robustness of our main result. Column (1) of the table omits children from the sample; the fact that the estimated effect becomes larger in absolute value suggests that it is concentrated among adults. Columns (2) and (3) report the effect of the tax preference on inpatient and outpatient spending separately; the fact that inpatient

spending is less price-responsive than outpatient spending is consistent with the results from the RAND experiment and other work that suggests that inpatient spending is less discretionary. Finally, columns (4) and (5) replicate the analysis on the earlier and the later five-year intervals covered by the sample, respectively. Although the effect of the tax preference is not statistically significantly different from zero in the earlier subsample, it is of roughly the same magnitude in both as in the full, pooled sample.

V. Conclusions and Implications for Future Research

The U.S. health care system is widely criticized for the poor value for money it delivers. As health policy analysts have long observed, the tax preference for health insurance is one of the principal sources of this problem. This paper is the first to estimate empirically the magnitude of its role without significant theoretical or functional form assumptions. We find that the tax preference for insurance significantly increases health spending.

The elasticities in Table 5 can be used to simulate how much health spending by privately-insured individuals would fall if the tax preference were repealed. Given that the average federal marginal tax rate (including Social Security and Medicare taxes) in our sample is 35.9 percent (not in any table), repealing the tax preference would increase the after-tax price of insured expenditures from $0.641p$ to p, where p is the before-tax price of health care. Evaluated at the average after-tax price, this amounts to a 43.8 percent increase ($=0.359p / (0.5*(0.641p + p))$. At an elasticity of -1.428, this increase translates into a 62.5 percent decrease in health spending; at an elasticity of -0.949, this increase translates into a 41.6 percent decrease (0.949*0.438) in health spending.

These effects, while quite large, are consistent with the results from simulation models, including our own work. Among individuals with nonzero health spending in our sample, the average coinsurance rate, as measured by the share of health spending that is out-of-pocket, is 32.3 percent. According to Jack and Sheiner (Table 2, 1997), at a tax preference for insurance of 32.8 percent, an effective coinsurance rate of this magnitude implies a coefficient of relative risk aversion of approximately 1.5. At a coefficient of relative risk aversion of 1.5, repealing the tax preference in their model leads to an approximate doubling of the coinsurance rate; this result is similar to the effect of the tax preference simulated by Feldstein and Friedman (1977). A doubling of the coinsurance rate from 32 to 64 percent, in turn, would lead to a decline in health spending of between 13.3 percent (at the RAND experiment's estimate of the elasticity of demand for health services of -0.2) and 46.7 percent (at Eichner's (1998) elasticity of demand for health services of -0.7).[7] Gruber (Table 5, 2002) reports that removing all tax subsidies for health insurance would result in a 35.4 percent decline in health spending among individuals who are offered insurance by their employer, expressed as a percentage point change from its initial value. Expressed as a percentage-point change at the average (in order to make his estimate comparable to the others), this difference amounts to a 43.0 percent decline in health spending. [8]

Simulations of the effect of repealing the tax preference based on our empirical elasticity estimates, however, may either overstate or understate the true effect. On the one hand, if spending becomes less responsive as the tax preference is phased out, then the effects of repeal will be smaller than observational data would predict. On the other

[7] That is, 0.133 = 0.2*(0.32 / (0.5*(0.32+0.64))) and 0.467 = 0.7*(0.32 / (0.5*(0.32+0.64))).
[8] That is, 0.43 = (0.354 / (.5*(0.354+(1-0.354)))).

hand, a nationwide change in tax policy may lead to a larger change in coinsurance rates and health spending than observational data based on small differences in marginal tax rates would predict. Amy Finkelstein (2007), for example, shows that the change in hospital spending associated with the introduction of Medicare was far greater than the elasticities from the RAND Experiment would have predicted. In addition, our estimates are based on the elasticity of behavior of individuals at the upper end of the income distribution (that is, around the Social Security threshold); the elasticity at the mean income may be either larger or smaller.

Future work might seek to identify empirically the mechanism through which the tax preference influences spending. Unfortunately, the MEPS-HC does not contain much detail about the insurance plan characteristics of the individuals in the sample.[9] Although our results suggest that the greater use of managed care by individuals with a smaller tax preference play an important role, more definitive research into the effects of the tax preference on insurance policy choice remains to be done. In addition, future work might investigate whether the influence of the tax preference varies with the observable characteristics of firms, such as size or offering of multiple insurance options. Such information will help policymakers better understand how reforms might improve the efficiency of health care in the United States and abroad.

[9] For example, the MEPS-HC does not ask individuals about their plan's deductible and coinsurance rate. In contrast, the MEPS-Insurance Component, which is a firm-level data set, contains considerable detail about insurance plans. However, the MEPS-Insurance Component/Household Component linked file was discontinued effective in 2002. In addition, those years of the file that do exist are not available for public use, have significantly smaller sample sizes, and are not nationally representative.

References

Cogan, John F., R. Glenn Hubbard, and Daniel P. Kessler, *Healthy, Wealthy, and Wise*, Hoover Insitution/AEI Press, 2005.

Eichner, Matthew, The Demand for Medical Care: What People Pay Does Matter, *American Economic Review* 88:117-121, 1998.

Feldstein, Martin, The Welfare Loss from Excess Health Insurance, *Journal of Political Economy* 81: 251-80, 1973.

Feldstein, Martin, and Bernard Friedman, Tax Subsidies, the Rational Demand for Insurance, and the Health Care Crisis, *Journal of Public Economics* 7: 155-178, 1977.

Finkelstein, Amy, The Aggregate Effects of Health Insurance: Evidence from the Introduction of Medicare, *Quarterly Journal of Economics* 122(1):1-38, 2007.

Gruber, Jonathan, Taxes and Health Insurance, in James Poterba, ed., *Tax Policy and the Economy*, Volume 16, 2002, MIT Press.

Jack, William, Arik Levinson, and Sjamsu Rahardja, Employee Cost-sharing and the Welfare Effects of Flexible Spending Accounts, *Journal of Public Economics* 90: 2285-2301, 2006.

Jack, William, and Louise Sheiner, Welfare-Improving Health Expenditure Subsidies, *American Economic Review* 87: 206-221, 1997.

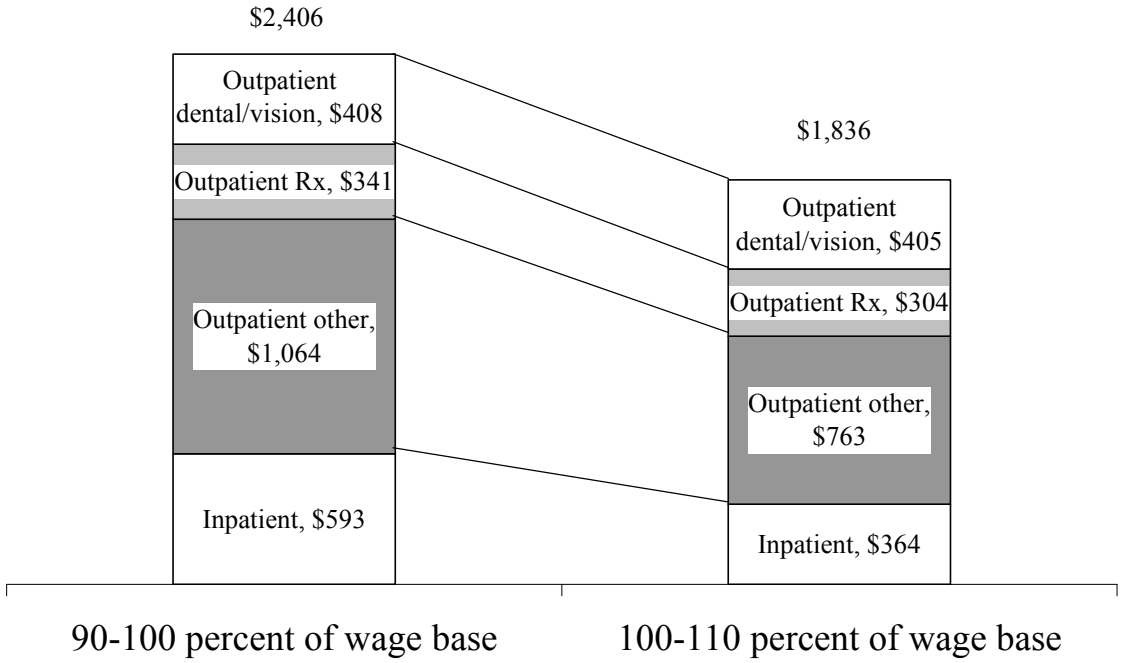
Manning, Willard G., *et al.*, Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment, *American Economic Review* 77(3): 251-277, 1987.

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

Pauly, Mark V., Taxation, Health Insurance, and Market Failure in the Medical Economy, *Journal of Economic Literature* 24: 629-75, 1986.

Smart, Michael, and Mark Stabile, Tax Credits, Insurance, and the Use of Medical Care, *Canadian Journal of Economics* 38(2): 345-65, 2005.

Figure 1: Distribution of spending by type and by spending interval, 1996-2005 Individuals in families with insurance policyholder earning 90-100 percent and 100-110 percent of Social Security wage base



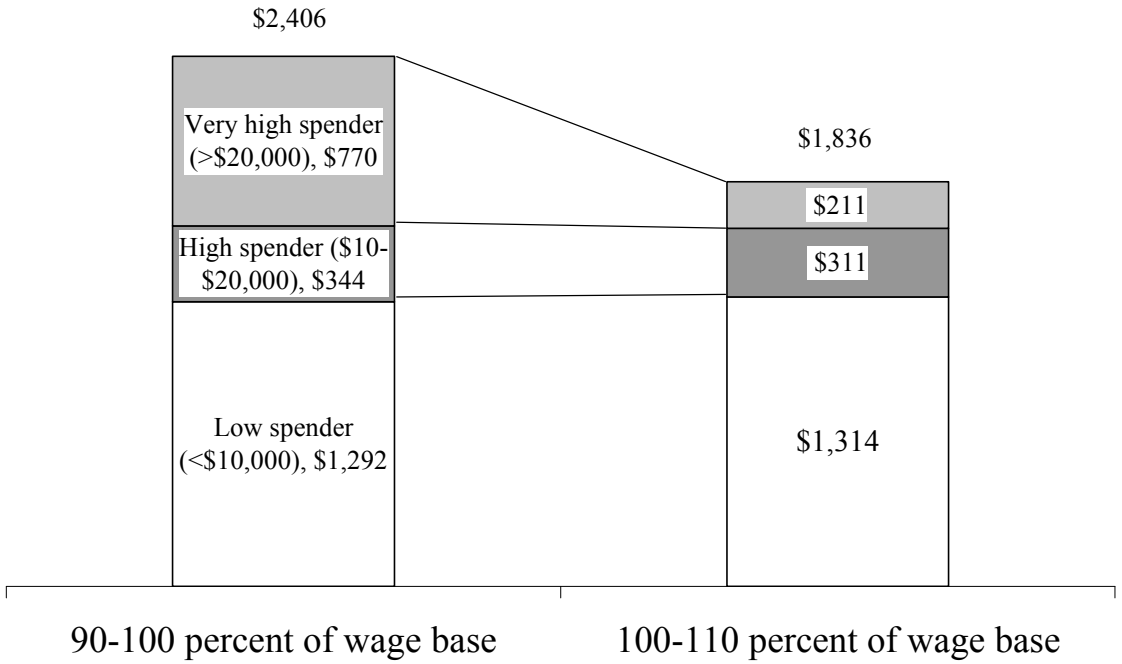


Table 1: Social Security wage base, 1996-2005

Year	Wage Base Amount
1996	$62,700
1997	65,400
1998	68,400
1999	72,600
2000	76,200
2001	80,400
2002	84,900
2003	87,000
2004	87,900
2005	90,000

Table 2: Average health spending (2004 $) of individuals in families with a full-year employed worker and full-year employer insurance coverage, 1996-2005 by wage and salary income of insurance policyholder

Wage/salary income of insurance policyholder	Average health spending (standard deviation)	Sample size [annual population size]
<70% of Social Security wage base	$1,953 (5,046)	75,700 [81,440,000]
70-80% of wage base	1,937 (4,443)	5,943 [7,518,000]
80-90% of wage base	2,065 (4,726)	4,175 [5,428,000]
90-100% of wage base	**2,406 (7,852)**	**2,977 [3,787,000]**
100-110% of wage base	**1,836 (3,848)**	**1,971 [2,572,000]**
110-120% of wage base	2,110 (4,957)	1,811 [2,331,000]
120-130% of wage base	2,016 (5,929)	448 [626,000]
>130% of Social Security wage base	2,122 (4,526)	3,780 [4,953,000]
All wage/salary income levels	1,982 (5,073)	96,805 [108,700,000]

Note: Averages are calculated using MEPS sample weights.

Table 3: Self-reported health plan types of individuals in families with a full-year employed worker and full-year employer insurance coverage, 1996-2005 by wage and salary income of insurance policyholder

Wage/salary income of insurance policyholder	Ever have HMO/Gatekeeper	Ever have PPO/POS	Never have any managed care
<70% of Social Security wage base	0.650	0.234	0.303
70-80% of wage base	0.648	0.257	0.311
80-90% of wage base	0.637	0.290	0.313
90-100% of wage base	**0.634**	**0.272**	**0.320**
100-110% of wage base	**0.653**	**0.271**	**0.307**
110-120% of wage base	0.623	0.293	0.328
120-130% of wage base	0.647	0.233	0.317
>130% of Social Security wage base	0.598	0.330	0.351
All wage/salary income levels	0.646	0.246	0.307

Note: Averages are calculated using MEPS sample weights.

Table 4: Characteristics of families and individuals, families with a full-year employed worker and full-year employer insurance coverage, 1996-2005, by wage and salary income of insurance policyholder

	Wage/salary income of policyholder is…	
	90-100% of wage base	100-110% of wage base
Family characteristics		
Total income (2004 $)	$101,325	$109,455
	(33,811)	(31,869)
Marginal federal tax rate (including Social Security and Medicare)	0.434	0.313
	(0.028)	(0.021)
Education	15.197	15.349
	(1.997)	(2.008)
Occupation: managerial/technical	0.690	0.691
Industry: financial services	0.264	0.268
Industry: manufacturing	0.230	0.247
Industry: construction	0.043	0.046
Industry: agriculture/mining	0.007	0.007
Industry: public administration	0.100	0.093
Individual characteristics		
Age	31.934	31.812
	(17.874)	(17.658)
Female gender	0.465	0.471
Married	0.504	0.501
N	2,977	1,971

Note: Averages are calculated using MEPS sample weights. Family education, occupation, and industry are defined to be those of its policyholder.

Table 5: Effect on health spending (2004 $) of wage/salary income of policyholder, families with a full-year employed worker and full-year employer-sponsored insurance

	Dependent Variable		
	Spending	Spending	ln(spending)
	(1)	(2)	(3)
Wage/salary income of policyholder			
<70% of Social Security wage base	-$481 ***	-$456 ***	-0.087
	(168)	(169)	(0.053)
70-80% of wage base	-469 ***	-478 ***	-0.067
	(179)	(177)	(0.061)
80-90% of wage base	-358 *	-395 **	-0.036
	(193)	(191)	(0.065)
90-100% of wage base			
100-110% of wage base	**-581 *****	**-580 *****	**-0.195 ** **
	(191)	**(188)**	**(0.081)**
110-120% of wage base	-365 *	-348 *	-0.051
	(206)	(202)	(0.083)
120-130% of wage base	-256	-287	-0.151
	(369)	(367)	(0.129)
>130% of Social Security wage base	-337 *	-173	-0.150 **
	(185)	(192)	(0.065)
Effect of household income			
Income x 10^-5		909 ***	
		(254)	
Income^2 x 10^-10		-714 ***	
		(202)	
Income^3 x 10^-16		1330 ***	
		(431)	
Ln(income)			0.367 ***
			(0.023)
In regression but not reported in table	Year FE	Year, age FE Gender Marital status Family size Education Industry Occupation	Year, age FE Gender Marital status Family size Education Industry Occupation
Number of observations	96,805	96,805	96,805
Number of families	48,578	48,578	48,578

Notes: *, **, *** denote significance at the 10, 5, and 1 percent levels, respectively. Heteroscedasticity-consistent standard errors allowing for within-family correlation are in parentheses. Observations are weighted using MEPS sample weights. Education, occupation, and industry are defined to be those of the policyholder.

Table 6: Effect on health spending (2004 $) of the after-tax price of insurance, families with a full-year employed worker and full-year employer-sponsored insurance

	Dependent Variable		
	Spending	Spending	ln(spending)
After-tax price of insurance	(1)	(2)	(3)
(1 - marginal federal tax rate)	-$4,842 ***	-$4,418 ***	
	(1587)	(1439)	
Ln(1 - marginal federal tax rate)			-0.949 **
			(0.393)
Wage/salary income of policyholder			
<70% of Social Security wage base	-$78	-$414 ***	-0.053
	(85)	(158)	(0.046)
70-80% of wage base	-364	-462 ***	-0.054
	(152)	(173)	(0.059)
80-90% of wage base	-319 *	-385 **	-0.029
	(184)	(189)	(0.064)
110-120% of wage base	195	250 *	0.148
	(150)	(150)	(0.094)
120-130% of wage base	278	337	0.056
	(338)	(343)	(0.137)
>130% of Social Security wage base	81	458 ***	0.060
	(116)	(144)	(0.082)
Effect of household income			
Income x 10^-5		-613	
		(558)	
Income^2 x 10^-10		-78	
		(289)	
Income^3 x 10^-16		406	
		(528)	
Ln(income)			0.241 ***
			(0.057)
In regression but not reported in table	Year FE	Year, age FE Gender Marital status Family size Education Industry Occupation	Year, age FE Gender Marital status Family size Education Industry Occupation
Number of observations	96,805	96,805	96,805
Number of families	48,578	48,578	48,578

Notes: See notes to Table 4. Models are estimated by instrumental variables; the excluded instrument for the tax rate is whether wage/salary income of policyholder is 100-110 percent of wage base.

Table 7: Effect on health spending (2004 $) of the after-tax price of insurance, alternative models

	ln(spending) (1)	ln(inpatient spending) (2)	ln(outpatient spending) (3)	ln(spending) (4)	ln(spending) (5)
<u>After-tax price of insurance</u>					
Ln(1 - marginal federal tax rate)	-1.236 ***	-0.104	-0.899 **	-0.724	-1.080 *
	(0.461)	(0.298)	(0.389)	(0.566)	(0.552)
<u>Effect of family income</u>					
Ln(income)	0.111 *	-0.081 **	0.200 ***	0.202 ***	0.170 **
	(0.059)	(0.039)	(0.052)	(0.073)	(0.076)
Exclusions from sample	No children	None	None	1996-2000 only	2001-2005 only
Number of observations	68,473	96,805	96,805	43,254	53,551
Number of families	48,539	48,578	48,578	21,413	27,165

Notes: See notes to Table 4. All specifications are based on model (3) from Table 5 with the changes listed. In regression models but not reported in the table are year fixed effects, age fixed effects, gender, marital status, education, industry, occupation, and six indicator variables measuring the wage and salary income of the policyholder.