Tax Incentives and the Decision to Purchase Long-Term Care Insurance

Charles Courtemanche[+]
Daifeng He*

Washington University in St. Louis

May 25, 2008

Abstract

This paper studies the impact of the tax incentive prescribed in the Health Insurance Portability and Accountability Act of 1996 (HIPAA) on individuals' long-term care (LTC) insurance purchasing behavior. Using data from the Health and Retirement Study, we find that the tax incentive in HIPAA increased the take-up rate of private LTC insurance by 3.3 percentage points, or 25%, for those eligible. Despite this seemingly strong response, our results imply that even an above-the-line tax deduction would not increase the coverage rate of seniors beyond 13%, indicating that tax incentives alone are unlikely to expand the market substantially. We also present, to our knowledge, the first estimate of the price elasticity of demand for LTC insurance of around -3.9, suggesting that demand is highly elastic at the current low ownership rate. Finally, we evaluate the net fiscal impact of the tax incentive and find that the tax deductibility of LTC insurance premiums leads to a net revenue loss for the government, as the reduced tax revenue from granting the tax incentive exceeds the savings in Medicaid's LTC expenditures.

JEL Classification: I10, I18, H20

Keywords: Long-term care, long-term care insurance, tax incentive, HIPAA, medical expenses, itemization, demand elasticity, fiscal impact

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[+] Department of Economics, University of North Carolina at Greensboro, P.O. Box 26165, Greensboro, NC 27402. E-mail: cjcourte@uncg.edu.
*Corresponding author, Department of Economics, Washington University in St. Louis, One Brookings Drive, Campus Box 1208, St. Louis, MO 63130. E-mail: dhe@wustl.edu. Tel: 314-935-5670. Fax: 314-935-4156.
The authors are grateful to the editor, an anonymous referee, Sebastian Galiani, Lee Benham, Marcus Berliant, Steve Buccola, Edward Greenberg, Jeremy Jackson, Mindy Marks, Bruce Petersen, Michael Plotzke and Paul Rothstein for helpful comments and suggestions. All errors are our own. Partial financial support from the CRES, Washington University is acknowledged.

I. Introduction

The long-term care needs of seniors have been placing great financial pressure on the U.S. public insurance program Medicaid in recent years. In 2004, Medicaid paid 42% of the nation's spending on long-term care ($158 billion) and 43% of its spending on nursing homes ($115 billion) (Kaiser, 2006a). These numbers will likely rise dramatically since the share of the population above age 85 is expected to triple in the next four decades (Census Bureau, 2004). How to ease the burden on Medicaid of the seniors' long-term care needs has drawn a great deal of public attention and been the subject of heated policy debates (Abt Associates, 2001).[1] One option is to use tax incentives to expand the market for private long-term care (hereafter LTC) insurance, which currently covers only about 10% of the elderly population above age 65 and paid about 8% of the nation's total LTC expenditures and 9% of the nation's nursing home bills in 2004 (Kaiser, 2006b).

Governments at both the federal and state levels have implemented tax incentives to stimulate the private LTC insurance market. The Health Insurance Portability and Accountability Act of 1996 (HIPAA) gave favorable tax treatment to private LTC insurance, allowing it to be treated as health insurance when calculating an individual's federal income tax liability. For the vast majority of the population, LTC insurance premiums can therefore be counted as medical expenses for the purpose of itemized deductions.

This paper presents, to our knowledge, the first evidence of how people respond to the tax incentive in HIPAA, as well as the first estimate of the price elasticity of demand for LTC insurance. The fact that only 10% of the elderly have LTC insurance a decade after HIPAA was passed suggests that the act has not dramatically increased the size of the market. Nonetheless, calculating how much of the current market size can be attributed to HIPAA is useful because it allows us to estimate what the impact would be of a more widespread policy, such as an above-the-line deduction.

[1] Examples of options provided in Abt Associates (2001) include "maintenance of current law, the expansion of Medicare to cover LTC, mandatory private insurance, refundable tax credits to encourage growth in the private LTC insurance market, policy that provides relief from Medicaid eligibility requirements for individuals who purchase LTC insurance."

A priori, it is not clear whether the tax incentive provided by HIPAA should have an impact on people's LTC insurance purchasing decisions. On one hand, the demand for LTC insurance may not be responsive to price changes due to potential underlying limiting factors.[2] In particular, Brown and Finkelstein (2006) argue that Medicaid may crowd out the demand for private LTC insurance for up to the 60th percentile of the wealth distribution. Moreover, individuals are allowed to deduct only the portion of their medical expenses above 7.5% of their adjusted gross income (AGI). This stringent requirement suggests that the deductibility of medical expenses may apply only in years when one experiences unexpected negative health shocks. If the deductibility of medical expenses is largely unpredictable, favorable tax treatment contingent on medical itemizing status might not affect an individual's purchasing decision.

On the other hand, Brown and Finkelstein (2006) also point out that the very existence of Medicaid crowd-out suggests that prospective LTC insurance buyers are price sensitive, which may imply that the change in relative prices induced by HIPAA may in fact have affected purchasing. Moreover, for people in the age range for making LTC insurance purchasing decisions, deductibility of medical expenses is much more predictable than it is for the average population.[3]

This ambiguity suggests that whether or not tax incentives affect LTC insurance purchasing decisions is an empirical issue. Using data from the Health and Retirement Study (HRS), we aim to answer three questions: 1) Did people respond to the tax incentive prescribed in HIPAA; 2) What is the price elasticity of demand for LTC insurance; and 3) What was the effect of the tax incentive on net government revenues?

We answer the first question by exploiting the fact that, since HIPAA allows individuals to deduct LTC insurance premiums as medical expenses, only those who itemize medical

[2] The factors may include individual myopia, misconceptions about the extent of the public insurance coverage, informal care provided by family and friends, and a Medicaid crowding-out effect (see Norton, 2000 for a review).

[3] Individuals in our sample were between 55-65 in 1996, largely conforming to the prime buying age of 55-69 for LTC insurance (HIAA 2000). The correlation of medical itemizing status between consecutive years is about 0.5 in our sample, supporting our view that itemizing is somewhat predictable for this age group.

expenses are eligible for the tax break. We estimate a difference-in-differences model, defining the treatment group as individuals who itemized medical expenses in the pre-treatment year and the control group as those who did not itemize medical expenses in the pre-treatment year and would not have been able to do so even if they had owned a deductible policy. We use itemizing status in the pre-treatment year instead of that in the current year to avoid reverse causality: in the post-treatment years, individuals who owned LTC insurance were more likely to itemize medical expenses since the premium of the policy could then be counted as medical expenses.

We find that HIPAA increased the ownership rate of LTC insurance by 3.3 percentage points, or 25%, for those eligible for the tax treatment. While this effect seems substantial, it implies that HIPAA increased the total market size of LTC insurance by less than half a percentage point. An extrapolation of our result suggests that an above-the-line tax deduction would expand the coverage rate of seniors from the current 10% to only 13.3%. Our findings are consistent with the argument in the literature that Medicaid crowd-out limits the potential size of the private LTC insurance market (Brown and Finkelstein, 2006 and 2007, Brown et al, 2007).

We estimate the price elasticity of LTC insurance by exploiting the fact that, for individuals who do itemize medical expenses, the size of the tax break depends on their federal marginal income tax rate. Using an instrumental variables estimator, we estimate an elasticity of around -3.9, suggesting that the current market for private LTC insurance is very price elastic in the local range of low baseline ownership rates.

Finally, we conduct a fiscal impact analysis to examine the effect of the tax incentive on net government revenues. We find that the foregone tax revenue exceeds the savings for Medicaid, suggesting that it may not be fiscally wise to use tax subsidies to expand the private LTC insurance market.

The rest of the paper is organized as follows. Section II provides background information about LTC, LTC insurance, and the policy intervention prescribed in HIPAA. Section III describes the data, outlines the empirical identification strategy and reports the results.

Section IV conducts robustness checks. Section V estimates the price elasticity of LTC insurance demand. Section VI conducts the fiscal impact analysis. Finally, section VII concludes.

II. Background

1. LTC and LTC insurance

LTC refers to a range of medical, personal, and/or social services designed to support the needs of individuals living with disability or chronic health conditions. Nursing homes provide institutional LTC to individuals who need assistance with Activities of Daily Living (ADLs), such as eating, dressing, bathing, transferring to and out of bed, toileting, and continence. In 2000, almost 6 million seniors above age 65 in the U.S. needed LTC services, and about 1.5 millions seniors were nursing home residents (Kaiser, 2006b). The average risk of utilizing a nursing home is high, and there is a considerable right tail in the risk distribution.[4] Nursing home stays are very expensive, with the national average monthly rate of a semi-private room being $5,280 in 2005 (Metlife, 2005). Without some sort of insurance, this can quickly drain the financial resources of an ordinary elderly U.S. household. Theoretically, the large right tail in the risk distribution combined with the high cost associated with the risk should make insurance very desirable (Brown and Finkelstein, 2006).

There are two ways to insure one's LTC expenditure risks. The public insurance program Medicaid has been the major payment source for the nation's LTC needs, covering about 43% of total nursing home expenditures and 42% of total LTC expenditures (Kaiser, 2006a). However, an individual has to be indigent or exhaust almost all her income and a substantial amount of her assets to meet Medicaid's means-tested eligibility requirements for LTC coverage. Norton (2000) describes Medicaid's nursing home coverage as insurance with a deductible equal to one's assets and a co-pay equal to one's income.

[4] Brown and Finkelstein (2006) estimate that 27% of 65 year-old men and 44% of 65 year-old women would enter a nursing home at some point in their life, with 12% of men and 22% of women who enter one spending more than 3 years there.

Private LTC insurance is an alternative way to insure LTC expenditure risks. The market for private LTC insurance is small, as only about 10% of seniors above age 65 owned a policy in 2004. The benefit structure of a typically-purchased policy is limited, providing a daily-capped benefit of $100, compared to a national average daily cost of $143 in 2000 (Brown and Finkelstein, 2006).

There has been a wide range of explanations for the limited market size of private LTC insurance. Potential supply-side factors include asymmetric information, imperfect competition, high administrative costs, and the undiversifiable intertemporal risk of rising health care costs. Potential demand-side factors include limited individual rationality, misconceptions about the extent of public insurance, informal care provided by family and friends, and Medicaid crowd-out (see Norton, 2000 for a review). A series of papers by Brown and Finkelstein (2007 and 2006) and Brown et al. (2007) emphasize the role of Medicaid crowd-out in explaining the limited size of the private LTC insurance market. In particular, the authors estimate that, despite its limited benefit structure, Medicaid crowds out demand for private LTC insurance up to the 60th percentile of the wealth distribution (Brown and Finkelstein, 2006).

2. The tax treatment of LTC insurance in HIPAA

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) provides the same favorable tax treatments for qualified LTC insurance that exist for health insurance, effective January 1, 1997.[5, 6] The resulting tax incentive differs for different types of individuals. First, for employer-sponsored LTC insurance, an employee can exclude from her taxable income the employer's contribution to the premium.[7] Second, self-employed individuals can deduct above-the-line a portion of their LTC insurance premiums, up to certain maximum caps.[8] This portion was 45% when HIPAA was first passed and was

[5] About 90% of all the private LTC insurance policies purchased are "qualified LTC insurance" as defined by HIPAA (Kassner and Enid, 2004).

[6] HIPAA's text reads "a qualified long-term care insurance contract shall be treated as an accident and health insurance contract", Title III\Subtitle C\Part I\Sec 7720B\(a).

[7] According to the National Compensation survey, 11% of private industry workers are offered LTC insurance. However, LTC insurance offered at the workplace is typically funded completely by the employees (Bureau of Labor Statistics, 2004). Therefore, we ignore employer-sponsored LTC insurance in the rest of the paper.

[8] In 1996, the caps were $200, $375, $750, $2,000 and $2,500 for individuals 40 or below, between 41 and 50,

increased to 60% in 2001, 70% in 2002, and 100% in 2003 (Joint Committee on Taxation, 2001). Third, LTC insurance premiums not eligible for exclusion or above-the-line deduction can be treated as medical expenses for the purpose of itemized deductions, up to certain maximum caps.[9] The focus of our analysis is the tax treatment in the form of the medical expenses deduction since this is applicable to the general population. From now on, our use of "tax incentive" refers to the deductibility of LTC insurance as a medical expense, unless stated otherwise. We briefly discuss the tax incentive on LTC insurance purchased by the self-employed in the robustness check session.

An individual must satisfy two conditions to deduct medical expenses. First, she has to choose to claim itemized deductions instead of taking the standard deduction. An individual will presumably choose whichever gives her a higher amount of total deductions when filing the tax return. Second, given that an individual has chosen to itemize deductions, she can itemize only the amount of total unreimbursed medical expenses above 7.5% of her adjusted gross income (AGI). The latter requirement can be quite stringent since 7.5% of AGI is a high floor for most adults. However, since health problems become more common as one ages, the elderly and near-elderly who are the typical purchasers of LTC insurance are much more likely to itemize medical expenses than the general population. Indeed, 15% of our sample itemized medical expenses.

For a medical expenses itemizer, the tax subsidy granted by HIPAA lowers the effective price of LTC insurance relative to non-tax-deductible consumption. If an individual's marginal federal income tax rate is τ and she receives a full deduction on her LTC insurance premium, the effective relative price of her LTC insurance policy is $1-\tau$. For example, consider an individual with a marginal federal income tax rate of 25% who has $1000 to spend on either non-deductible consumption or LTC insurance. If she spends this $1000 on LTC insurance and she can fully deduct the premium, she will receive $250 in tax subsidies, meaning that purchasing the $1000 policy costs her only $750 in terms of

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between 51 and 60, between 61 and 70 and above 70, respectively. The caps are indexed for inflation. In 2006, the caps were $280, $530, $1060, $2830 and $3530 for the respective age groups. See the instructions for Form 1040 for 1996 and 2006.

[9] The caps are the same as those in footnote 8 since they apply to both the above-the-line deductions and deductions in the form of medical expenses.

foregone consumption. Therefore, the relative price of the deductible LTC insurance policy is 0.75, or one minus the marginal tax rate. This reduction in the relative price would be expected to increase the quantity of insurance demanded.

III. Data Description and Empirical Strategy

1. Data and Summary Statistics

We use the Health and Retirement Study (HRS), a nationally representative longitudinal survey conducted biennially since 1992. HRS contains rich information on demographics, family structure, financial status, insurance status, and health status. Our analysis mainly utilizes the 1996, 1998, 2000, 2002, and 2004 waves of data. The LTC insurance coverage data seems to suffer from substantial reporting errors in the earlier waves of 1992 and 1994.[10] We will therefore only use the 1992 and 1994 waves in some of the robustness checks and falsification tests.

We limit our analysis to the HRS cohort, which consists of individuals born between 1931 and 1941.[11] The HRS and AHEAD cohorts are the only cohorts included in the HRS prior to the enactment of HIPAA in 1997. Following Brown et al. (2007), we do not use the AHEAD cohort since these people had passed the primary age range for purchasing LTC insurance when HIPAA took effect.

We obtain most of our data from the RAND version of HRS, including LTC insurance ownership status, household income and wealth, mortgage payment, property tax, out-of-pocket medical expenses, demographics, and a detailed set of variables on health status.[12]

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[10] The LTC ownership rates in the HRS are 1.1% in the 1992 wave and 1.3% in the 1994, substantially lower than the estimates in other analyses for this time period. This possible data flaw has been recognized in the literature; for example, see Finkelstein and McGarry, 2006, Appendix A. It may have originated from the survey design in these two waves in which the questions about LTC insurance were asked in the context of "other types of health insurance" that an individual owned. Starting from wave 1996, a separate set of questions was asked specifically about LTC insurance.

[11] The entire HRS sample includes five cohorts, the HRS, AHEAD, WB, CODA and EBB.

[12] Household income in the RAND HRS is the sum of household capital income, all other household income, and the individual incomes of the respondent and her spouse. Individual income includes earnings, employer pension or annuity, social disability income and supplemental security income, other government transfers, social security retirement, and unemployment or workers compensation. Household wealth in RAND HRS is the sum of all wealth components minus all debt, excluding the secondary residence. Wealth components

Other variables come from the original HRS data set, including itemizing status, medical itemizing status, charitable contributions, and insurance premiums.[13] Table 1 presents summary statistics of the relevant variables.

[Table 1 approximately here]

Figure 1 shows the LTC insurance ownership rates across our sample among individuals who itemized medical expenses and those who did not. In 1996, prior to the institution of HIPAA, the difference in ownership rates between the medical itemizers and medical non-itemizers was 1.7 percentage points, and the 95% confidence intervals for the two groups overlap. The difference was similar in 1998, shortly after HIPAA took effect. After 1998, the gap between the medical expenses itemizers and non-itemizers began to rise steadily, reaching about 10 percentage points in 2004. The average difference in ownership rates after HIPAA took effect was about 7 percentage points. Excluding 1998, the average difference rises to about 9 percentage points. Our empirical strategy examines how much of this correlation between policy ownership and itemizing status is due to the causal effect of HIPAA.

[Figure 1 approximately here]

2. Identification Strategy

The tax benefit on LTC insurance prescribed by HIPAA applies to the entire population and thus does not give rise to clear-cut treatment and control groups. Any individual is eligible for the tax benefit if she chooses to take itemized deductions and to itemize medical expenses, so we encounter a selection into treatment problem. We address this

include value of primary residence, net value of other real estate (excluding the secondary residence), net value of business, net value of vehicles, net value of IRA, Keogh accounts, net value of stocks, mutual funds and investment funds, value of CD, government savings bonds and T-bills, value of bonds, and all other savings. Debt includes value of all mortgages on the primary residence, net value of other home loan on the primary residence, and value of other debts.

[13] Some of the public finance literature on the impact of tax incentives has used tax data, which generally gives accurate information on tax price and deduction amounts without involving imputations. For example, see Gouveia and Strauss (2004). However, in a study on LTC insurance ownership, tax data is not usable since tax data, which record all the entries on Form 1040, does not contain information on LTC insurance. In particular, the total amount of medical expenses is entered as a lump sum on schedule A of Form 1040 without being divided into sub-categories, at least during the period that our study examines.

issue by relying on a difference-in-differences approach, which controls for all factors that are constant over time and might jointly determine the outcome of interest and the decision to itemize medical expenses. This approach also allows us to include a detailed set of health covariates to control for the possible effect of changes in health status over time on the decision to acquire LTC insurance.

An additional concern is reverse causality, as individuals who own LTC insurance policies may be more likely to itemize medical expenses in the post-treatment years than those who do not, *ceteris paribus*. Since HIPAA allowed LTC insurance premiums to count as medical expenses, policy-owners have higher deductible medical expenses than those who do not own a policy, giving them a higher probability of reaching the 7.5% AGI floor. To address this potential problem, we use medical itemizing status and general itemizing status (whether a person takes itemized deductions or the standard deduction) in the pretreatment year 1996 to define the treatment and control groups.[14] Since LTC insurance premiums were not tax deductible in 1996, individuals who owned policies then were not more likely than others to itemize medical expenses, *ceteris paribus*. Classifying on the basis of itemizing status in the pretreatment year 1996 represents an intention-to-treat analysis.

We divide the sample into four groups according to pretreatment itemizing status and relevant measures of medical expenses. [15] In our analysis, "treatment" refers to eligibility for the tax subsidy, based on pretreatment behavior. Group 1 is "the fully-treated treatment group," containing 1,461 individuals who itemized medical expenses in the pretreatment year 1996. These people should expect to be eligible for the full tax benefit when LTC insurance becomes deductible. Group 2 consists of individuals with a level of medical expenditures in 1996 high enough to benefit from the tax incentive, but who elected to take the standard deduction. We define a "high enough" level of medical expenditures as having total unreimbursed medical expenses exceeding 7.5% of the AGI floor after adding a hypothetical LTC insurance premium. These individuals may or may not be eligible for the tax incentive after LTC insurance becomes deductible. On one hand, if adding a LTC

[14] 1996 is pretreatment since HIPAA became effective on January 1, 1997.
[15] In our online Appendix I, we discuss in detail how we define the various measures of medical expenses necessary to implement our grouping of the sample and how we impute the hypothetical LTC insurance premiums used below.

insurance premium to medical expenditures induces them to itemize deductions instead of taking the standard deduction, they would be able to itemize medical expenses and receive the tax benefit on at least a portion of the LTC insurance premium. On the other hand, if their other deductible expenses (mortgage interest payments, etc.) are low enough that owning a deductible LTC insurance policy would not change their general itemizing decision, they would not be eligible for the tax treatment.[16] We refer to group 2, which consists of 2,593 individuals, as the "possibly treated treatment group." Since medical expenditures tend not to be the main driver of individuals' decision regarding whether to take the standard deduction or itemize deductions, we suspect that group 2 will behave more similarly to the control group (defined below) than to the treatment group. Group 3 includes individuals who itemized deductions but did not itemize medical expenses in 1996, because their total unreimbursed medical expenses fell short of the 7.5% AGI floor, but whose medical expenses would have exceeded 7.5% of their AGI if we add a hypothetical LTC insurance premium. We expect those in this group to receive a "partial" tax treatment since they would only be able to itemize the portion of the premium that exceeds the 7.5% floor. Therefore, we name group 3, which contains 218 individuals, the "partially treated treatment group." Group 4 consists of the rest of the sample: individuals who did not itemize medical expenses in 1996 and whose total unreimbursed medical expenses would not have reached the 7.5% floor even if a hypothetical LTC insurance premium was added. Those individuals would not be eligible for any tax benefit, so their LTC insurance purchasing decision should not be affected by HIPAA, making them a clean control group. The control group contains 4,294 individuals. Figure 2 provides an illustration of the four groups.[17]

[Figure 2 approximately here.]

We estimate the following difference-in-differences regression:

$$LTCI_{it} = a_0 + y_t + b_i + a_1 TX_i * POST_t + \boldsymbol{X}_{it}\boldsymbol{B} + e_{it} \qquad (1)$$

[16] Data limitations prevent us from obtaining a precise measure of other deductible expenditures, so we do not attempt to impute whether adding a hypothetical LTC insurance premium will induce a person to itemize deductions instead of taking the standard deduction.

[17] Our online Appendix II presents a theoretical model to justify our division of the sample into these groups.

where $LTCI_{it}$ indicates whether individual i owns LTC insurance in year t; y_t is a year fixed effect; and b_i is an individual fixed effect. TX_i is the treatment status indicator, equal to 1 if individual i is in the treatment group and 0 if she is in the control group; the treatment group can be any of the three aforementioned groups or a combination of them as explained below. $POST_t$ indicates whether the current time period is post-treatment (after 1997), and TX_i*POST_t gives the treatment status of individual i at time t. $\boldsymbol{X}_{it}$ is a set of control variables including household income, household wealth, marital status, dummies for age groups, and 37 variables for health status.[18,19] The health status variables indicate whether the respondent and her spouse have chronic health conditions (high blood pressure, diabetes, cancer, heart disease, and arthritis), limitations on activities of daily living (ADLs) (bathing or showering, eating, dressing, walking, getting into or out of bed, and toileting) and instrumental ADLs (using a map, using a phone, managing money, taking medications, shopping, and preparing meals), as well as self-reported measures of their health status and memory capacity.[20] We first estimate model (1) without controls, then add financial and demographic controls, then finally add the health control variables. Since our regressions include individual fixed effects, we do not include controls for race, gender, and education.

The parameter of interest is a_1, which measures the effect of being 'eligible' for the HIPAA subsidy on the probability of owning an LTC insurance policy. The difference-in-differences estimator of a_1 is consistent under the maintained assumption of strict exogeneity of the treatment status. This assumption would be violated, for example, if there are differential trends in LTC insurance ownership rates between medical itemizers and non-medical itemizers. One particular concern is that medical itemizers may be sicker than non-medical itemizers, increasing their demand for LTC insurance over time and biasing our estimate of a_1 upward. Alternatively, individuals with pre-existing health conditions, limitations with ADLs or IADLs, or cognitive impairments may not be eligible to purchase LTC insurance or face high prices that limit purchasing, in which case our estimate of a_1 could be biased downward. We therefore include controls for health conditions, limitations

[18] Regressions including the square of income and wealth produce almost identical results.
[19] We group individuals into age groups of five-year intervals, such as 55-59, and 60-64.
[20] The scales used for self-reported health status and memory are as follows: 1 for excellent, 2 for very good, 3 for good, 4 for fair and 5 for poor.

on ADLs and IADLs, and memory capacity in an attempt to control for these potential sources of bias in our estimates.

The last column of Table 1 reports whether the health control variables differ systematically by medical itemization status in the pre-treatment year 1996. Medical itemizers do appear to have a higher prevalence rate for certain diseases than non-medical itemizers. However, out of the 25 ADLs, IADLs, and cognitive variables that most directly reflect demand for and access to LTC insurance, only eight differences are significant at the 10% level, among which medical itemizers score better in four of them while the non-itemizers score better in the other four. We therefore do not conclude that medical itemizers and medical non-itemizers differ systematically in terms of the health variables that would most directly influence LTC ownership. Moreover, our use of individual fixed effects removes time-invariant sources of bias that may result from these differences, and we examine further the possibility of differential trends in LTC ownership between medical itemizers and non-itemizers in section IV.

Given the theoretical ambiguity about the response of groups 2 and 3 to HIPAA, we estimate model (1) with different treatment groups: the fully-treated treatment group, the possibly-treated treatment group, the partially-treated treatment group, and a "generally-treated" treatment group consisting of both fully- and partially-treated individuals. We expect that the average treatment effect will be highest for the fully-treated group and lowest for the possibly-treated group. In all regressions, we exclude individuals who were self-employed and did not itemize medical expenses in 1996, since they were treated through a mechanism other than itemization behavior.

3. Results

In regressions not reported (but available upon request), we examine the short-run effect of HIPAA using 1998 as the only post-treatment year. Our estimate of a_1 is practically zero, implying that people did not respond to the tax incentive immediately after HIPAA was installed. A lag before impact is not surprising since diffusion of information regarding a policy change can be gradual. Since HIPAA did not take effect until January 1st, 1997, we suspect that many people first found out about the favorable tax treatment on LTC

insurance in early 1998, while reading the instructions on their 1997 tax returns. Furthermore, the decision to purchase LTC insurance typically involves a long-term commitment to pay a premium for many years before starting to receive benefits.[21] It should therefore involve careful thought, calculations, and comparisons, all of which take time. Finally, premiums often cost $1,000 per year or more. The large expense associated with purchasing LTC insurance may cause time to pass before individuals respond to tax incentives for two reasons. First, they need time to accumulate the financial resources necessary to make a purchase. Second, those who are healthy may decide that purchasing LTC insurance is a good idea, but postpone actually making the purchase until they feel that there is a reasonable chance that they will need LTC services.

We therefore examine the longer-run impact by excluding 1998 from the sample and using 2000, 2002, and 2004 as the post-treatment years.[22] Table 2 reports the main results of the paper, those from the difference-in-differences regression (1) with the fully-treated treatment group as the treatment group in columns (1)-(4). Column (1) does not include any control variables except for the individual fixed effects and the year dummies. Column (2) includes real household income, real household wealth, marital status, and the age group dummies (hereafter partial controls).[23] Column (3) adds a set of 37 controls for health conditions, ADLs, IADLs, and memory capacity (hereafter full controls). The estimates of the parameter of interest a_1 are very similar across specifications regardless of the controls added. The point estimate in the regression with full controls is 0.033 and significant at the 5% level. This implies that the fully-treated individuals increased their likelihood of owning a LTC policy by 3.3 percentage points after HIPAA was installed, relative to the control group. This magnitude represents a 25% increase from the baseline ownership rate of LTC insurance among the fully-treated individuals in 1996 (13%). These results suggest that individuals 'eligible' for the tax treatment do respond to the incentive. Although this effect appears large, the tax treatment in HIPAA did not increase the total size of the LTC insurance market substantially. Since only about 14% of the individuals in our sample

[21] On average, an individual holds a LTC insurance policy for more than 10 years before she starts to receive benefits. The prime buying age of LTC insurance is from 55 to 69 while the average age of first use of a nursing home is 83 (HIAA 2000, Brown and Finkelstein 2006).
[22] Including data from the year 1998 makes the estimate of a_1 slightly insignificant in most of our regressions.
[23] Household real income and wealth are based on 2004 value.

itemized medical expenses in 1996, a 3.3 percentage point increase in the ownership rate for them would translate into less than half a percentage point increase in the ownership rate for the population as a whole.

[Table 2 approximately here]

An extrapolation of this estimate to the general population suggests that allowing for an above-the-line deduction of LTC insurance premiums would increase the take-up rate of LTC insurance by 3.3 percentage points for the taxpayers. Assuming that all individuals pay income taxes, such a policy would expand the LTC insurance ownership rate of seniors from the current 10% to 13.3%. Our results therefore imply that the potential of tax incentives to expand the LTC insurance market is quite limited, consistent with the notion in the literature that public policies designed to stimulate the private LTC insurance market would have a limited effect (Brown and Finkelstein, 2006 and 2007, Brown et al. 2007).

In column (4), we report the estimates from the same specification as column (3) but excluding individuals who received Medicaid benefits in any of the waves of our data. The coefficient estimate of 0.037 is slightly larger than the estimates in the first three columns, which is expected since those who had used Medicaid would most likely rely on public insurance for their LTC needs and thus not purchase LTC insurance regardless of the tax incentive.

The remaining three columns of Table 2 report the results when the treatment group is the possibly-treated treatment group, the partially-treated treatment group, and the generally-treated treatment group. The possibly-treated treatment group appears to behave very similarly to the control group. The response of the partially-treated treatment group is positive but small and statistically insignificant, which is not surprising since this group would be able to deduct only a portion of their LTC insurance purchase. Accordingly, the results for the generally-treated treatment group are slightly weaker than those for the fully-treated group. The coefficient of interest, however, remains statistically significant.

IV. Robustness checks and falsification tests

a. Matching on pretreatment characteristics

Our maintained assumption in the difference-in-differences specification is that the treatment and control groups have the same trends in LTC purchasing behavior over time. As a test of the validity of this assumption, we estimate the parameter of interest by implementing a set of generalized matching estimators. Matching estimates are less susceptible to the criticism of differential time trends because the treatment group and the control group should be more likely to have the same unobservable trend if they are comparable in terms of observable characteristics.

We implement the matching estimation as follows. First, we collapse the data in the post-treatment periods (years 2000, 2002, and 2004) into a single period by averaging the variables in equation (1) over the three periods. We then take the difference between the collapsed post-treatment data and pretreatment data, transforming the data into a cross-section. Next, we match the control group to the fully-treated treatment group on the common support using both kernel and *k*-nearest neighborhood matching based on propensity score. The propensity score is the predicted probability of itemizing medical expenses in the pretreatment year 1996, obtained through a probit regression of medical itemizing status in 1996 on gender, race, education, and the full set of controls used in regression (1).

Table 3 displays the results. Column (1) reports the first-difference estimate of the transformed cross-sectional data on the common support. Columns (2)-(4) show results from kernel matching with the kernel being epanechnikov, biweight, and normal distributions, respectively. Columns (5) to (7) are results from the *k*-nearest neighborhood matching with *k*=1, 2, and 3, respectively. The results from the first-difference estimation, the kernel matching, and the nearest neighborhood matching with *k*=1 are very similar to the fixed effects estimates.[24] The nearest neighborhood matching results with k=2 and k=3 are not as similar, but are still well within the 95% confidence intervals of the fixed effects estimates.

[24] The fact that the first-difference result is similar to our fixed effects results suggests that autocorrelation is not responsible for the statistical significance we obtain in Table 2.

[Table 3 approximately here]

b. Falsification tests

We further examine the validity of our identification assumption of no differential trends between the treatment and control groups by examining the pre-treatment trends among the medical itemizers and non-medical itemizers. We estimate regression (1) with the full set of controls, defining the treatment group as individuals who itemized medical expenses in 1992 and the control group as those who did not itemize medical expenses in 1992 and did not qualify as partially- or possibly-treated. The treatment and control groups here correspond to the fully-treated and control groups in section III. We restrict the sample to 1992 and 1994, and consider 1992 to be the pre-treatment year and 1994 the post-treatment year. Since no actual treatment occurred between 1992 and 1994, a significant estimate would provide evidence that medical itemizers have a different time trend in their LTC insurance take-up than the non-medical itemizers, and that our estimates in section III may be biased. A potential problem with this falsification test is that, as discussed earlier, the LTC ownership rates in waves 1992 and 1994 are too low to be reliable, possibly as a result of the less-than-ideal context under which the relevant survey questions were asked. We therefore suspect that our dependent variable in the falsification test contains considerable measurement error.

We also consider three variations of this falsification test. First, we use 1992 as the pre-treatment year and 1996 as the post-treatment year, and classify the treatment and control groups on the basis of itemization status and medical expenses in 1992. Similarly, we use 1994 as the pre-treatment year and 1996 as the post-treatment year. Finally, to be most consistent with our use in Section III of one pre-treatment year and multiple post-treatment years, we use 1992 as the pre-treatment year and 1994 and 1996 as post-treatment years.

We present the results in Table 4. The coefficient estimates of *TX*POST* are statistically insignificant and small in magnitude in all four tests, supporting our identification assumption that the time trends of the treatment and control groups are the same. Nonetheless, we cannot completely rule out the possibility that there was a general shift in

demand between these groups in the post-treatment periods. In particular, HIPAA's legitimization of the LTC insurance market, apart from the tax incentive, may have increased demand most strongly among the sickest individuals, who may be most likely to itemize medical expenses.

[Table 4 approximately here]

c. HIPAA's impact on the LTC insurance purchasing decision by the self-employed.
As another robustness check, we explore a different treatment mechanism provided by HIPAA. Specifically, we examine how HIPAA affects the LTC insurance purchasing decision of the self-employed. As discussed previously, HIPAA allows self-employed individuals to deduct above-the-line a portion of their LTC insurance premiums, allowing for a straightforward definition of the treatment and control groups. However, we have less confidence in the validity of the strict exogeneity assumption, since self-employed individuals and employees likely differ in terms of risk tolerance, possibly resulting in differential time trends in LTC insurance ownership. Nonetheless, studying the behavior of the self-employed serves as a useful robustness check.

We estimate the difference-in-differences regression equation (1) defining the treatment group as individuals who were self-employed in 1996 and the control group the same as that in the main analysis. This approach is similar to that used by Gruber and Poterba (1994) in their study of the elasticity of health insurance.

Columns (1)-(3) of Table 5 report the results. The coefficient estimate of the parameter of interest in the regression with full controls is 0.030 and significant at the 10% level. This suggests that the self-employed increased their ownership of LTC insurance by 3.0 percentage points, relative to those who did not receive any tax treatment on LTC insurance. This incentive effect is slightly smaller in magnitude and less significant than

the effect found on medical itemizers, which is reasonable since self-employed individuals were allowed to deduct only a portion of their insurance premiums until 2003.[25]

[Table 5 approximately here.]

d. Using medical expenses itemizing status in the majority of pretreatment years to define treatment groups.

Recall that we define our treatment and control groups in Section III based on an individual's 1996 itemizing status and measures of her medical expenses. Although the correlation of medical itemizing status between consecutive years is 0.5 in our sample, using a single year's medical itemizing status to classify the treatment and control groups might be misleading. Some individuals who do not normally itemize medical expenses may have itemized in 1996 due to a negative health shock. Such individuals may not respond to the tax incentive since they would not expect to be eligible in most years. The reverse may also be true for some individuals classified into the control group in our main analysis.

As a robustness check, we define our treatment groups slightly differently. We use medical itemizing status and total medical expenses in the majority of the pretreatment years 1992, 1994, and 1996 to define an alternative classification of the sample into treatment and control groups. An individual is fully treated if she itemized medical expenses in two or three of the three pretreatment years. She is partially treated if she meets the aforementioned qualifications for partial treatment in two of the three pretreatment years. Similarly, she is possibly treated if she meets the qualifications for possible treatment in at least two of the three years. The rest of the sample is in the control group. This "majority" approach of defining the treatment and control groups attempts to account for the possibility that individuals' expected future itemizing status may be based on their typical itemizing status in the past, as opposed to whether or not they itemized in a single year. Columns (4)-(6) of Table 5 report the results. Reassuringly, they are similar to our main results.

[25] Additionally, self-employed people may be less risk averse than the rest of the population. It is therefore possible that insurance is less valuable to them, making a relative drop in the price of insurance less attractive to this group.

V. Elasticity of LTC insurance

In this section, we estimate the price elasticity of demand for LTC insurance. Although an extensive literature has estimated the elasticity of various acute health insurances (see Gruber 2001 for a review), to our knowledge our paper is the first to do so for LTC insurance.

The tax treatment effectively changes the relative price of LTC insurance relative to ordinary consumption that is not tax deductible. Therefore, we estimate the following fixed effects tax price regression:

$$LTCI_{it} = a_0 + y_t + b_i + \gamma_1 taxprice_{it} + \boldsymbol{X}_{it}\boldsymbol{B} + e_{it} \qquad (2).$$

where y_t , b_i and $\boldsymbol{X}_{it}$ are defined as before. We set $taxprice_{it}$ equal to 1 for the entire sample in the pretreatment period 1996. In the post-treatment periods, we assign those who itemized medical expenses in period t a $taxprice_{it}$ equal to $1-\tau$, where τ is the individual's marginal federal income tax rate. $taxprice_{it}$ remains equal to 1 for those who did not itemize medical expenses.[26] Dividing the estimate of the semi-elasticity parameter γ_1 by the medical itemizers' baseline ownership rate gives an estimate of the tax price elasticity of LTC insurance.

In addition to the measurement error in constructing the variable *taxprice*, reverse causality is another potential identification problem when estimating (2). When LTC insurance is tax-deductible, individuals who own a LTC insurance policy are more likely to itemize medical expenses and thus receive a *taxprice* equal to one minus their marginal tax rate. We address these potential problems through an instrumental variable approach. We instrument for the endogenous variable *taxprice* with *item_med96*POST,* where *item_med96* is an indicator variable for whether individual *i* itemized medical expenses in the pretreatment year 1996.[27] As discussed in Section III, *item_med96*POST* is based on

[26] The variable *taxprice* contains non-classical measurement error since we do not consider state income tax, phase out of itemized deductions, the alternative minimum tax, and the caps on the amount of premiums that are deductible. See our online Appendix I for a detailed description of how we construct the marginal tax rate τ from the RAND HRS and HRS data, as well as a discussion of potential measurement errors.

[27] Finkelstein (2001) uses a similar instrument in a study on how tax incentives affect individuals' decision to

pretreatment behavior and therefore not susceptible to reverse causality. It is also correlated with *taxprice* since *item_med96* is correlated with current medical itemizing status, which affects *taxprice*. We also use a set of instruments including *item_med96*POST,* *item_med96*POST*sex,* and *item_med96*POST*edu,* where *sex* is an indicator for whether the individual is male, and *edu* is the individual's number of years of education. Interacting *item_med96*POST* with gender and education generates more variation in the predicted value of *taxprice* than from using only *item_med96*POST*. The set of instruments therefore has the potential to give more precise estimates.

Table 6 reports the results from the tax price regressions. The first column presents the OLS results. The direction of the potential bias in the OLS estimates is not apparent since the variable *taxprice* contains non-classical measurement errors. Columns (1)-(3) report the IV results using the single instrument *item_med96*POST*; columns (1)'-(3)' report the IV results using the set of instruments defined above. In all three regressions with the set of instruments, an overidentification test of the validity of the set of instruments fails to reject the null hypothesis. The IV coefficient estimates associated with the variable *taxprice* range from -0.44 to -0.51; all are significant at the 5% level. The estimates from the specifications with full controls translate to an elasticity of -3.9, given the baseline LTC ownership rate of 13% among medical expenses itemizers in our sample in 1996.[28] These results imply that demand for LTC insurance is very price elastic, at least within a local range of low ownership rates. The large elasticity that we obtain is consistent with the answer to one of the HRS survey questions, which indicates that high premiums are the main reason that individuals choose to cancel a LTC insurance policy. Note that we do not advise direct comparison between this elasticity estimate and the elasticity estimates of acute health insurance in the literature, which are much lower, ranging from -0.6 to -1.8 (Cutler, 2002). This is because the underlying market structures of LTC insurance and acute health insurance are very different. In particular, the baseline ownership rate of acute health insurance is usually 60-70% or higher (Gruber and Poterba, 1994; Gruber, 2001). It

take up supplementary health insurance.

[28] 13% is the ownership rate among individuals included in the regression with full controls, which does not include those with missing values for one or more control variables or the self-employed individuals excluded from the regressions. The 12% ownership rate for itemizers reported in Table 1 does not drop these individuals.

is possible that responsiveness to price changes would be much weaker if the market for LTC insurance were as nearly satiated.

[Table 6 approximately here.]

An additional concern with the tax price regressions is that income determines marginal tax rate and may also influence LTC purchasing decisions, meaning that failing to completely control for income may bias estimates of γ_1. We experiment with different approaches to modeling the income effect, including linear, polynomials up to the fifth power, and a set of dummies for 5-percentile groups. Our findings are very robust to all approaches, so we only present the results from the linear specification.

A final concern with our elasticity estimates is that we ignore the state tax incentives installed in some states. However, we do not expect that these are as important as the federal incentive since state income tax rates are much lower than the federal ones. Moreover, omitting them should not systematically bias our results in a particular direction.

VI. Net fiscal impact of the tax subsidy

In this section, we evaluate the net fiscal impact of implementing the tax incentive on LTC insurance in HIPAA. From a pure fiscal point of view, the cost to the government is the loss in tax revenue, while the saving is the reduction in Medicaid LTC expenditures. We develop equations for the cost and saving and calibrate the model using parameters imputed from the HRS and AHEAD cohorts of the HRS as well as from the existing literature. We find that the loss in tax revenue exceeds the savings on Medicaid funds by almost $150 per senior, using conservative estimates of the former and possibly exaggerated estimates of the latter.

1. Loss in tax revenue

We begin by estimating the loss in tax revenue resulting from the tax incentive. The loss in tax revenue is the expected total tax subsidies to be granted to those eligible, the medical

itemizers who own LTC insurance. It therefore equals the discounted sum of expected annual tax subsidies among the medical itemizers who own LTC insurance, multiplied by the probability of an individual being a medical itemizer and owning a policy. Formally, a representative senior who purchases a LTC insurance policy in the base year t=0 and holds it for T years can expect to receive a total tax subsidy S of

$$S = \sum_{t=0}^{T} \frac{\tau X (1+x)^t P(L) P(I)}{(1+r)^t}$$

where τ is the marginal tax rate and X is the annual premium for medical itemizers who own LTC insurance, with an annual real growth rate of x. $P(I)$ is the probability of itemizing medical expenses. $P(L)$ is the probability of owning LTC insurance among the medical itemizers, and r is the discount rate.

We obtain parameter values as follows. We assume τ=*0.21*, X=*\$2063*, $P(L)$=*0.19*, and $P(I)$=*0.16* based on the weighted sample averages in the post-treatment periods from the HRS cohort.[29] We also assume x=0.029.[30] We further assume T=17, i.e. an individual holds LTC insurance for 18 years.[31] Throughout our analysis in this section, we use a discount rate of 0.03.[32]

The resulting tax subsidy per senior is therefore

$$S = \sum_{t=0}^{17} \frac{0.21 * 2063 (1+0.029)^t * 0.19 * 0.16}{(1+0.03)^t} = 235.12$$

Implementing the tax incentive therefore costs the government approximately \$235 per senior in foregone tax revenue.

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[29] 0.21 is the average marginal tax rate for the medical itemizers who own LTC insurance. \$2,063 is the average annual LTC insurance premium paid by medical itemizers, excluding individuals paying a zero premium or an annual premium above \$50,000. 0.19 is the average ownership rate of LTC insurance among medical itemizers, 0.16 is proportion of medical itemizers in the sample.

[30] The average real growth rate of nursing homes costs over the period 2002-2007 is 0.029, according to Metlife's annual nursing home costs surveys (authors' calculation) (Metlife 2002, 2003, 2004, 2005, 2006, and 2007). Since premiums ultimately reflect the expected costs multiplied by a loading factor, they should grow at a similar rate as costs if we assume a constant probability of utilization and loading factor.

[31] In the AHEAD cohort, the average LTC insurance owner purchases a policy at age 65, and the average age to use a nursing home is 83. These numbers are similar to the corresponding estimates in HIAA (2000) and Brown and Finkelstein (2006). Also note that many LTC insurance policies carry waivers to allow the policyholders to stop paying premiums once they start receiving benefits,

[32] The average real interest rate on treasury notes and bonds with a 10-year maturity is 0.027 over 2004-2008 and that of those with a 20-year maturity is 0.034 (OMB 2008).

2. Savings on Medicaid funds.

We next estimate the savings in Medicaid expenses that would result from the increased take-up of private LTC insurance due to the tax incentive. Medicaid's LTC expenditures *M* for a representative senior are equal to her expected lifetime nursing home expenses if she claims Medicaid LTC benefits, minus the income and assets that she has to spend down before qualifying for Medicaid:[33]

$$M = P(N)P(M)(C - A - I)$$

where *P(N)* is the probability of ever using a nursing home conditional on reaching age 65. *P(M)* is the probability of receiving Medicaid LTC benefits conditional on utilizing nursing home services. *C* is the expected lifetime cost of nursing home stays conditional on utilization, and *A* and *I* are the amount of assets and income that a senior would have to spend down.

The expected lifetime cost of nursing home services conditional on utilization is

$$C = \sum_{t=T+1}^{T+n} C_0 \frac{(1+p)^t}{(1+r)^t}$$

where *n* is the number of years of nursing home stays needed, C_0 is the annual cost of stays measured at t=0, and *p* is the annual growth rate in the real price of care.

An individual has to spend down her income and assets beyond the income and asset disregards allowed by the government before Medicaid begins to pay. Since disregards differ substantially on the basis of marital status (apart from state of residence, and income and asset levels at the time of application), we calculate the amount of assets and income that a representative senior has to spend down, weighted by marital status, to be

$$A = \frac{P(S)\max(0, A_{0S} - A_S) + (1 - P(S))\max(0, A_{0M} - A_M)}{(1+r)^{T+1}}$$

$$I = \sum_{t=T+1}^{T+n} \frac{P(S)\max(0, I_{0S} - I_S) + (1 - P(S))\max(0, I_{0M} - I_M)}{(1+r)^t}$$

[33] For simplicity, we ignore other LTC expenses like home health benefits covered by Medicaid and most private LTC insurance given that these other expenses are much smaller than the nursing home expenses.

where $P(S)$ is the probability of being single at the time of entering a nursing home. A_{0S} and A_{0M} represent the average asset levels for single and married individuals at the time when they apply for Medicaid.[34] A_S and A_M are the asset disregards allowed for a single and married individual. The corresponding parameters for income spend-down are similarly defined.

Medicaid's savings after implementing the tax incentive are therefore:

$$M = -P(N)\Delta P(M)\left(\begin{array}{l}\sum_{t=T+1}^{T+n} C_0 \frac{(1+p)^t}{(1+r)^t} - \frac{P(S)\max(0, A_{0S} - A_S) + (1-P(S))\max(0, A_{0M} - A_M)}{(1+r)^{T+1}} \\ -\sum_{t=T+1}^{T+n} \frac{P(S)\max(0, I_{0S} - I_S) + (1-P(S))\max(0, I_{0M} - I_M)}{(1+r)^t}\end{array}\right)$$

We choose parameter values as follows. We set $P(M)=0.5$, the probability that a representative senior would rely on Medicaid to pay for her nursing home expenses conditional on utilization (Norton, 2000). $\Delta P(M)$, the change in this probability as a result of the tax incentive, is equal to the increased probability that a senior takes up LTC insurance due to the tax incentive, multiplied by the probability that she would have to rely on Medicaid otherwise. $\Delta P(M)$ therefore is equal to $\Delta P(L)P(I)P(M)$. In Section III, we estimate that the tax incentive increased $P(L)$ by 0.033 for the 16% of seniors who itemized medical expenses. We therefore set $\Delta P(M)$=0.033*0.16*0.5=0.00264. We further assume a uni-sex probability of a 65-year old ever having a nursing home stay to be 0.36 and an average length of stay conditional on utilization to be 1.7 years, which we round to 2.[35] We assume an annual cost C_0 of $41,756 and a real price growth rate p of 0.04.[36, 37]

[34] Our use of income and asset levels at the time of application is reasonable if seniors do not transfer or hide assets in anticipation of applying for Medicaid benefits, or if Medicaid does not catch them doing so. To our knowledge, there is no reliable evidence for either. We however acknowledge that these are strong assumptions.

[35] The probability of ever using a nursing home is 0.44 for a 65 year-old female and the average length of stay is two years; the corresponding numbers for a male are 0.27 and 1.3 years (Brown and Finkelstein 2006). The uni-sex utilization probability that we use is the average of the utilization probabilities of the two genders, weighted by the proportions of the two genders in the population in 2016, the time when a typical individual in the HRS cohort would utilize nursing homes. The Census Bureau (2004) predicts that 53% of the population of age 65-69 would be female in 2016. The uni-sex length of stay is obtained similarly.

[36] The average price of a one-year stay in a nursing home is $52,195 in 2002 (Metlife 2002). Since Medicaid on average reimburses about 80% of the market price, 80% of $52,192 gives $41,756. (Ideally, we would like to use the price in 2000, which is the base year of our calculation, if we could find a reliable price for that year.)

[37] Recall that the average real growth rate of nursing homes costs over the period 2002-2007 is 0.029 (see footnote 31). We use 0.04 to err on the side of overestimating the savings.

We estimate the other income and asset parameters using data from the AHEAD cohort. Married individuals had a mean income of $21,085 and non-housing wealth of $59,672 prior to entering a nursing home while single individuals had a mean income of $8,859 and non-housing wealth of $1,253. We assign these values to I_{0M}, A_{0M}, I_{0S}, and A_{0S}.[38] 70% of nursing home residents in the AHEAD cohort were single the year before entering, so $P(S)$=0.7. We further set A_S=$2,000, A_M=$82,468, I_S=$960, I_M=$24,000, reflecting the federal maximum income and asset disregards when an individual applies for Medicaid benefits (Brown and Finkelstein, 2006).

Medicaid's savings is therefore

3. Discussion

The tax incentive therefore leads to a net revenue loss of $144 per senior, the difference between the loss in tax revenue of $235 and the savings on Medicaid funds of $91. An extrapolation of our estimates suggests that an above-the-line tax deduction would lead to an even larger net revenue loss of $898 per senior.[39]

This calculation may actually understate the net loss for several reasons. First, we assume a real price growth of nursing home stays of 0.04. If we instead use 0.03, which is the actual growth rate in the real price of care averaged over 2002-2007, the net loss becomes $160 per senior. Second, we use non-housing wealth when calculating the assets that individuals must spend down. Total wealth including housing asset is substantially higher: $197,452 for the married or $18,012 for the single. Using total wealth instead of non-housing wealth leads to a larger net loss of $172.[40] Third, we use the federal maximum income and asset

[38] We assume that the HRS and AHEAD cohorts have similar average income and asset levels at the old age of using nursing homes, even though we realize that actual income and asset accumulation patterns may be different across cohorts.

[39] For the above-the-line deduction, we drop the probability of being a medical itemizer of 0.16 from both the cost and savings calculations.

[40] Note that some states put a lien on the housing wealth of Medicaid LTC beneficiaries (Brown and Finkelstein, 2006). This means at least for these states, the relevant asset parameter should be the total wealth

disregards. This overstates the savings as the actual amount that an individual (or her spouse) can keep could be considerably lower than the federal allowances, depending on her state of residence and initial income and asset levels. Using the most stringent state allowances (A_M=\$16,824, A_S=\$1,500, I_M=\$16,884, and I_S=\$360) causes the net loss to become \$155. Finally, we round the average 1.7 year utilization length to 2 years, which again overstates the savings.

We also calculate the values of some of the key parameters needed for the savings of the tax incentive to equal the costs and find that they appear unlikely. For example, fixing other parameters, the real annual growth rate of nursing home costs would have to be 9%. Such a real price growth persistently over a long period of time is quite unlikely. Alternatively, the tax incentive would lead to equal costs and savings if the probability of a senior relying on Medicaid for nursing home services rises to higher than one, which is impossible.

That said, our analysis relies on a number of strong assumptions about individual behaviors as well as parameter values. Nonetheless, the robustness of our result suggests that the government is unlikely to achieve fiscal balance when using tax incentives to stimulate the private market and ease the burden of LTC expenses on Medicaid.

VII. Conclusion

In this paper, we examine the impact of the favorable tax treatment in the Health Insurance Portability and Accountability Act of 1996 on individuals' LTC insurance purchasing decisions. We estimate that the tax incentives prescribed in HIPAA induced those eligible for the tax treatment to increase their probability of taking up LTC insurance by 3.3 percentage points, or 25% from the baseline. We therefore conclude that people did respond to the tax incentive prescribed in HIPAA. However, this tax incentive did not substantially increase the total market size for private LTC insurance. Moreover, our estimates imply that an above-the-line deduction would only expand the ownership rate of

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instead of the non-housing wealth.

LTC insurance among the elderly to 13%, if we assume similar responses to tax incentives from the general population.

We also found that the demand for LTC insurance is very price elastic, with a price elasticity of around -3.9 when the overall ownership rate of LTC insurance is low. Finally, we find that the loss in tax revenue from granting the tax incentive exceeds the reduction in Medicaid expenditures, suggesting that from a fiscal point of view, it is not cost-effective to use tax subsidies to expand the private LTC insurance market.

Limitations of our analysis provide directions for future research. Estimating elasticity using a more refined measure of individuals' federal marginal income tax rates may prove fruitful. Additionally, future research could examine the effectiveness of state-level incentives in promoting the private LTC insurance market.

References

Abt Associates, 2001. Financing long-term care for the baby boom generation. HSRE working paper 8, May 2001, prepared by Pizer, S., Frakt, A., and Decker, F.

American Academy of Actuaries, 2001. Federal tax incentives for long-term care insurance: actuarial issues and public policy implications. Issue brief, summer 2001.

Brown, J., Finkelstein, A., 2006. The interaction of public and private insurance: Medicaid and the long-term care insurance market. Forthcoming, American Economic Review.

Brown, J., Finkelstein, A., 2007. Supply or demand: why is the Market for long-term care insurance so small? Forthcoming, Journal of Public Economics.

Brown, J., Coe, N., Finkelstein, A., 2007. Medicaid crowd-out of private long term care insurance demand: evidence from the Health and Retirement Survey. Forthcoming, Tax Policy and the Economy.

Bureau of Labor Statistics, 2004. Long-term care insurance gains prominence, Jordon Pfuntner and Elizabeth Dietz, available at http://www.bls.gov/opub/cwc/print/cm20040123ar01p1.htm

Census Bureau, 2004. Projected population of the United States, by age and sex: 2000 to 2050. March 2004, available at www.census.gov/ipc/www/usinterimproj/natprojtab02a.pdf

Congressional Budget Office (CBO), 2004. Financing long-term care for the elderly. April 2004.

Cutler, D., 2002. Health care and the public sector. In: Auerbach, A., and Feldstein, M. (Eds.). Handbook of Public Economics, Vol 4. North-Holland, 2143-2243.

Finkelstein, A., McGarry, K., 2006. Multiple dimensions of private information: evidence from the long-term care insurance market. American Economic Review 96(4): 938-958.

Gouveia, M., Strauss, R., 2004. The U.S. individual income tax and the medical expense deduction. Paper for presentation at the National Tax Association 97th Annual Conference on Taxation, November 2004.

Gruber, J., 2001. The impact of the tax system on health insurance coverage. International Journal of Health Care Finance and Economics: Why do Employers Do What They Do? Studies of Employer Sponsored Health Insurance 1(3): 293-304.

Gruber, J., Poterba, J., 1994. Tax incentives and the decision to purchase health insurance: evidence from the self-employed. The Quarterly Journal of Economics 109(3):701-733.

Health Insurance Association of America (HIAA), 2000. Who buys LTC insurance in 2000? Available at www.ahipresearch.org/pdfs/17_WhoBuysLTCI2000.pdf

Joint Committee on Taxation, 2001. Description of federal tax rules and legislative background relating to long-term care. Scheduled for a public hearing before the Senate Committee on Finance, March 26, 2001.

Kaiser, 2006a. Medicaid and long-term care services, Kaiser Commission on Medicaid and the uninsured. July 2006. Available at http://kaiserfamilyfoundation.org/medicaid/upload/Medicaid-and-Long-Term-Care-Services-PDF.pdf.

Kaiser, 2006b. The Medicaid program at a glance, Kaiser Commission on Medicaid and the uninsured. May 2006. Available at www.kff.org/medicaid/upload/7235-02.pdf

Leuven, E., Sianesi, B., 2003. PSMATCH2: Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing. http://ideas.repec.org/c/boc/bocode/s432001.html. Version 3.0.0.

Metlife, 2002. Metlife market survey on nursing home and home care costs 2002. April 2002. Available at www.metlife.com/WPSAssets/171570886210273653 80V1FPDF1.pdf

Metlife, 2003. Metlife market survey on nursing home & home care costs. August 2003. Available at www.metlife.com/WPSAssets/165828858111060646 31V1FNursing%20Home%20Home%20Care%20Costs.pdf

Metlife, 2004. Metlife market survey on nursing home & home care costs. September 2004. Available at www.metlife.com/WPSAssets/165828858111060646 31V1FNursing%20Home%20Home%20Care%20Costs.pdf

Metlife, 2005. The Metlife market survey of nursing home and home care costs. September 2005. Available at www.metlife.com/WPSAssets/165828858111060646 31V1FNursing%20Home%20Home%20Care%20Costs.pdf

Metlife, 2006, The Metlife market survey of nursing home & home care costs. September 2006. Available at www.metlife.com/WPSAssets/1875695828115945597 5V1F2006NHHCMarketSurvey.pdf

Metlife, 2007. The Metlife market survey of nursing home & assisted living costs. October 2007. Available at www.metlife.com/FileAssets/MMI/MMIStudies2007NHAL.pdf

Mortgage-X, 2007. Available at http://mortgage-x.com/x/ratesweekly.asp

Norton, E., 2000. Long-term care. In: Culyer, A.J., and Newhouse, J.P. (Eds.). Handbook of Health Economics, Vol. 1B. North-Holland, 956–994.

Office of Management and Budget (OMB), 2008. Budget Assuptions. Available at http://www.whitehouse.gov/omb/circulars/a094/dischist.pdf

Schaffer, M., Stillman, S., 2007. xtivreg2: Stata module to perform extended IV/2SLS, GMM and AC/HAC, LIML and k-class regression for panel data models. Available at http://ideas.repec.org/c/boc/bocode/s456501.html.

Table 1 Summary Statistics

Variable Name	Entire Sample	Medical Itemizers	Non-Medical Itemizers	Difference
LTC Insurance	0.105	0.120	0.103	0.017
	(0.004)	(0.009)	(0.005)	(0.010)*
Medical Itemizer	0.134	-	-	-
	(0.006)			
Majority Itemizer	0.010	-	-	-
	(0.005)			
Itemizer	0.496	-	-	-
	(0.011)			
Self-Employed	0.127	0.206	0.114	0.092
	(0.004)	(0.133)	(0.004)	(0.014)***
Marginal Tax Rate	0.232	0.248	0.229	0.019
	(0.002)	(0.003)	(0.002)	(0.003)***
Household Income	71,580	85,299	68,918	16,381
	(2,129)	(4,215)	(2,144)	(4,244)***
Household Wealth	360,431	514,174	335,494	178,680
	(14,322)	(52,775)	(13,700)	(53,599)***
Married	0.750	0.816	0.739	0.077
	(0.006)	(0.014)	(0.007)	(0.016)***
Male	0.476	0.477	0.476	0.002
	(0.004)	(0.012)	(0.004)	(0.0132)
White	0.867	0.882	0.863	0.018
	(0.007)	(0.010)	(0.008)	(0.009)**
Age 55-60	0.484	0.489	0.483	0.006
	(0.005)	(0.014)	(0.006)	(0.016)
Age 60-65	0.420	0.425	0.419	0.006
	(0.006)	(0.015)	(0.007)	(0.167)
Age 65-70	0.052	0.049	0.052	-0.003
	(0.002)	(0.007)	(0.002)	(0.007)
Age over 70	0.001	0.001	0.001	-0.000
	(0.000)	(0.001)	(0.000)	(0.001)
High School Graduate	0.362	0.346	0.364	-0.018
	(0.007)	(0.017)	(0.008)	(0.019)
Some College	0.194	0.241	0.186	0.055
	(0.006)	(0.133)	(0.007)	(0.015)***
College Graduate	0.198	0.253	0.190	0.063
	(0.009)	(0.018)	(0.010)	(0.018)***
High Blood Pressure	0.379	0.395	0.378	0.017
	(0.006)	(0.015)	(0.006)	(0.014)
Diabetes	0.111	0.113	0.111	0.002
	(0.003)	(0.010)	(0.003)	(0.011)
Cancer	0.070	0.089	0.067	0.023
	(0.003)	(0.009)	(0.003)	(0.010)**
Heart Disease	0.141	0.151	0.139	0.012
	(0.005)	(0.013)	(0.004)	(0.013)
Arthritis	0.446	0.433	0.448	-0.015
	(0.007)	(0.019)	(0.008)	(0.021)
Spouse: High Blood Pressure	0.260	0.293	0.255	0.038
	(0.006)	(0.016)	(0.007)	(0.017)**
Spouse: Diabetes	0.075	0.099	0.070	0.029
	(0.003)	(0.010)	(0.003)	(0.010)*
Spouse: Cancer	0.055	0.081	0.051	0.030
	(0.003)	(0.008)	(0.003)	(0.007)***
Spouse: Heart Disease	0.105	0.139	0.099	0.040
	(0.003)	(0.010)	(0.003)	(0.012)***

Spouse: Arthritis	0.306 (0.007)	0.320 (0.015)	0.303 (0.007)	0.016 (0.016)
Bathe	0.030 (0.002)	0.038 (0.006)	0.029 (0.002)	0.009 (0.006)
Eat	0.015 (0.002)	0.017 (0.004)	0.014 (0.002)	0.003 (0.004)
Dress	0.063 (0.003)	0.062 (0.006)	0.063 (0.003)	-0.001 (0.009)
Walk	0.035 (0.002)	0.033 (0.005)	0.035 (0.002)	-0.002 (0.005)
Bed	0.048 (0.003)	0.043 (0.005)	0.049 (0.002)	-0.006 (0.006)
Toilet	0.026 (0.002)	0.029 (0.004)	0.026 (0.002)	0.003 (0.006)
Spouse: Bathe	0.019 (0.001)	0.029 (0.005)	0.017 (0.002)	0.011 (0.006)*
Spouse: Eat	0.011 (0.001)	0.018 (0.004)	0.010 (0.001)	0.008 (0.005)*
Spouse: Dress	0.038 (0.002)	0.048 (0.007)	0.036 (0.003)	0.012 (0.007)*
Spouse: Walk	0.021 (0.002)	0.026 (0.005)	0.020 (0.002)	0.006 (0.005)
Spouse: Bed	0.029 (0.002)	0.037 (0.007)	0.027 (0.002)	0.010 (0.008)
Spouse: Toilet	0.016 (0.001)	0.026 (0.005)	0.014 (0.002)	0.012 (0.005)**
Map	0.204 (0.008)	0.143 (0.010)	0.213 (0.008)	-0.070 (0.010)***
Phone	0.020 (0.002)	0.011 (0.003)	0.022 (0.002)	-0.011 (0.004)***
Money	0.049 (0.003)	0.046 (0.007)	0.049 (0.003)	-0.003 (0.008)
Medications	0.094 (0.006)	0.067 (0.007)	0.099 (0.007)	-0.031 (0.009)***
Shopping	0.076 (0.004)	0.072 (0.008)	0.077 (0.004)	-0.005 (0.008)
Meals	0.067 (0.003)	0.067 (0.008)	0.067 (0.003)	-0.000 (0.007)
Spouse: Map	0.132 (0.005)	0.126 (0.010)	0.133 (0.005)	-0.006 (0.013)
Spouse: Phone	0.016 (0.001)	0.017 (0.005)	0.016 (0.001)	0.002 (0.005)
Spouse: Money	0.036 (0.002)	0.039 (0.007)	0.035 (0.002)	-0.003 (0.007)
Spouse: Medications	0.063 (0.005)	0.064 (0.007)	0.063 (0.002)	-0.001 (0.009)
Spouse: Shopping	0.050 (0.003)	0.063 (0.010)	0.048 (0.003)	0.015 (0.011)
Spouse: Meals	0.053 (0.003)	0.064 (0.007)	0.052 (0.003)	0.013 (0.008)
Memory	2.933 (0.014)	2.842 (0.028)	2.947 (0.015)	-0.105 (0.029)***
Self-reported health condition	2.572 (0.021)	2.510 (0.046)	2.582 (0.022)	-0.073 (0.049)
Spouse: self-reported health condition	1.838 (0.021)	2.050 (0.044)	1.80 (0.024)	0.025 (0.053)***

Notes: Based on wave 1996 of the HRS cohort. The first three columns report means and standard deviations. The last column reports the mean differences between medical itemizers and medical non-itemizers, with corresponding standard errors. *** indicates a difference statistically significant at the 1% level; ** 5% level; * 10% level. The statistics are weighted by HRS individual sampling weights of 1996.

Table 2 Difference-in-Differences Regressions

Dependent variable=LTC insurance ownership
Treatment group=fully-treated treatment group

	Fully treated treatment group				Possibly treated	Partially treated	Generally treated
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment *Post	0.029 (0.014) **	0.027 (0.014)*	0.033 (0.015)**	0.037 (0.015)**	0.003 (0.010)	0.007 (0.032)	0.028 (0.014)**
Household Income	-	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.001)	0.000 (0.000)
Household Wealth	-	0.000 (0.000)*	0.000 (0.000)*	0.000 (0.000)**	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)**
Married	-	0.022 (0.016)	0.017 (0.026)	0.017 (0.027)	-0.019 (0.025)	-0.006 (0.030)	0.013 (0.027)
Age 55-60	-	-0.037 (0.028)	-0.045 (0.030)	-0.047 (0.030)	-0.033 (0.029)	-0.026 (0.033)	-0.035 (0.030)
Age 60-65	-	-0.057 (0.030)*	-0.068 (0.032)**	-0.069 (0.033)**	-0.053 (0.031)*	-0.051 (0.036)	-0.063 (0.033)*
Age 65-70	-	-0.036 (0.034)	-0.045 (0.036)	-0.044 (0.037)	-0.039 (0.035)	-0.038 (0.040)	-0.047 (0.037)
Age Over 70	-	-0.041 (0.038)	-0.046 (0.041)	-0.045 (0.041)	-0.047 (0.039)	-0.037 (0.046)	-0.046 (0.042)
High Blood Pressure	-	-	0.020 (0.012)	0.021 (0.012)	0.011 (0.011)	0.014 (0.013)	0.014 (0.012)
Diabetes	-	-	0.002 (0.017)	-0.001 (0.018)	0.006 (0.013)	0.006 (0.019)	-0.008 (0.018)
Cancer	-	-	-0.033 (0.016)*	-0.037 (0.017)**	-0.035 (0.015)**	-0.022 (0.018)	-0.022 (0.016)
Heart Disease	-	-	-0.012 (0.016)	-0.012 (0.017)	0.002 (0.013)	-0.017 (0.018)	-0.013 (0.017)
Arthritis	-	-	0.021 (0.012)*	0.021 (0.013)	0.011 (0.011)	0.012 (0.014)	0.013 (0.013)
Spouse: High Blood Pressure	-	-	-0.018 (0.013)	-0.021 (0.013)	-0.015 (0.012)	-0.006 (0.015)	-0.014 (0.013)
Spouse: Diabetes	-	-	0.002 (0.019)	0.000 (0.019)	0.000 (0.017)	0.009 (0.022)	0.016 (0.019)
Spouse: Cancer	-	-	0.036 (0.019)*	0.038 (0.019)**	0.026 (0.019)	0.026 (0.023)	0.030 (0.020)
Spouse: Heart Disease	-	-	0.011 (0.017)	0.014 (0.018)	0.025 (0.016)	0.001 (0.020)	0.006 (0.018)
Spouse: Arthritis	-	-	0.006 (0.014)	0.006 (0.014)	0.004 (0.014)	0.010 (0.016)	0.010 (0.014)
Bathe	-	-	-0.037 (0.020)	-0.034 (0.021)	-0.015 (0.014)	-0.017 (0.024)	-0.021 (0.020)
Eat	-	-	-0.002 (0.025)	0.030 (0.026)	-0.013 (0.018)	-0.017 (0.027)	-0.005 (0.024)
Dress	-	-	-0.004 (0.014)	-0.009 (0.015)	0.010 (0.010)	0.007 (0.017)	-0.007 (0.014)
Walk	-	-	0.008 (0.019)	-0.016 (0.019)	0.001 (0.012)	0.008 (0.022)	-0.002 (0.019)
Bed	-	-	0.020 (0.018)	0.026 (0.020)	0.008 (0.011)	0.017 (0.020)	0.022 (0.017)
Toilet	-	-	-0.031 (0.019)	-0.027 (0.021)	-0.009 (0.013)	-0.045 (0.022)**	-0.029 (0.020)
Spouse: Bathe	-	-	-0.010 (0.023)	-0.011 (0.024)	-0.018 (0.019)	-0.030 (0.027)	-0.020 (0.023)

Spouse: Eat	-	-	-0.030	-0.034	0.019	0.018	-0.016
			(0.029)	(0.033)	(0.024)	(0.033)	(0.028)
Spouse: Dress	-	-	0.020	0.019	0.021	0.040	0.022
			(0.018)	(0.019)	(0.017)	(0.023)*	(0.019)
Spouse: Walk	-	-	0.017	0.014	0.019	0.014	0.018
			(0.019)	(0.023)	(0.019)	(0.029)	(0.023)
Spouse: Bed	-	-	0.011	0.014	0.011	0.028	0.008
			(0.021)	(0.022)	(0.019)	(0.027)	(0.023)
Spouse: Toilet	-	-	0.009	0.016	-0.024	-0.019	0.007
			(0.023)	(0.025)	(0.020)	(0.030)	(0.025)
Map	-	-	-0.008	-0.009	-0.007	-0.014	-0.010
			(0.010)	(0.010)	(0.008)	(0.011)	(0.010)
Phone	-	-	0.001	-0.007	-0.020	0.006	-0.009
			(0.011)	(0.021)	(0.013)	(0.020)	(0.019)
Money	-	-	0.014	0.014	0.004	0.004	0.016
			(0.014)	(0.015)	(0.013)	(0.016)	(0.014)
Medications	-	-	0.020	0.023	0.024	0.009	0.010
			(0.016)	(0.017)	(0.014)*	(0.018)	(0.016)
Shopping	-	-	0.008	0.012	-0.002	0.009	0.002
			(0.014)	(0.015)	(0.011)	(0.016)	(0.014)
Meals	-	-	0.005	0.011	-0.000	-0.005	0.010
			(0.012)	(0.013)	(0.010)	(0.015)	(0.013)
Spouse: Map	-	-	0.007	0.007	-0.005	0.004	0.008
			(0.011)	(0.011)	(0.010)	(0.012)	(0.011)
Spouse: Phone	-	-	-0.019	-0.023	-0.008	-0.006	-0.002
			(0.022)	(0.022)	(0.016)	(0.026)	(0.022)
Spouse: Money	-	-	-0.012	-0.011	-0.007	-0.021	-0.011
			(0.016)	(0.016)	(0.015)	(0.019)	(0.016)
Spouse: Medications	-	-	0.008	0.004	0.006	0.012	0.009
			(0.019)	(0.019)	(0.017)	(0.021)	(0.019)
Spouse: Shopping	-	-	0.004	0.005	-0.010	-0.005	-0.002
			(0.016)	(0.016)	(0.014)	(0.018)	(0.016)
Spouse: Meals	-	-	-0.003	-0.004	-0.009	-0.011	-0.009
			(0.014)	(0.015)	(0.014)	(0.017)	(0.015)
Memory	-	-	-0.004	-0.006	-0.000	-0.000	-0.004
			(0.004)	(0.005)	(0.004)	(0.005)	(0.005)
Self-reported health condition	-	-	-0.003	-0.004	-0.000	0.000	-0.003
			(0.004)	(0.004)	(0.004)	(0.005)	(0.004)
Spouse: self-reported health condition	-	-	-0.001	-0.000	0.002	0.000	-0.001
			(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
# of observations	19,061	19,061	17,344	16,662	18,167	12,813	16,362
Adjusted R^2	0.401	0.402	0.403	0.406	0.401	0.407	0.408

Notes: Standard errors in parentheses. *** indicates statistically significant at the 1% level; ** 5% level; * 10% level. Individual and year fixed effects are included in all regressions. Observations are weighted using the HRS individual sampling weights of 1996. Self-employed individuals who did not itemize medical are excluded.

Table 3 Matching Estimation

Dependent variable=LTC insurance ownership
Treatment group=fully-treated Treatment Group

	First-difference	Kernel density matching			*k*-nearest neighborhood matching		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment *Post	0.034	0.033	0.033	0.032	0.035	0.017	0.019
	(0.016)**	(0.015)**	(0.015)**	(0.015)**	(0.020)*	(0.017)	(0.017)
Controls	full	full	full	full	full	full	full
# of observations	4,417	4,417	4,417	4,417	4,417	4,417	4,417
R^2	0.013	-	-	-	-	-	-

Notes: Standard errors in parentheses. *** indicates statistically significant at the 1% level; ** 5% level; * 10% level. Individual and year fixed effects are included in all regressions. Observations are weighted using the HRS individual sampling weights of 1996. Self-employed individuals who did not itemize medical are excluded. The STATA module psmatch2 by Leuven and Sianesi (2003) is used to implement the matching procedure.

Table 4 Falsification Tests

Dependent variable=LTC insurance ownership
Treatment group=fully-treated treatment group

	1992 and 1994	1992 and 1996	1994 and 1996	1992 and 1994-96
Treatment *Post	-0.010	-0.007	-0.010	-0.009
	(0.006)	(0.015)	(0.016)	(0.009)
Controls	Full	Full	Full	Full
# of observations	9,605	9,871	5,159	14,596
Adjusted R^2	0.235	0.125	0.196	0.186

Notes: Standard errors in parentheses. Individual and year fixed effects are included in all regressions. Observations are weighted using the HRS individual sampling weights of 1996. Self-employed individuals who did not itemize medical are excluded.

Table 5 Results for the Self-Employed and Majority Itemizers

Dependent variable=LTC insurance ownership

	Self-employed vs. non-self-employed non-medical itemizers			Itemized medical in majority of pre-treatment years as treatment group		
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment *Post	0.023	0.022	0.030	0.028	0.027	0.031
	(0.014)*	(0.014)*	(0.016)*	(0.015)*	(0.015)*	(0.015)**
Controls	-	partial	Full	-	partial	full
# of observations	18,805	18,805	16,960	26,389	26,389	24,149
Adjusted R^2	0.396	0.397	0.398	0.410	0.412	0.412

Notes: Standard errors in parentheses. *** indicates statistically significant at the 1% level; ** 5% level; * 10% level. Individual and year fixed effects are included in all regressions. Observations are weighted using the HRS sampling weights of 1996. In columns (1)-(3), non-self-employed individuals who were classified as "generally-treated," "partially-treated," or "possibly-treated" in the main analysis are excluded. In columns (4)-(6), individuals who are self-employed in the majority of years and did not itemize medical expenses in the majority of years are excluded.

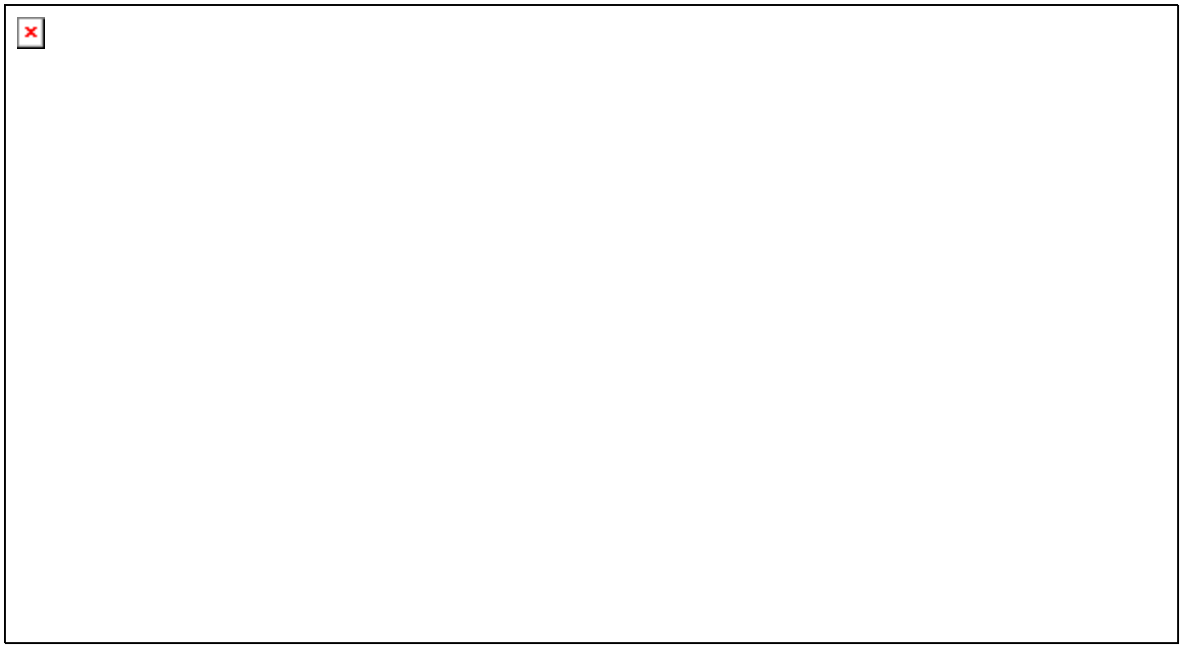
Table 6 Fixed Effects Tax Price Regressions

Dependent variable=LTC insurance ownership
Treatment group=fully-treated treatment group

	OLS	IV					
		(1)	(2)	(3)	(1) '	(2) '	(3) '
Tax Price	-0.221	-0.480	-0.447	-0.513	-0.469	-0.442	-0.503
	(0.050)***	(0.198)**	(0.198)**	(0.208)**	(0.198)**	(0.198)**	(0.205)**
Controls	full	-	partial	full	-	partial	full
p-value of overidentificaiton test	-	-	-	-	0.306	0.269	0.618
# of observations	17,269	17,975	17,975	16,316	17,924	17,885	16,289
Adjusted R^2	0.406	0.004	0.008	0.010	0.004	0.008	0.010

Notes: Standard errors in parentheses. *** indicates statistically significant at the 1% level; ** 5% level; * 10% level. Individual and year fixed effects are included in all regressions. Observations are weighted using the HRS individual sampling weights of 1996. Self-employed individuals who did not itemize medical are excluded. Regressions in Columns (1) '-(3) ' are estimated using the STATA module xtivreg2 (Schaffer and Stillman, 2007).

Figure 1 Ownership Rate of LTC Insurance by Medical Itemizing Status



Notes: Vertical bars indicate 95% confidence intervals; means and standard deviations are weighted using the HRS individual sampling weights of 1996.

Figure 2 Division of the Sample into Four Groups

<table>
<tr><td>ite_med96=1</td><td colspan="3">ite_med96=0</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">medexp>7.5% AGI

item96=0</td><td colspan="2">medexp<7.5% AGI</td></tr>
<tr><td colspan="2">medexp+LTCI>7.5%</td><td>medexp+LTCI<7.5%</td></tr>
<tr><td>Group 1</td><td>Group 2 (1)</td><td>item96=0

Group 2 (2)</td><td>item96=1

Group 3</td><td>Group 4</td></tr>
</table>

Notes: ite_med96 indicates whether an individual took medical expenses deductions in 1996; item96 indicates whether an individual took itemized deductions in 1996; medexp is the total unreimbursed medical expenses in 1996 and LTCI is the imputed hypothetical LTC insurance premium if an individual did not own a policy or is the actual amount of LTC insurance premium if she owned a policy in 1996 (for detailed definitions, see our online Appendix I at http://artsci.wustl.edu/~dhe).