Taxes and Fringe Benefits Offered by Employers

by

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Abstract

Using cross-sectional data for blue- and white-collar workers in U.S. metropolitan areas from 1980-1996, I build on Gentry and Peress (1994) in examining how the tax treatment of fringe benefits affects employers' decisions to offer benefits. The differences in state-level income taxes create variation in the tax incentive to offer fringe benefits. I find that marginal tax changes affect the probability of more less common fringe benefits being offered, such as pension plans and drug and alcohol treatment programs, principally for blue-collar workers. Taxes do not affect the offer of basic, ubiquitously offered medical and life insurance. Importantly, taxes are found to be a key determinant of the firm's decision to fully finance a plan, as opposed to offering the benefit as a cost-sharing plan. Higher income people are more likely to be offered benefits, even controlling for cost-of-living, suggesting that benefits are a normal good and refuting the compensating differential story.

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I. Introduction

Healthcare expenditures in the U.S. have been rising faster than GDP for the past 30 years: 16 percent of United States GDP in 2007 was spent on healthcare, an increase from 7 percent in 1970.[1] This number is projected to have increased to 17.6 percent in 2009.[2] The U.S. spends more per capita on healthcare annually – $7,800 in 2008 – than any country in the world.[3] Despite spending an increasing share of GDP on healthcare, many Americans lack access to care; forty-six million Americans are uninsured. This lack of access to insurance may actually contribute to the elevated spending because uninsured people often go to the high-cost emergency room for routine care. However, overinsurance through generous "Cadillac plans" is also blamed for driving up healthcare expenditures. These statistics flooded the news from 2009 to 2010, serving as reinforcement for the need to pass the most comprehensive healthcare reform bill ever.[4]

Thus, the U.S. spends a large amount of money on healthcare and a considerable portion of the healthcare system operates through the tax code. The U.S. tax code provides incentives for consumers to purchase medical insurance, life insurance; dental, vision and hearing care; drug and alcohol treatment programs and pension plans – among others – through the exclusion of employer-sponsored benefits. While it is well established that the tax exclusion encourages employers to offer health insurance, less is known about how the tax code affects the degree of generosity of the health plans that are offered; it is possible that the tax exclusion leads to

[1] (Kaiser Family Foundation, 2009a)
[2] (Kaiser Family Foundation, 2009b)
[3] (California Association of Health Plans, 2009)
[4] This paper was written during the 2009-2010 healthcare reform; a bill was finally passed in March 2010.

overinsurance.[5] This paper will examine the response of firms' decisions to offer health-related and non-health-related benefits to changes in tax policy.

Tax Exclusion of Employer-Sponsored Health Insurance, Life Insurance and Pension Plans[6]

The exclusion of employer-sponsored health and life insurance is the absence of taxation on employer payments towards the purchase of the insurance and on employee income in the form of insurance. The IRS states that all fringe benefits are taxable wages unless specifically excluded; health insurance is one of these specific exclusions, as is life insurance, so the value of the insurance benefit is excluded from federal payroll and income tax base. In addition to the exclusion, the cost of the premiums is deductible as a business expense for the employer should they choose to itemize their deductions. Employee contributions are only excluded if they work at a firm with a cafeteria plan: a plan that allows employees to choose between compensation that is taxable – wages – and nontaxable – health insurance, child care or life insurance. In this case employees take a salary reduction for benefits. Employer-sponsored plans were the form of health insurance used by 63 percent of Americans under 65 years of age in 2007.[7]

In addition to impacting the majority of Americans, this structure also costs the Federal government a substantial sum. The lost tax revenue due to the exclusion of employer-sponsored health insurance is estimated to be about $200 billion annually.[8] This number does not include the lost tax revenue due to non-health-related tax-free benefits such as life insurance and pension plans. Contributions to pension plans were estimated to be $126.7 billion worth of excludable

[5] As discussed in the Literature Review, Royalty, Gruber and Bernard and Selden have shown significant responsiveness to the tax code for the offer of health insurance.
[6] For the remainder of the paper "health insurance" will refer to all of the health-related benefits: medical, dental, vision, hearing and drug and alcohol treatment programs.
[7] (Gould, 2009)
[8] (Furman 2008, Buchmueller & Monheit, 2009)

income in 2010. The exclusion for life insurance premiums is very small in comparison to health and pension plans at an estimated $2.7 billion in 2010.[9] Overall, the tax exclusion for the ten fringe benefits that will be examined amounts to about $330 billion dollars annually with the majority of that coming from the exclusion for the various benefits that fall under the health insurance umbrella.

A common criticism of the exclusion for employer-sponsored health insurance is that the tax advantage is primarily used by higher income individuals or households. The regressive nature of the structure arises through two different channels. First, the dollar value of the health insurance being excluded would be taxed at the individual's personal marginal tax rate or, in the case of a married couple filing jointly, the household's marginal tax rate. A higher income individual has a higher marginal tax rate, so health insurance that is worth the same to a high-income and a low-income individual would be taxed more for the high-income individual. An example illustrates this well: Person A has a marginal tax rate of 35% and Person B has a marginal tax rate of 20%. They both work for the same company and receive health insurance that is worth $5,000. If they paid income tax on this benefit, Person A would pay $1,750 and Person B would pay $1,000. So the exclusion is worth more to people in higher marginal tax brackets. Put another way, higher income people *avoid* more tax as a result of the exclusion.

The second way the exclusion is not evenly distributed, as Mark Pauly (2009) points out, is through a selection bias. He writes, "higher income households…are more likely to have employment-based insurance, to have more generous coverage, and to live in areas with high medical care spending." Surprisingly, the exclusion can actually raise the after-tax price of health insurance for people with negative tax liability who receive the earned income tax credit.[10]

[9] (Joint Committee on Taxation, 2006)
[10] (Nichols and Rosenberg, 2008)

These studies provide evidence that the exclusion for employer-sponsored insurance, or any other employer-sponsored benefit, is more of an advantage to higher income people, both because they are more likely to have employer-sponsored insurance and because they would be paying more tax on the value of the insurance were it provided as a taxable benefit.

Pauly's idea brings up the interesting relationship between the cost and the benefit of insurance. In states with high healthcare costs, the premium will be more expensive for employers. But in these same states it is important to have insurance because out-of-pocket expenses would be very high. Thus high healthcare costs could discourage employers from offering health-related benefits because they are more expensive or it could encourage them to offer these benefits because employee demand is stronger for health-related benefits as opposed to wages or non-health-related benefits.

A second common criticism of the tax exclusion is that it creates job lock. Job lock occurs if employees who would prefer to change jobs, or might be more productive in another sector of the economy, stay in their current job so as not to lose benefits. In the case of job lock, workers are not in their most effective roles, and the economy is not producing up to its full potential. Jonathon Gruber and Brigitte Madrian (2004), reviewing the literature on health insurance and labor supply, state that a reasonable lower bound estimate of job lock is 10 percent and the upper bound estimates range from 25 percent to 35 percent. This means that roughly one in five people who want to move from job-to-job do not because they fear losing health insurance coverage. One-fifth of job transfers being prohibited by the linkage of health insurance to employers seems like it would have a large impact, yet Gruber (2008) estimates the welfare loss from job lock at only 0.1-0.2 percent of GDP. Gruber admits that his estimate is a "back of the envelope" calculation, but his estimate is in the same range as other literature

estimating welfare implications of lock job, as he points out. The clear result is that job lock does not severely hurt the economy. However, most of these studies have focused on the short run, ignoring long term productivity effects, and are trying to pick up a difficult thing to measure.[11] Further study is needed on the topic before much faith can be put in these estimates that the welfare effects of job lock are modest.

Despite the large loss of tax revenue, the skew towards higher income households and the job lock that result from the exclusion, the benefits must not be overlooked. The IRS ruled in the 1940s that employer-sponsored insurance is exempt from income taxation because it realized that there are certain advantages to employers sponsoring insurance for their employees, such as the incentive it provides for people to enroll.[12] As Pauly (2009) puts it, "because the tax exclusion applies only to medical spending covered by insurance payments, it provides a financial incentive to use insurance to cover the cost of care." In this way, the exclusion may reduce the number of uninsured in our country. Melissa Thomasson (2003) shows evidence in support of this in a paper examining survey data from 1952, just before health insurance became a widespread benefit due to post-war controls on wages, and from 1957, just after. She finds that the percentage of health insured people in the country went from 63 percent to 76 percent over this time period, and that the percentage of people insured through a group health insurance policy substantially increased from 47 percent to 66 percent. Therefore, the exclusion did increase both the total number of people with health insurance coverage and the number of people with employment-based coverage in the 1950s, but it is important to consider that the present insurance market has changed profoundly from the insurance market in the 1950s, and

[11] (Gruber and Madrian, 2004)
[12] (Helms, 2008)

the elimination of employment-based coverage would not necessarily mean a decrease in the number of insured today (see Abraham and Feldman for further discussion in the next section).

Another advantage of the exclusion is that it increases the size of the insurance pool within each company. Pooling reduces adverse selection, the perennial problem in the insurance industry. Adverse selection is the phenomenon that people know their risks better than the insurance company, and, therefore, only high-risk people purchase insurance. By providing substantial incentive for medium- and low-risk individuals and their dependents to join the company pool, the problem of adverse selection decreases. As Gould (2009) argues, "Employment-based insurance is effective because workplaces can pool large groups of people along dimensions unrelated to health, ensuring more predictable medical costs and allowing insurers to take advantage of the economies of scale." This is not to say that companies are the only suitable pooling mechanism; many of the proposals debated in Congress this past year centered around creating pooling mechanisms for the uninsured to drive down the cost of premiums for people not receiving employer-sponsored insurance. A public option run by the government and local insurance exchanges were two ideas for an alternative mechanism to create pools.

The Structure and Composition of Employee Benefits

Health insurance is the most common and essential benefit offered by employers, but it is far from being the only one. As mentioned above, 46 million Americans do not have health insurance, leaving roughly 258 million who are covered. There are many different types of health insurance, ranging from public programs sponsored by the government, to private

programs offered by employers, to private plans purchased by individuals.[13] In addition to basic medical insurance, many employers offer other health-related benefits such as dental, vision and hearing care; and drug and alcohol treatment programs. Outside of the health-related benefits realm, pension plans and life insurance are other types of benefits offered to employees. This section will explore the different types of coverage, their prevalence, and recent trends in the type of private health insurance coverage.

A major difference between the U.S. and other developed countries is that the U.S. government does not provide universal health insurance coverage as found in Australia, New Zealand, Ireland, United Kingdom, France and Canada. However, what appears to be a fundamentally different system has similarities because private health insurance exists in all of those countries in addition to government-provided coverage. In these cases, it is used for supplementary coverage and the contributions to cost-sharing plans – the only difference between this system and our own is who provides the primary coverage.[14]

Private health insurance accounts for the coverage of the 139.2 million Americans who are neither uninsured nor insured by the government. The great majority of private health insurance is sponsored by employers due to the tax exclusion for this benefit. Gruber and Madrian (2004) state that over 90 percent of people who are privately insured receive their coverage through their employment or the employment of a family member. Non employment-

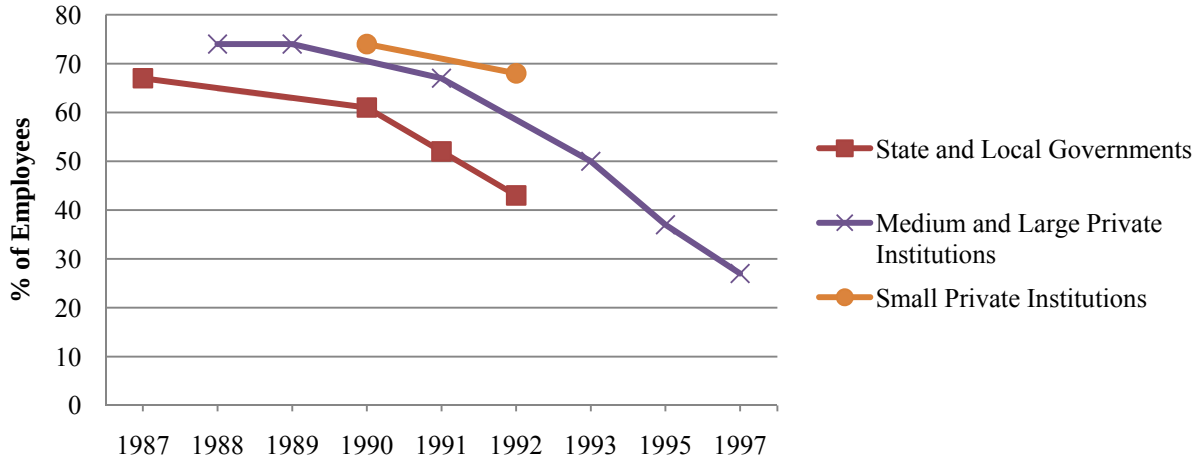
[13] Public health insurance currently covers three distinct groups within the U.S.: the elderly and disabled, the poor and the military. The elderly and disabled are covered by Medicare, which numbered 42.4 million people in 2005 and a projected 45.7 million people in 2009. Medicare is funded by federal taxes and is a cost-sharing program between the government and the subscriber. Medicaid covered 57.7 million low-income families and children in 2005 and a projected 64.2 million people in 2009. Medicaid is financed by the federal government and also, unlike Medicare, state and local governments which maintain sovereignty with respect to how they run the program. The Military Health System covers about 8.9 million people, including both active service members and veterans – the latter through the Veterans Health Administration. Members of the armed forces can choose between HMO, PPO or fee-for-service plans. Thus, public health insurance in 2009 covered an estimated 118.8 million people, or just over one-third of the U.S. population of 304 million.

[14] (OECD Health Project, 2005)

sponsored plans are available for private purchase and the premiums of these plans, like all others, are tax deductible. UnitedHealth Group, WellPoint and Aetna are currently the three largest private health insurance companies in the U.S..

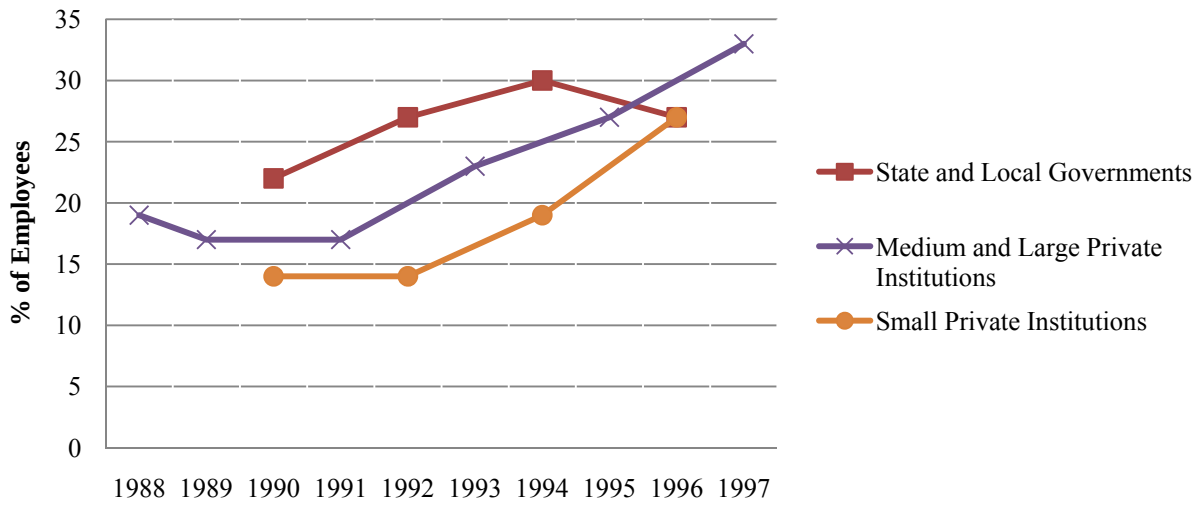
Irrespective of the type of plan – public or private – health insurance benefits can be composed a number of ways. The main division is between traditional indemnity insurance, also called fee-for-service, and managed care. Under fee-for-service plans, the insured person chooses to see any provider he or she wishes and claims reimbursement for the cost of the care received. These plans do involve cost-sharing but the amount of cost-sharing does not vary depending on the provider. Other than checks to see that the claims are part of the covered benefits, no attempt is made to manage care. Fee-for-service plans were dominant in the U.S. in the late 1980s, but since then have been declining as managed care options become more prevalent in an attempt to rein in high costs. The Bureau of Labor Statistics data compiled in Figure 1 shows this trend for medium and large private establishments, small private establishments and state and local governments.

Figure 1. Percent of Employees with Medical Care in Fee-for-Service Plans



Managed care puts more control in the hands of the insurers to contain cost through several channels. One such channel is through Health Maintenance Organizations (HMOs), which integrate insurance and the delivery of care by allowing the insured access to only a preapproved panel of providers. If people insured under the HMO seek treatment from a provider who is not in their plan, they will face a substantial deductible or co-payment. Another channel to contain costs is through preferred provider organizations (PPOs), which are very similar to HMOs except that they allow the insured to visit any doctor within their network without a referral from their primary care physician. The shift towards managed care plans shown in Figure 2 reflects growing awareness of the increasing cost of healthcare in the U.S..

Figure 2. Percent of Employees with Medical Care in Health Maintenance Organization Plans



The prevalence of fringe benefits increased during the second half of the twentieth century. Nonsalary compensation made up 10.2 percent of compensation for state and local

government employees and 11.5 percent for private sector employees in 1972. This grew to 36.7 percent of all compensation in 1982.[15] The National Association of Dental Plans estimated that 156 million Americans had dental insurance in 1999.[16] That number grew drastically in the preceding thirty years, transforming dental care from a rare fringe benefit into a common component of benefits packages. For example, the BLS data used for the data analysis in this paper show that, on average, 53 percent of employees were offered dental care as a benefit in 1980 and 73 percent were offered dental care in 1996, proving substantial growth in the popularity of dental care being offered as a benefit in this seventeen-year timeframe. However, despite the growth, this benefit is still more commonly offered by employers at larger companies. Besides dental care, all states have laws that require state-licensed health insurers to include coverage for mental health services and substance abuse treatment. My dataset shows that hearing and vision care coverage has also increased recently.

The recession of 2009-2010 may have reversed this trend of increasing benefits. In the past two years, seventeen states have cut benefits or increased the amount workers must contribute to their pension plans due to the recent drop in state and local tax revenue.[17] It is possible that the recession of the early 90s, a period covered in my dataset, decreased benefit offer rates as well. This recent decrease in benefit offering highlights the importance of controlling for economic conditions when dealing with time series analysis on benefits data.

[15] (Kemp, 1989)
[16] (Doheny, 1999)
[17] (Dougherty, 2010)

Practical Implications for Employees

While it is well established that employers take advantage of the tax exclusion and offer health insurance, life insurance and pension plans, what is not so clear is to what extent the offer of these benefits responds to changes tax policy. If a state lowered its marginal tax rate by 1 percent, would some employees in that state lose health insurance coverage? Keeping in mind that compensation should be understood as a package, would this drop in health insurance coverage result in higher wages? In the same vein, high-tax states might encourage more extensive types of coverage such as drug and alcohol treatment programs, hearing and vision care. Both this "bells and whistles" coverage and extensive fee-for-service medical plans are blamed by Congress for driving up our nation's healthcare costs.[18] This paper explores how health insurance and other fringe benefits respond to tax policy.

This study takes city-level data – sometimes state-level in sparsely populated places – as in Table 1, and regresses them on the state tax rate and other control variables. As seen in the table for 2008, there is substantial variation among the offer rates in different metropolitan areas across the U.S.. However, this table does not explain why so many more employees are offered retirement, medical and life benefits in the Atlanta-Sandy Spring-Gainesville area than in the rest of the nation. Are high taxes responsible for this? Perhaps there is a high participation in active unions that demand benefits. Likewise, Seattle-Tacoma-Olympia has a very high offer rate for medical care benefits, but there is no state income tax in Washington. Perhaps the cost of healthcare is very low in Washington State. Regardless, the example of Washington illustrates that taxes cannot explain everything. This table is a snapshot of the BLS tables from which the

[18] The health reform bill passed by Congress in March 2010 defined a high-cost (Cadillac) health plan based on the size of the premium. If a premium costs more than $10,200 for an individual or $27,500 for a family, insurers are subject to a 40% tax of the amount of the premium that exceeds these levels. This does not include stand alone vision or dental benefits, though the initial bill passed by the Senate did include vision and dental, the House amendment exempted them. (Gold, 2010)

data for this study were pulled. To understand the causal impact of the tax policy, we need to move beyond the aggregate numbers in Table 1.

Table 1. Local Area Benefit Access for 15 Metropolitan Areas, National Compensation Survey, December 2008[19]

Area	Retirement Benefits	Medical Care Benefits	Life Insurance
Atlanta-Sandy Springs-Gainesville, GA-AL	74*	84*	75*
Boston-Worcester-Manchester, MA-NH	60	73	58
Chicago-Naperville-Michigan City, IL-IN-WI	71	77	70*
Dallas-Fort Worth, TX	64	71	66
Detroit-Warren-Flint, MI	76*	80	70
Houston-Baytown-Huntsville, TX	66	76	63
Los Angeles- Long Beach-Riverside, CA	60*	70*	52*
Miami-Fort Lauderdale-Pompano Beach, FL		73	60
Minneapolis-St. Paul-St. Cloud, MN-WI		78	70
New York-Newark-Bridgeport, NY-NJ-CT-PA	63	75	60
Philadelphia-Camden-Vineland, PA-NJ-DE-MD		74	63
Phoenix-Mesa-Scottsdale, AZ	64	69	
San Jose-San Francisco-Oakland, CA	63	76	58
Seattle-Tacoma-Olympia, WA	71	84*	65
Washington-Baltimore-Northern Virginia, DC-MD-VA-WV	72	79	67
United States (March 2008)	66	74	62
*Indicates a statistically significant difference from the national estimate at a 90-percent confidence level			

[19] (U.S. Bureau of Labor Statistics, 2008) National estimate is not just based on these areas. The BLS has not released data on all fringe benefits for 2008 yet, so vision, hearing, dental and drug and alcohol treatment are not included.

II. Literature Review

Empirical Work

The work of Gentry and Peress (1994) serves as the building block for my analysis. They use regionally aggregated cross-sectional data from 1988-1992 that measures the fraction of workers in a region who are offered benefits. Medical and life insurance cost-sharing plans are included as well as dental, vision and hearing care; pension plans; and drug and alcohol treatment programs. Medical, life and pension plans that are entirely financed by the employer are also tallied. Variation in state tax rates is used to estimate the impact of taxes on the decision of employers to offer basic coverage and rarer "fringe" benefits. The tax variable is the 1990 state marginal tax rate in that region plus the federal marginal tax rate. They exclude metropolitan areas that span more than one state from their analysis because the tax data are on the state level and it is possible that employers offer benefits to employees that are taxed at different marginal tax rates in these areas.

Gentry and Peress find that the tax system encourages basic medical insurance plans and benefits that are more fringe for blue collar workers – the coefficient on the tax variable is positive and statistically significant for all of the benefits listed above except hearing care and drug and alcohol treatment programs. This same effect is not found for white collar workers, as the coefficient on the tax variable is not significant for any of the benefits offered. The important finding of Gentry and Peress is that taxes are important on both margins for blue-collar workers. Taxes affect the margin of an employer offering any coverage, as well as the margin of an employer offering additional benefits. These findings had important policy implications for the 1993 healthcare debate but they were also relevant to the 2009-2010 debate because many proposals aimed to reduce the number of "Cadillac plans" while increasing the number of

Americans with basic coverage.[20] Gentry and Peress show that eliminating the tax exclusion for employer-sponsored insurance will not achieve this goal as many employees would lose basic coverage if this happened. My analysis builds on the work of Gentry and Peress in four ways: I include a wage measure to allow consideration of the compensation package as a whole, add a cost-of-living measure, enlarge the dataset by including more years and weighting the tax rates in multistate metropolitan areas and compare the offer of tax-advantaged benefits to the offer of paid sick leave, a taxed benefit.

Abraham and Feldman's (2009) recent paper considers possible outcomes of the health insurance reform in Congress. They argue that the current situation with rising health insurance premiums and tax credits for individual plans could decrease employer's willingness to offer coverage. To predict the outcome if this indeed did happen, they simulate the take-up of individual health insurance policies if a worker were dropped from their employer-sponsored coverage. By using a binary regression with "Takeup" as the dependent variable, they find that the out-of-pocket premium is the most significant independent variable and therefore the most important factor for households deciding whether or not to purchase coverage. Based on these simulations, they estimate that between 69 percent and 77.4 percent of dropped workers would be willing to pay to take up individual coverage. This result underscores the importance of the tax exclusion for employer-sponsored health insurance because it implies that without such coverage one quarter of the people currently covered through it would not have health insurance.

Several economists since Gentry and Peress (1994) have contributed to the literature on how taxes affect offer rates of benefits. Abraham, DeLeire and Royalty (2009) examine health insurance offer rates at small companies. Data from the 2006 Medical Expenditure Panel Survey

[20] As stated above, a Cadillac plan is defined by the value of the premium; the House Amendment exempts dental and vision care.

(MEPS) show that there is an "offer gap" with respect to health insurance: 43 percent of workers in establishments with fewer than 50 workers were offered insurance, compared to 96 percent of workers in establishments with 50 or more workers. Three possible explanations have been discussed. The first is based on the observation that workers at small firms also earn lower wages in addition to having lower chance of being offered a benefit. Given that this is the case, workers at smaller firms might demand fewer benefits because their primary demand is for wage increases. The second explanation is that per-enrollee administrative costs are higher at smaller firms, and therefore make the offering of health insurance more expensive. The third explanation is that insurance market failures drive up the cost of premiums for small companies, making health insurance unaffordable; for example, adverse selection might make insurance premiums especially costly. This is an intuitively appealing explanation because the major advantage of employer-sponsored insurance is the pooling mechanism and this pool is much smaller at establishments with fewer people.

Abraham, DeLeire and Royalty seek to explain the reason for this offer gap by looking at offer rates of other benefits: retirement plans and paid vacation. Retirement plans and paid vacation are also more prevalent in larger establishments than small ones, making them a convenient basis of comparison. Offer rates increase with establishment size in the same way for both health insurance and retirement plans, which suggests that insurance market failures are not to blame for the offer gap. Offer rates increase with establishment size for paid vacation as well, but to a lesser degree than health insurance and pension plans. This result suggests that administrative costs are an explanation for the offer gap because the authors assume that the administrative costs associated with paid vacation are much smaller than offering health insurance or retirement plans. Adding wage controls to their difference-in-difference regression

did not substantially change estimated difference in offer rates for workers at small and large establishments, evidence against the demand story. Thus, the policy proposals that Abraham, DeLeire and Royalty recommend are those that lower administrative costs, such as the Massachusetts' Commonwealth Connector.

Anne Beeson Royalty (2000) replicates the use of state level tax rates seen in Gentry and Peress (1994) to measure the tax advantage of benefits in "Tax Preferences for Fringe Benefits and Workers' Eligibility for Employer Health Insurance." She bases every individual's tax rate on the median income. However, Royalty differs from Gentry and Peress (1994) in that she uses Current Population Survey (CPS) data, which are individual-level survey data. Her regressions are linear probability estimates and probits modeling the likelihood of a person being offered particular fringe benefits. Eighty-three percent of workers in the sample are eligible for and offered employer-sponsored health insurance, and 62 percent are eligible for and offered pension plans. She does find that higher marginal tax rates increase the likelihood of being offered health insurance with a coefficient of 0.009. This finding confirms Gentry and Peress (1994) for health insurance specifically and will be replicated by others in the literature discussed below. The most inventive part of Royalty's work is her comparison of a tax-advantaged fringe benefit – pension – with a taxable one – paid sick leave. She is the first economist to use this technique, which is important because it provides evidence that state-level unobservables are correlated with health insurance and paid sick leave. The coefficient on the pension variable is positive and the coefficient on paid sick leave is negative and insignificant, implying that there are not state-level unobservables that are creating a spurious relationship between taxes and the offer of benefits. This addition to the field ensures that the method of using tax rates to predict offer rates of benefits is a suitable one.

Jonathan Gruber uses a strikingly similar method in his 2001 "The Impact of the Tax System on Health Insurance Coverage," though he looked only at health insurance and did not consider other fringe benefits. Gruber employs benefits data from the CPS in 1988, 1993, 1995, 1997 and 1999 and tax data from TAXSIM with individuals as his unit of observation. The individual's state of residence recreates the state-to-state variation in tax rates used in Gentry and Peress (1994) and Royalty (2000). Gruber picks up on some time series effects, as well, because states changed the progressivity of their tax laws during this eleven-year span. Interestingly, only 79 percent of the workers in his dataset were offered health insurance. This is markedly lower than the percentage of workers offered medical insurance in my BLS-derived dataset, which is 96 percent, likely due to the inclusion of self-employed workers in his CPS data, whereas my BLS data is reported by firms, but also lower than Royalty's observation of 83 percent. Gruber's main finding is that a one percentage point increase in the tax price of health insurance – through lower taxes – would result in a 0.94 percentage point reduction in the chance that an employee is offered insurance. However, Gruber finds the dependent variable insurance offer and eligibility more appropriate because the firm's offer does not matter if the individual is not eligible – this coefficient is 0.74.[21] This translates to an elasticity of -0.648. Although his unit of observation is the individual, not the metropolitan area, Gruber shares much of his methodology with Gentry and Peress (1994), echoing that "tax policy matters for insurance coverage, but almost all of its influence is through the employer's decision to offer insurance," concurring that plan participation rates are less important to study. Given that the employer's decision is the crucial one, it is encouraging that he reinforces the finding that employers are sensitive to the tax price of health insurance benefits.

[21] Eligibility is self-reported and Gruber never defines how it is determined.

Another complementary paper on the topic was published by Bernard and Selden (2002): "Offers, Private Coverage, and the Tax Subsidy for Health Insurance: 1987 and 1996." Bernard and Selden follow in the tradition of the recent literature by examining the tax price elasticity of employer offers of health insurance, retirement plans and paid sick leave. Building on both Royalty (2000) and Gruber (2001), they use individual workers and families as their unit of observation. The benefits data come from the 1987 National Medical Expenditure Survey and the 1996 Medical Expenditure Panel Survey, and the tax data from TAXSIM. This dataset shows a higher rate of health insurance offers than Royalty (2000) or Gruber (2001), finding that 88.2 percent of employees were offered and eligible for private health insurance in both 1987 and 1996. 69 percent of workers were offered retirement benefits in 1987 and 64.5 percent in 1996. The main result is that a one percentage point increase in the tax price of health insurance decreases offer rates by 0.728 percentage points. This translates to an elasticity of -0.556, slightly smaller in absolute value than Gruber's estimate. While Bernard and Selden's work serves to roughly confirm the tax price offer elasticity found before them, it also follows the work of Royalty (2000) by examining other fringe benefits: retirement plans and paid sick leave. As discussed above, what makes these two benefits interesting as a source of comparison is that the tax exclusion applies to retirement plans but not to paid sick leave, so we would expect a weak or insignificant tax price elasticity for paid sick leave. This is in fact the case, as the coefficient on tax price is -0.728 and statistically significant to the 10 percent level for retirement plans and -0.243 and insignificant for paid sick leave. This confirms that the tax price variable in their equation is picking up tax effects and not state-specific demographic effects that might have been missed somehow by the fixed effects variables. Though Bernard and Selden use workers as the unit of observation, they point out that an employer's decision to offer insurance is reflective

of the preferences of a group of workers and this may not correlate perfectly with the individual worker's tax price. They believe this measurement error underestimates the tax price elasticity of offers, perhaps pointing the way for the next paper on the topic to use a larger unit of observation.

Royalty, Gruber and Bernard and Selden further the method first used by Gentry and Peress in 1994, confirming their finding that tax incentives affect the probability of basic benefits being offered. However, the focus of these three more recent papers and much of the other literature – as seen with Abraham and Feldman (2009) – is definitely on health insurance, without explicitly defining the components of the plans. Though offer rates of retirement plans are also found to respond to the tax incentive when they are contrasted with paid sick leave, rarer components of health insurance like hearing care and drug and alcohol treatment programs are largely ignored. These are the components of the "Cadillac" health plans that fuel Congressional debate. Additionally, all three of the recent papers use individual workers or families as their unit of observation, though this is a problematic approach because a firm's decision to offer insurance is a collective choice problem. Together the three papers leave open a spot in the literature for the study of the effects of the tax incentive on less common fringe benefits on a more aggregate level. What follows will fill this void in the literature by considering medical and life insurance; dental, vision and hearing care; pension plans, drug and alcohol treatment programs and paid sick leave at the level of cities or sections of states using tax rates constructed for a representative blue- or white-collar worker.

Theoretical Background

Firm- or individual-level data have been used in all of the existing literature that explores the effect of taxes on fringe benefits, creating a problem given the nature of a firm's decision to offer benefits. Gruber and Lettau (2004) point out that firm-level data do not allow observation of the characteristics of the workers to which the firm is responding with their offer decision, and randomly selected individual-level data give information about only that individual's demand, which might not be representative of all workers at the firm. Since different employees at the firm have different marginal tax rates, income, and consumption preferences, they will also have a different demand for fringe benefits; however, due to antidiscrimination statute the same health insurance must be offered to all eligible workers. Goldstein and Pauly (1976) described a firm's decision to offer benefits as a collective group choice problem with an outcome reached through two possible channels. The first option is for the collective choice to be made by a union or standard voting mechanism; it will, therefore, reflect the demand preferences of the median worker. The second possibility is that employers seek to minimize their total labor costs; in this case they compose their benefits packages to mirror the average preferences of their workers.

Gruber and Lettau in "How elastic is the firm's demand for health insurance?" (2004) build a theoretical model to explain how a firm would go about minimizing their labor costs. They start with a Cobb-Douglas utility function that expresses the preferences of each worker: C_i is the consumption of person i, and H is the quality of health insurance which, as mentioned above, cannot vary within the firm due to antidiscrimination rules.

$$U(C_i,H) = C_i^{\alpha}H^{1-\alpha}$$

The consumption element of the Cobb-Douglas equation is further modeled by the equation below: for the worker i Y_i is non-labor income, t_i is the tax rate and W_i is wage income.

$C_i = Y_i + (1-t_i)W_i$ [22]

It is easy to understand from this model that when H increases, W must decrease to maintain constant utility. This model also makes explicit the increase in H that will result from higher taxes; however, this increase in H will be in proportion consumption which, as shown above, is related to worker earnings. So workers with higher earnings will be willing to forego more consumption for the same increase in the quality of health insurance. Gruber and Lettau (2004) conclude that an average of tax rates weighted by worker earnings would be the most appropriate measure of demand due to the aggregate tax price that a firm faces. While Gruber and Lettau (2004) try this approach in their paper, they acknowledge that it is the unique feature of their dataset, which has information on different worker characteristics within a firm that allows them to do this.

The above sketches out a theoretical model within an average firm, but the nature of the decision to offer benefits can change from firm to firm. For this reason, Royalty (2000) and Gruber and Lettau (2004) include firm characteristics in addition to individual characteristics in their models because workers at smaller firms are considerably less likely to be offered health insurance than those at larger companies.[23]

In addition to the tax effect on the offer of fringe benefits that I hope to tease out, the inclusion of wage data and a cost-of-living measure allow for my results to be extended to

[22] $\delta Wi/\delta H = -(1-\alpha)Ci/[\alpha(1-ti)H]$ is the equation that follows in their model which shows the drop in W that leaves utility unaffected due to an increase in H.
[23] (Abraham, DeLeire and Royalty, 2009)

propose insights into compensation as a whole and how it varies from place-to-place. The Roback (1982) model, assuming zero moving costs, states that worker utility available in any city must be identical to the utility available elsewhere or people will move. In the context of my data, this means that worker utility must be equalized across the BLS survey area, be that a metropolitan area, part of a state or a state. Therefore, states with higher taxes should have either higher pre-tax wages, more benefits or a low cost-of-living. In one model I hold cost-of-living constant in an attempt to explore this compensating differential question. Preferences for the composition of a compensation package, pay versus benefits, differ according to an individual's marginal tax rate – the aggregate nature of my data will not offer much illumination on this point. Also important to consider are other factors in each place that effect demand for benefits, healthcare costs, for example, complicate this simple pay versus benefits choice. However, my results will either support or refute the Roback model of a compensating differential and either way reinforce the notion that compensation must be thought of as a package that includes pay and many different types of taxed and tax-advantaged benefits. Another way to explain this is that there are two possible effects higher wages can have on benefits. The positive effect is that as wages increase, demand probably becomes less elastic. The negative effect is that increasing wages shifts compensation away from benefits.

III. Data

The analysis uses three distinct types of data: pay and benefits data, tax data, and demographic data. The pay and benefits data come from the U.S. Department of Labor's Bureau of Labor Statistics (BLS). Information on the percentage of workers in a particular metropolitan area that are offered benefits comes from the *Area Wage Survey* for the years 1980-1990. The benefits of interest for this study are hospitalization, surgical, medical and life insurance; dental care and pension plans.[24] Beginning in 1991, the BLS changed the name of the survey to the *Occupational Compensation Survey*. In certain years the *Occupational Compensation Survey* only includes pay; these years are excluded and only years that have information on pay and benefits go into the dataset. The *Occupational Compensation Survey* is available online for years after 1992 on the BLS website; all prior years are paper copies or microfilms and should be available in libraries that are U.S. Government Depositories.

The BLS data are broken down by city or section of the state in the absence of a large city. For example, in the year 1982, Jacksonville, Florida is one of the observations, as is Northeast Pennsylvania. Also common in the surveys are observations for combined metropolitan areas such as Dallas-Fort Worth. However, multistate metropolitan areas also appear in the *Occupational Compensation Surveys*. For example, the year 1986 includes pay and benefits data for Davenport, Iowa-Rock Island, Illinois-Moline, Illinois, three of the cities on the border between Illinois and Iowa that are part of the Quad Cities. This type of multistate combined metropolitan area is problematic for the econometric analysis because the tax data are

[24] For hospitalization, surgical, medical and life insurance and pension plans, it is recorded if the plan is entirely financed by the employer (firm-financed medical, firm-financed life, firm-financed pension) or if it is a cost-sharing plan (medical, life, pension). In 1988, the format of the survey changed to include information on vision and hearing care benefits, which I include along with drug and alcohol treatment programs offer rates. Also in 1988, the BLS reported the hospitalization, surgical and medical insurance offer rates aggregated together instead of each reported separately as they had been previously. As there was rarely any difference between the offer rates of these three types of insurance in the years before 1988, the three are clumped together for consistency with the later years in the dataset.

for the state in which the employer is located. Similarly, largely commuter cities such as Washington, DC create measurement error in my tax price variable because it is possible that workers are being taxed by their state of residence, not the state in which they work. Governments of some states with multistate metropolitan areas have developed tax policy to deal with the tax avoidance issue that arises when someone lives in a low-tax state to avoid paying taxes in the high-tax state in which they are employed. Seventeen states have reciprocity agreements with at least one other state and sometimes with as many as seven.[25] A reciprocity agreement allows a person to pay taxes to his or her state of residence even though the income was earned in another state. However, in the absence of a reciprocity agreement, as in the case of New York City-Northern New Jersey-Long Island, workers pay income taxes to the state in which their employer is located and if the marginal tax rate is higher in the state of residence, they pay residual tax to that state as well.[26] Thus the absence of reciprocity agreements removes the economic incentive to live in a state with a lower tax rate.

There are fourteen multistate metropolitan areas with reciprocity agreements in my sample. They are Davenport-Rock Island-Moline, Minneapolis-St. Paul, Louisville, Wilmington, Chicago-Gary-Kenosha, Pawtucket-Woonsocket-Attleboro, Washington DC, Cincinnati, Lawrence-Haverhill, Wichita Falls-Lawton-Altus, Lower Eastern Shore, Hagerstown-Cumberland-Chambersburg, Northeastern Tennessee-Western Virginia and Evansville-Clarksville-Hopkinsville-Owensboro-Bowling Green. Some of these multistate metropolitan areas are surveyed more than once during the seventeen-year time frame, resulting in 38 observations from these areas. To correct for this measurement error, I constructed a weighted average of the two different tax rates, based on the proportion of the cities' population

[25] (Coomes and Hoyt, 2008)
[26] In some states the amount of tax paid to the state of employment is received back as a tax credit, in other states it is tax deductible from taxes paid to the state of residence.

in each state which I got from Coomes and Hoyt (2008). For example, the Davenport-Rock Island-Moline metropolitan area weighted average is in Equation 1. 1) Combined Marginal Tax Rate=((.42*IowaMTR)+(.58*IllinoisMTR))

This new combined marginal tax rate is used for the 38 observations from multistate metropolitan areas that have reciprocity agreements. I also need to weight the tax rates for multistate metropolitan areas that do not have reciprocity agreements, even though the absence of a reciprocity agreement removes the incentive to live in a state with a higher tax rate, because my model matches the state tax rate to the benefits offered and arbitrarily choosing one of the state's tax rates is inaccurate. Therefore, for multistate metropolitan areas without reciprocity agreements, I constructed a marginal tax rate based on the employment share in each state; because taxes are paid in the state of employment this accurately captures the rate of tax being paid in the metro area.[27] The following multistate metro areas that do not have reciprocity agreements are included in my sample: Omaha, Philadelphia, Kansas City, Charlotte-Gastonia-Rock Hill, Augusta Aiken-Columbia-Sumter, St. Louis and Clarksville-Hopkinsville.[28] Some of these areas are in the sample multiple years, resulting in a total of 34 multistate metropolitan areas without reciprocity agreements. Altogether, there are 73 observations, just over ten percent of my dataset from multistate metropolitan areas.

Importantly, these surveys report the percentage of employees in that particular city that are *offered* the benefits. As stated in the *Area Wage Survey*, "a plan is included even though a majority of the employees in an establishment do not choose to participate in it because they are

[27] I was unable to find the employment share for Yakima-Richland-Kennewick-Pasco-Walla Walla-Pendelton, WA-OR, a multistate metro area in my sample, so the Washington State tax rate (0%) was used. This metro area accounted for only one observation in my sample, so while leaving it unweighted did create measurement error, it would not be enough to alter the results.

[28] Interestingly, including these multistate metropolitan areas actually weakens the results. For example, in my pooled model with a worker type dummy, the life insurance regression has a significant coefficient on the tax variable when multistate metropolitan areas are dropped from the sample – the coefficient is insignificant in my results where the tax rates for the multistate metropolitan areas are weighted.

required to bear part of its cost (provided the choice to participate is available or will eventually be available to a majority)." Much of the economic literature on health insurance benefits studies take-up rates, and the *Occupational Compensation Survey* itself includes information on employee participation in these programs. However, the following analysis focuses on the benefits offered because the benefit needs to be offered by the firm in order for the employee to get the tax advantage. Additionally, Gruber (2001) has already shown that taxes do not influence worker take-up decisions, though they theoretically might because the amount paid in to a cost-sharing plan is tax deductible. Details on how the BLS determines each type of benefit are included in Appendix I.

For all areas and in all years, pay and benefits data are recorded for different types of workers. The early years of the survey report "office" and "production" workers separately, up to and including the 1990 survey. Beginning in 1991, the distinction is between "white-collar" and "blue-collar" workers. Given the change in nomenclature, all "production" and "blue-collar" workers will be referred to as blue-collar and all "office" and "white-collar" workers as white-collar for consistency. Theoretically, we should expect no difference between responsiveness to taxes of blue- and white-collar workers because wages and unionization are controlled for, unless there are other types of differences between blue- and white-collar workers. Cities or regions lacking pay information for computer programmers or janitors were omitted from the sample since these occupations were previously chosen as the representative blue- and white-collar jobs.[29]

This work builds on Gentry and Peress (1994) in four ways. The first is by adding a measure of average income for workers in that metropolitan area in addition to the information

[29] This effort to be consistent when comparing wages across time and places cut about 15 observations out of the dataset.

on benefits offered. For this purpose a representative white-collar worker and a representative blue-collar worker were chosen, both of whom were present in the sample every year that data were collected from 1980-1996.[30] The profession chosen as the representative white-collar worker was a computer programmer, and the occupation chosen as the representative blue-collar worker was a janitor.[31] The average hourly wage for a computer programmer and a janitor in that metropolitan area was recorded along with the benefits data as a measure of income. I am comfortable using wages as a measure of income because I expect other forms of income – dividend income or capital gains – to be minor for the representative computer programmer and janitor. Summary statistics from the 1999 CPS show that the mean non-wage income for people without a high school education is $8,932, with a high school education $9,148 and with some college, $9,055. These are much smaller than the mean non-wage income for a college graduate, which was $11,182 in 1999.[32] It is reasonable to expect the blue-collar workers in my sample not to have graduated from college, however, the computer programmers might fall in the $11,182 range.[33] To be fair, all forms of income factor into the demand for benefits, as the Gruber and Lettau theory shows, so total income is the desirable measure. However, since I do not expect capital income to vary systematically across place, it will not bias the results in one particular direction. The average hourly wage was reported in the survey for blue-collar workers, but for white-collar workers the weekly wage and number of hours worked per week

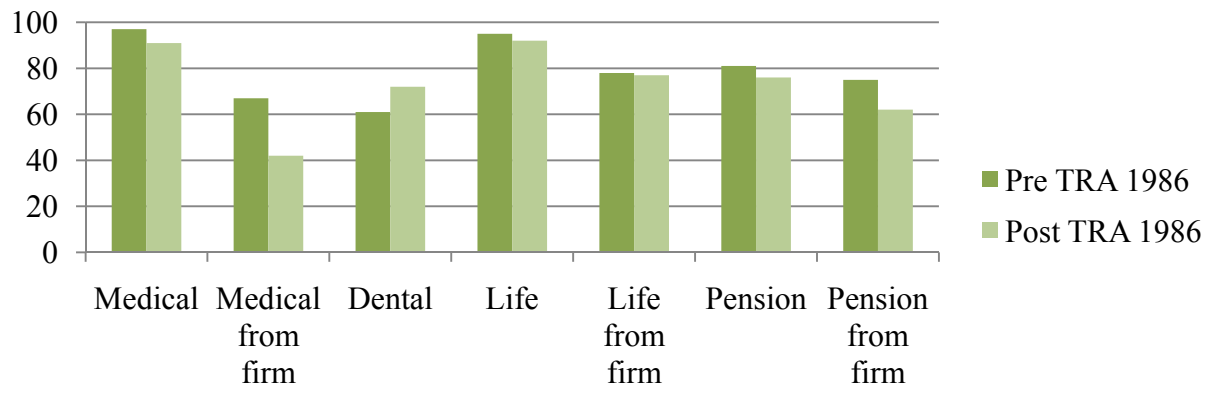
[30] It has been suggested that I construct an index of representative white-collar and blue-collar jobs all weighted by their share of employment to smooth some of the occupation-specific volatility in earnings. This is a great idea and would more accurately capture the wage in that metropolitan area, however, given the time-intensive nature of gathering additional data, I was unable to incorporate this into my work.
[31] For a more detailed description of how the BLS defines these two occupations see Appendix I.
[32] (Susin, 2003)
[33] This article also shows that 13.3 percent of people had zero non-wage income in 1995, suggesting that these mean numbers might be biased upwards by a small number extremely wealthy individuals who have high non-wage income. This could be the case even in the less educated categories where, for example many successful musicians are high school dropouts and many professional athletes do not finish college. Both of these groups are high income groups and might choose to invest the earnings that they cannot possibly spend, resulting in high interest and dividend income.

were reported in the survey. White-collar workers' weekly wage was divided by the average number of hours worked per week so that both white-collar and blue-collar measures of income are for hourly wages. All wages are reported in 1996 dollars and appear in regressions as the natural log of the wage rate. This measure of income is important in the econometrical analysis to see its effect on benefits offered.

The second way this analysis adds to Gentry and Peress (1994) is by creating a larger dataset through including more years of survey responses. Gentry and Peress (1994) have data from 1988-1992, and here I have data from 1980-1996. The additional twelve years create a larger sample size, thereby giving more power to the econometric results. However, in addition to simply having a larger sample size, these data span the Tax Reform Act of 1986 (TRA 86) which is an important source of variation in tax rates. TRA 86 lowered the top federal marginal tax rate from 50 percent to 28 percent and several states changed their tax code as well. Figure 3 shows changes in the rate of benefit offering in my sample after TRA 86. I take advantage of this source of exogenous variation by allowing my tax variable to vary over time; information on the state marginal tax rate for my representative workers is included for every year in my sample, in each state surveyed. My model includes year dummies, which will soak up most of this year-to-year variation in state tax rates due to TRA 86; however, the interaction of Federal and state tax rates allows for some time series variation, albeit a small amount.[34] Also, many state policy changes were induced by TRA 86, creating variation that I do capture. With such a short time, Gentry and Peress (1994) relied on cross-sectional variation, and therefore used the tax rate from 1990 for all observations in their sample. My sample size is further increased by weighting the tax rates for cities in multistate metropolitan areas, allowing their inclusion in the data.

[34] This variation primarily comes from returns that itemize deductions.

Figure 3. Percentage of Employees Offered Benefits Before and After TRA 86



The third way in which this work builds upon the work of Gentry and Peress (1994) is by including data on a taxable benefit, paid sick leave. Using this benefit in the same model as the tax-advantaged benefits serves as a falsification check that the model is not missing any state-level unobservables, a state's intrinsic demand for fringe benefits, for example. This method follows Royalty (2000) and Bernard and Selden (2002).

The fourth way this work builds on Gentry and Peress (1994) is by including data on the quality-adjusted rent for an apartment in each metropolitan area in 1990 as a proxy for cost-of-living. The geographic variation in cost-of-living likely affects an employer's compensation decisions. Often, employees who transfer to another office of the same company see a cost-of-living adjustment to their compensation package if the new office is in a more expensive location. However, it is unclear how total compensation is higher in places with a high cost-of-living; it could be solely due to an increase in pay, or pay and benefits both. If the offer rate of benefits is higher in places with a high cost-of-living, many of which also often have a high state tax rate, New York City for example, this could be biasing my tax variable upward. For this reason I have included the measure of quality-adjusted rent used in Fitzpatrick and Thompson

(2010) which they borrow from Chen and Rosenthal (2008).[35] Table 2 shows that the mean quality-adjusted rent was $5,663.26 in 1990. The cheapest area was Rio Grande Valley, Texas at $2,027.5, and the most expensive area was San Francisco, California at $11,811.2.

Summary statistics on the benefits data alone reveal some interesting trends. As seen in Figure 3, the percentage of employees offered medical and life insurance in cost-sharing plans decreased slightly after TRA 86, going from 97 percent to 91 percent for the former and 95 percent to 92 percent for the latter. However, the percentage of employees offered dental care increased over this period. All benefits that are entirely financed by employers decreased over the period as well.

The likelihood that workers receive different benefits does vary by type of worker, as seen in Table 2. A higher percentage of white-collar workers are offered medical and life insurance and dental care cost-sharing plans than blue-collar workers. 96 percent of white-collar workers were offered medical insurance compared to 91 percent of blue-collar workers. 73 percent of white-collar workers were offered dental care compared to 64 percent of blue-collar workers. 97 percent of white-collar workers were offered life insurance compared to 91 percent of blue-collar workers. More white-collar workers are also offered pension plans, 83 percent, than blue-collar workers, 73 percent. The same holds true for drug and alcohol treatment programs with 89 percent of white-collar workers being offered these plans and only 83 percent of blue-collar workers. 78 percent of white-collar workers are offered paid sick leave, compared to 40 percent of blue-collar workers. This discrepancy could be due to the fact that the tax exclusion for benefits is worth more for people with higher marginal tax rates so the white-collar workers may demand more benefits than do blue-collar workers. However, a similar number of

[35] This dataset was compiled by Chen and Rosenthal, and they graciously allowed me to use it. Thanks to Katie Fitzpatrick for requesting and sending it to me.

blue-collar and white-collar workers were offered less common fringe benefits such as vision and hearing care. Just over 35 percent of blue-collar workers were offered vision coverage, compared to just under 35 percent of white-collar workers, and 18 percent of blue-collar workers were offered hearing coverage compared to 16 percent of white-collar workers. Unions have been thought to play a role in the recent increase in these rarer fringe benefits and this is difficult to control for because while union participation is an easy thing to measure, the activity of the union in bargaining for benefits is difficult to know.

Table 2. Summary Statistics for Benefits Data and Explanatory Variables

Benefits: Blue-Collar	Mean	Min	Max	Standard Deviation	Observations
Medical Insurance	91.02	61	100	7.52	338
Dental Care	63.99	23	96	15.21	339
Life Insurance	90.73	67	100	5.27	338
Pension Plans	72.99	40	100	12.09	337
Vision Care	35.18	1	81	18.02	200
Hearing Care	18.03	1	78	13.87	196
Drug & Alcohol Treatment	83.29	40	100	10.76	200
Firm-Financed Medical Insurance	53.84	7	94	19.83	339
Firm-Financed Life Insurance	75.08	40	96	10.47	338
Firm-Financed Pension Plans	62.69	22	96	14.47	337
Paid Sick Leave	39.78	4	89	16.70	338
Benefits: White-Collar	Mean	Min	Max	Standard Deviation	Observations
Medical Insurance	96.18	71	100	5.21	308
Dental Care	72.99	20	97	15.07	308
Life Insurance	96.61	61	100	3.86	308
Pension Plans	83.11	30	100	9.95	308
Vision Care	34.75	3	81	17.29	178
Hearing Care	16.26	1	89	13.52	174
Drug & Alcohol Treatment	89.32	50	100	9.44	176
Firm-Financed Medical Insurance	49.23	9	95	18.20	308
Firm-Financed Life Insurance	80.52	39	98	8.94	308
Firm-Financed Pension Plans	71.65	20	97	13.64	308
Paid Sick Leave	77.72	42	97	10.21	308
Explanatory Variables	Mean	Min	Max	Standard Deviation	Observations
Blue-Collar					
State Marginal Tax Rate (%)	4.07	0	11.02	2.62	339
Federal Marginal Tax Rate (%)	18.21	15	24.58	3.94	339
Real Hourly Wage ($1996)	6.05	3.39	13.01	1.49	339
White-Collar					
State Marginal Tax Rate (%)	4.49	0	11	2.99	309
Federal Marginal Tax Rate (%)	30.92	28	38.35	3.76	309
Real Hourly Wage ($1996)	13.79	7.18	22.76	3.49	309
All Workers					
Healthcare Costs ($1999)	1123.76	519.46	1557.70	204.47	648
Average Age (Years)	35.41	27.1	38.9	1.82	648
High School Education (%)	75.10	64.3	86.6	4.75	648
College Education (%)	20.25	12.3	33.3	3.93	648
Advanced Degree (%)	7.17	4.5	17.2	1.94	648
Unionization (%)	16.79	3.7	32.54	6.87	648
Quality-Adjusted Rent ($1990)	5663.26	2027.5	11811.2	2254.07	648

The benefit offer rates in the BLS surveys are averages of the binary offer outcome of the number of workers surveyed. The number of workers surveyed is different in each BLS survey, but is correlated to the population of the area surveyed. As shown in Table 3, the total number of workers surveyed in the 648 observations that comprise my dataset is over sixty million. However, there is a big difference between the smallest observation – 1500 people in Billings, Montana in 1983 – and the largest observation – 1,109,554 in the Chicago-Gary-Kenosha metropolitan area in 1996. There were roughly 12 million more blue-collar workers surveyed than white-collar workers and anywhere from 212,080 to 9,508,350 workers surveyed in a given year.[36]

Table 3. Number of Workers in BLS Surveys

	Mean	Min	Max	Total
Total All Workers	93,870.24	1500	1,109,554	60,800,000
Total Blue-Collar Workers				36,300,000
Total White-Collar Workers				24,500,000

Year	Number of Observations	Total Number of Workers
1980	50	4,919,165
1981	48	5,691,700
1982	36	2,641,400
1983	50	3,674,600
1984	48	4,514,900
1985	0	0
1986	38	4,011,100
1987	0	0
1988	51	2,502,400
1989	39	3,542,327
1990	27	2,671,900
1991	47	8,991,369
1992	89	5,207,680
1993	29	1,070,426
1994	5	212,080
1995	23	1,668,516
1996	68	9,508,350

[36] There is no data from 1985 and 1987 because the microfilms for those years were missing from Williams College Libraries. It is likely that the BLS did not survey in those years, or only surveyed pay, not pay and benefits.

The tax data come from the National Bureau of Economic Research's TAXSIM model version 9.0. The model provides information on the Federal, state and Federal Insurance Contributions Act (FICA) tax liability and marginal tax rates for the representative white-collar and blue-collar workers in every year from 1980 to 1996. The TAXSIM model is a collection of programs that simulate a hypothetical tax liability and marginal rate based on real tax returns. For every year and in every state, the following choices were made on the tax returns: joint marital status, one dependent exemption, zero taxpayers over 65 years of age, zero dividend income, zero property income, zero taxable pensions, zero Social Security Benefits, zero non-taxable transfer income, zero rent paid, zero property taxes paid, zero itemized deductions, zero child care expenses, zero unemployment compensation, one dependent under age 17, zero mortgage interest, zero short term capital gains or losses and zero long term capital gains or losses. All of the above deduction possibilities were purposely set to zero so as to focus on a household that takes the standard deduction, as most taxpayers do. Marital status was set as joint with one child under the age of 17 to create a representative household.

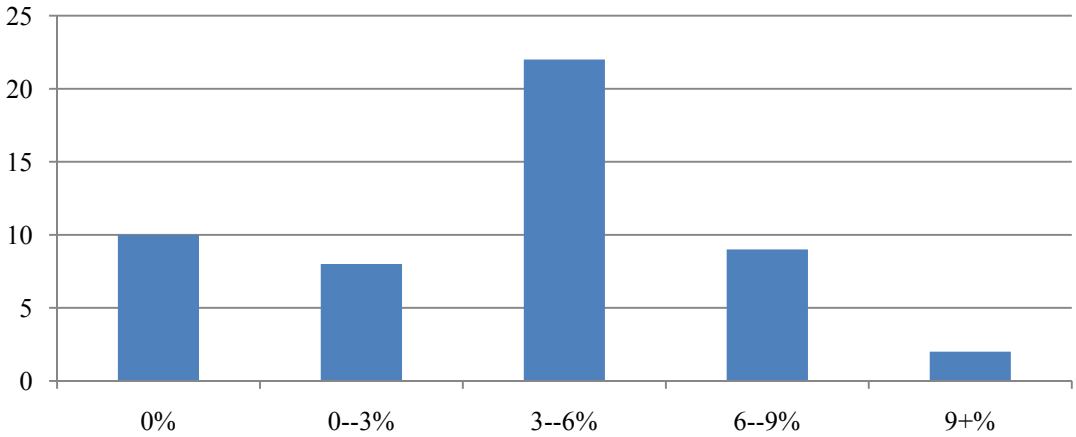
The annual wage used for the TAXSIM input comes from the *Historical Statistics of the United States* which has a nationally representative wage for different types of workers up to the year 1994. The annual wage and salary income of the taxpayer was determined by consulting a different source than the *Area Wage Survey* in an attempt to find a constant national wage, because the desired source of variation is state tax variation, not state-to-state differences in income. This could be a problem if states had radically different income distributions during the years of my sample because the nationally representative wage would not reflect decision-making in uncharacteristic places, however using the actual wage could create endogeneity so I am choosing the lesser of two problems. Unfortunately, the *Historical Statistics of the United*

States did not classify workers with the detail that the *Area Wage Survey* does, for example, computer programmer and janitor, instead categorizing broader classes of workers. For this reason, the category of communications workers will be used for the white-collar tax returns and services workers for blue-collar tax returns. Because the *Historical Statistics of the United States* stopped reporting annual income in 1994, the income used for 1995 and 1996 are estimates. These estimates were developed by calculating the change in wage between each of the fifteen previous years and subtracting inflation to get the annual real wage growth. The annual real wage growth was averaged and added to inflation in 1995 and 1996 to get the annual income estimates for 1995 and 1996. This nationally representative annual wage was used for the wage and salary income of the taxpayer.[37] See Appendix II for a sample tax return input to TAXSIM for a white-collar worker in Alabama in 1980.

The TAXSIM output shows that there was significant variation in state income tax rates both regionally and over time. Regionally, state income tax rates ranged from zero to 11.02 percent in 1984 and, over time, the number of states with no income tax changed. See Figure 4 for an illustration of the regional variation in the tax rate for a blue-collar worker in 1980. Ten states had no income tax in 1980: Arkansas, Connecticut, Florida, Nevada, New Hampshire, South Dakota, Tennessee, Texas, Washington and Wyoming. In addition to these, Oklahoma eliminated its state income tax in 1987 but reinstated it in 1990, and Connecticut implemented an income tax in 1991 for the first time during the sample frame. This regional and time series variation in the state income tax rates will be important for the econometric analysis.

[37] Following standard practice in TAXSIM where the wage and salary income of the spouse is assumed to make up one third of the family's total compensation, the spouse's income was set to one-half of the taxpayer's income.

Figure 4. Number of States with 1980 MTR in the Specified Ranges for a Representative Blue-Collar Worker



The demographic data seek to capture statewide factors that could affect the probability of a benefit being offered. Healthcare costs are measured by hospital-adjusted expenses per inpatient day in 1999. These data come from the Kaiser Family Foundation's statehealthfacts.org. As Table 2 shows, the lowest healthcare costs in the sample are $519.46 in Montana and the highest are $1,557.70 in New Mexico. The Kaiser data were chosen after consideration of various other measures of healthcare costs.[38] Often the cost of a set basket of goods is carefully guarded by private insurance companies. For this reason, I have chosen a measure that is outside the years of my sample. However, when the 1999 hospital-adjusted expenses per inpatient day are compared to the same measure in 2007, the correlation is .93, which suggests that the cost differences between states were persistent. If these cost differences were persistent from 1999 to 2007, it is likely that they were persistent from 1991 to 1999 and farther back in time. This indicator of healthcare costs provides a measure of the regional

[38] I initially searched for a measure of healthcare costs and could only find healthcare expenditures. Though I did not realize it at the time, an insurance premium reflects the expected expenditure which equals the price times the quantity, so I do not necessarily need this measure to be cost as opposed to expenditure.

variation in the price of medical, dental, hearing, vision and drug and rehabilitation benefits, which could affect offer rates in either direction, as discussed in the Introduction.

Data on the average age in each state are from the *1990 U.S. Census*. Table 2 shows that the average age in the youngest state is 27.1 years in Utah and 38.9 years in the oldest state, West Virginia. It is possible that an older population demands more healthcare and, therefore, more health-related benefits; if so this variable will control for regional variation in this demand, though the healthcare costs variable could also pick up this demand as well. Data on education rates in each state are also from the *1990 U.S. Census*. The percentage of the population over 25 years of age with a high school diploma is lowest in Kentucky at 64.3 percent and highest in Alaska at 86.6 percent. Education levels could be correlated to worker demand for benefits because an educated worker better understands that it is to his or her advantage to avoid taxes and receive benefits from an employer. The percentage of the population over the age of 25 with a bachelor's degree is lowest in West Virginia at 12.3 percent and highest in Washington, DC at 33.3 percent. The percentage of the population over the age of 25 with an advanced degree is lowest in North Dakota at 4.5 percent and highest again in Washington, DC at 17.2 percent. Though it seems that the education measures of bachelor's degrees and advanced degrees would not be relevant for the blue-collar workers in the sample, the composition of the state will affect the composition of the firm and therefore, the likelihood of being offered benefits.

Unions are known to collectively bargain for better compensation for their members, which includes better benefits. Therefore, it is possible that states with large union participation rates have more employees offered benefits irrespective of taxes. The unionization data are from the Current Population Survey[39] and give the percentage of employed workers in a state who are members of a union for every year from 1983-1996. The mean union membership was 16.79

[39] (Hirsch and Macpherson, 2003)

percent of workers in a state, but that encompasses a seventeen-year timeframe in which there was a strong trend towards decreasing unionization. The state with the highest percentage of union membership was New York in 1980 at 32.5 percent. The lowest rate of union membership was in South Carolina, 3.7 percent in 1996. Because these data were not available for the first three years of my sample, I constructed a time trend backwards to estimate the unionization rates in 1980, 1981 and 1982. Thus, this important variable controls for both regional and temporal differences in unionization.

IV. Methodology

As discussed above, the tax exclusion for employer-sponsored insurance and other benefits creates an incentive for employers to compensate their employees with benefits, both because the employer's contribution is deductible from the firm's taxable income and the benefit is not considered income for the employee and, therefore, not counted in their adjusted gross income subject to taxation. Given the structure of the tax exclusion, higher taxes should create more employee demand to be compensated with benefits, though how employers respond to this demand is complicated due to the collective group choice aspect of the offer decision. Aggregated data is a good way to measure the effect of taxes on benefits because local market conditions matter for firms which compete for employees; the fraction of the whole local market that is offered benefits, rather than a randomly-selected collection of firms or individuals, captures this local-market effect.

A weighted panel regression is used in an attempt to find a causal relationship between taxes and benefits offered by employers. Because medical and life insurance cost-sharing plans were almost ubiquitously offered, much of the identification is expected to come from other relatively rarer benefits such as dental, vision and hearing care; pension plans; drug and alcohol treatment programs; and firm-financed medical and life insurance and pension plans. Variation exists in the state tax rates due to regional differences in marginal tax rates, regional differences in the progressivity structure and changes in state laws over the seventeen-year period. In fact, a major strength of the dataset is that it has both cross-sectional and time series variation in state tax rates. The tax measure used is: state + federal marginal tax rate. The maximum combined state and Federal marginal tax rate in the sample was 48 percent in 1980 and 37 percent in 1996. Table 2 shows that the minimum state marginal tax rate in the sample is 0 percent and the

maximum is 11.02 percent. Equation 2 gives the regression model for each health-related fringe benefit.

2) $$P_{it} = \alpha + \beta_{1k}X_{it,\,k} + \beta_2 \ln(1 - TAX_{it}) + \beta_3 \ln(PRICE_i) + \beta_4 \ln(INCOME_{it}) + \beta_5 YEAR_t + \beta_6 CENSUSDIVISION_i + \varepsilon_i$$

P is log-odds transformed fraction of white or blue-collar workers offered the benefit, X is a vector of demographic variables, TAX is the combined state marginal tax rate plus the Federal marginal tax rate, PRICE is the measure of healthcare costs, INCOME is the average wage income and ε is the error term.[40] The subscript "i" denotes metropolitan areas, the subscript "t" the year, and the subscript "k" separates all the demographic variables. The main coefficient of interest is "β_2" which measures the tax advantage of offering a benefit. Because the tax price is 1-TAX, a negative coefficient means that higher taxes are correlated with higher benefit offer rates. The actual after-tax price that the employer pays for a premium is PRICE(1-TAX), and it is easy to see from this equation that higher marginal tax rates lower the after-tax cost for the firm. Year dummy variables are included to control for the possibility of more or fewer benefits being offered in a particular year for some reason related to that year. For example, when President Clinton was attempting to pass healthcare reform in 1993, employers might have started to phase out their benefits programs because they believed a public option was going to be available in the near future. Regional dummy variables are included for the nine census

[40] This model originally had the tax price variable interacted with the healthcarecosts variable, ln(1-TAX)*lnPRICE, since that is in fact the after-tax price a firm faces for a premium. However, since the estimated coefficient on PRICE could reflect the cost for the firm or the demand from employees, it does not have an expected sign – thus could confound the identification of this interaction term. This impact the results slightly; two more of the regressions show significant tax effects when I have the two terms separate than when they are interacted. The big difference between the ln(1-TAX) and ln(PRICE) coefficients seen in the Results tables indicate that keeping the variables separate is the sensible move.

divisions: New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain and Pacific. These were included to pick up any division-specific differences that might affect the offering of benefits.[41]

Each of the 648 observations in my dataset is weighted by the number of workers surveyed in that particular metropolitan area. There are two advantages to weighting the data. First, because larger survey samples allow for more precision, giving the more precise surveys more weight in my model will reduce the measurement error. Second, survey size is correlated to the population of the area in the BLS surveys; because some surveys represent a larger share of the U.S. population than others they should count more in the model. Because there is a large difference between the survey with the smallest scope in my sample, 1500, and the survey with the largest scope, 1,109,554, I believe strongly that weighting by survey size is the most accurate way to understand the correlative effects between taxes and benefit offering in these data. Weighting does influence the results; all the regressions were run unweighted and there was slightly less correlation between taxes and fringe benefits.

The price of some of the benefits the BLS includes in their survey does not depend on healthcare costs.[42] Therefore, the model in Equation 3 is used in regressions involving life insurance, entirely firm-financed life insurance, pension plans and entirely firm-financed pension plans.

[41] Regressions were attempted using state dummies instead of census division dummies, however because state fixed effects identify the tax effect based on differences within a state over time – and these differences are small – the model leads to imprecise estimated effects.

[42] It has been suggested that healthcare costs should be included in this model even though the benefits are not health-related because there might be substitution within the benefits package. This would occur if firms in states with high healthcare costs shift to offering relatively cheaper benefits such as pensions or life insurance. In response, this could be the case IF the coefficient on the ln(healthcarecosts) variable was always negative in my results, meaning that firms offer fewer health-related benefits in areas where healthcare costs are high. However, since this variable is also picking up the demand for health-related benefits, which is higher in high-cost places, it is not clear that price matters to the firm, they might simply have to offer what employees demand.

3) $P_{it} = \alpha + \beta_{1k}X_{it,\,k} + \beta_2 \ln(1 - TAX_{it}) + \beta_3 \ln(INCOME_{it}) + \beta_4 YEAR_t + \beta_5 CENSUSDIVISION_i + \varepsilon_i$

The decision of a firm whether or not to offer a benefit has a discrete outcome equal to one if they offer the benefit and zero if they do not. Discrete dependent variables raise two problems in linear probability models. First, because coefficients on the independent variables are interpreted as the increase or decrease in the probability of a benefit being offered, the model can predict the chance of a benefit being offered as greater than 100 percent and less than 0 percent. Second, because there are only two possible outcomes, a model with a discrete dependent variable violates the homoskedasticity assumption of LPM – that of constant variance of the error term. Typically probit or logit models are used in the case of a discrete dependent variable to correct for the two problems mentioned above. Because I have grouped data, however, it is not possible to express them as zero or one. In this case a log-odds specification can be used to achieve the same end goal a logit model does.[43] A log-odds transformation is used on the dependent variable P in all regression as in Equation 4.[44]

4) $P_{it} = \ln [\, p_{it} / (100 - p_{it})]$

p_i is the percentage of workers in metropolitan area i that were offered a particular benefit in year t. The coefficients reported in the regression tables are from the log-odds specification and have to be transformed into marginal effects before they can be interpreted, as they are in the Results

[43] (Log-Odds reference)
[44] Of the 6358 benefit observations used in the regressions, 28 had 100% of the workers covered, and so were changed to 99.99 to prevent the logarithm of the odds being undefined.

section. Results from a simple linear probability model without the log-odds specification are in Appendix III.

Paid sick leave is included in the analysis as a falsification check. Paid sick leave is not a tax-advantaged benefit because the pay is taxed as normal income. Following Royalty (2000), I use the same methodology to examine a taxed fringe benefit as I do for all the tax-advantaged benefits above, expecting no correlation between tax rates and the offer rate of paid sick leave. This method rules out omitted variable bias in the tax variable. Worker demand for benefits is the main omitted variable of concern; it is possible that workers in Green Bay, Wisconsin happen to have a high demand for fringe benefits and since Wisconsin is a relatively high-tax state (6.93 percent for a white-collar worker in 1992) this would cause a spurious correlation which suggests that higher taxes encourage more benefits. This comparative strategy assumes that there is a strong correlation between the state-level unobservables that affect the demand for any of the tax-advantaged benefits, dental, for example, and the taxed paid sick leave.[45]

However, since paid sick leave is a benefit itself, and employers offer benefits as a package, it is important to consider that these two benefits could be substitutes for each other. It is possible that when high taxes encourage employers to provide more tax-favored benefits, they provide fewer taxable benefits. If this substitution story is true, I would expect the sign on the tax price coefficient in the paid sick leave regression to have the opposite sign as tax-advantaged benefits – the tax coefficient for paid sick leave should be positive. This may not be the case, and if so, substitution between tax-advantaged and taxed benefits does not occur; however, as long as the tax price coefficient in the paid sick leave regression is not negative and significant, I know that there is not omitted variable bias in the other regressions' tax variable. The paid sick

[45] Royalty (2000) argues that a strong correlation does exist because 79% of workers in her CPS sample are eligible for both health insurance and sick leave or neither.

leave data are fitted to the model in Equation 3 and should be directly compared to the pension and life insurance benefits because all three are not directly affected by healthcare costs.

All of the same regressions are also run including a measure of cost-of living using Equation 5 for health-related benefits and Equation 6 for life insurance, pension plans and paid sick leave. This measure of cost-of-living is QARENT, quality-adjusted rent.

5) $P_{it} = \alpha + \beta_{1k}X_{it,\,k} + \beta_2 \ln(1 - TAX_{it}) + \beta_3 \ln(PRICE_i) + \beta_4 \ln(INCOME_{it}) + \beta_5 QARENT_i + \beta_6 YEAR_t + B_7 CENSUSDIVISION_i + \varepsilon_i$

6) $P_{it} = \alpha + \beta_{1k}X_{it,\,k} + \beta_2 \ln(1 - TAX_{it}) + \beta_3 \ln(INCOME_{it}) + \beta_4 QARENT_i + \beta_5 YEAR_t + \beta_6 CENSUSDIVISION_i + \varepsilon_i$

Including this measure of the cost-of-living will show if the make-up of compensation is different in places with varying costs-of-living. It will also insure that the tax variable is not artificially high because total compensation is higher in more expensive locales which often have higher state tax rates – California and New York.[46]

An alternative specification is also run in which the observations from blue- and white-collar workers are pooled into one regression, also weighted by survey size, with a binary variable (dummy variable) for worker type. This will enhance the power of the statistical tests for all regressions by doubling their sample size. However, this specification assumes equal responsiveness to taxes across the blue- and white-collar groups, meaning that the offer of benefits to blue- and white-collar workers responds the same way to a one percent change in the

[46] Remember the nationally representative wage was used in the TAXSIM input only so the income measures in the regressions are time and place specific.

tax rate.[47] The model is shown in Equation 7 below for health-related benefits and Equation 8 for non-health related benefits.[48]

7) $P_{it} = \alpha + \beta_{1k}X_{it,\,k} + \beta_2 \ln(1 - TAX_{it}) + \beta_3 BLUE_{it} + \beta_4 \ln(PRICE_i) + \beta_5 \ln(INCOME_{it}) + \beta_6 YEAR_t + B_7 CENSUSDIVISION_i + \varepsilon_i$

8) $P_{it} = \alpha + \beta_{1k}X_{it,\,k} + \beta_1 \ln(1 - TAX_{it}) + \beta_2 BLUE_{it} + \beta_3 \ln(INCOME_{it}) + \beta_4 YEAR_t + B_5 CENSUSDIVISION_i + \varepsilon_i$

[47] This may not be a valid assumption; for example, consider the baseline regression for drug and alcohol treatment programs which has a significant tax effect for both types of workers. The marginal effect for blue-collar workers is .3366% and for white-collar workers is .8616%.

[48] A random effect specification was also attempted to control for the possibility of location and year specific similarities between the offer of benefits to blue- and white-collar workers. A between estimator was also attempted, this would take the average of the blue- and white-collar observations from each place at a point in time. However, both models showed very strange results and had little explanatory power of the effect taxes have on fringe benefits. I suspect that these models absorb all of the variation in state marginal tax rates, as the state dummies in the baseline specification did, and therefore render the tax variable insignificant as an explanatory variable.

V. Results

Blue-Collar Workers

The regression estimates of Equation 2, health-related benefits, and Equation 3, non-health-related benefits, for blue-collar workers are in Table 5.[49] Seven of the ten regressions have a negative coefficient on the tax price variable, indicating a positive correlation between the benefits offered and the state tax rate.[50] 1-TAX is the price of purchasing $1 of any tax-advantaged benefit. This estimated coefficient is statistically significant for the following benefits at the five percent level: pension plans, drug and alcohol treatment programs, firm-financed life insurance, and firm-financed pension plans. The estimated tax effect is statistically significant at the ten percent level for firm-financed medical insurance. These results indicate that the tax system encourages those specific fringe benefits for blue-collar workers. Thus, on the whole, taxes seem to affect firm-financed benefits more than cost-sharing plans.

The effect of a change in the independent variable depends on the level of the probability because a log-odds specification is used. To see the effect of a one percentage point increase in the marginal tax rate, I evaluated the mean probability of each benefit – see Table 4. A one percentage point increase in the marginal tax rate increases the percentage of blue-collar workers offered pension plans by just over half a percentage point (0.57). This same increase results in 0.34 percentage points more workers being offered drug and alcohol treatment programs. For firm-financed medical insurance plans, the same change in the tax rate causes a 0.63 percentage

[49] As mentioned in the Methodology section, these regressions are weighted by the survey size. Weighting does matter; unweighted only four of the ten blue-collar regressions show statistically significant tax coefficients, whereas weighted five of ten do.

[50] This is expected because the variable is ln(1-TAX), meaning that states with higher tax rates have a smaller input for this variable. Since a higher tax rate theoretically leads to more benefits, these benefits would be expected to correlate negatively with this variable, but positively with the state tax rate.

point increase in the offer rate, firm-financed life insurance plans a 0.38 increase and firm-financed pension plans a 0.64 percentage point increase.

Table 4. Increase in Offer Rate of Blue-Collar Benefits Due to a 1% Increase in the Marginal Tax Rate

Pension Plans	0.5653 %
Drug and Alcohol Treatment	0.3366 %
Firm-Financed Medical Insurance	0.6254 %
Firm-Financed Life Insurance	0.3755 %
Firm-Financed Pension Plans	0.6409 %

Overall, the model explains a substantial amount of the regional variation in the percentage of employees offered benefits. The adjusted R^2's range from 0.33 to 0.81. The coefficients on the demographic variables are not significant much of the time, but show the expected signs. For example, the coefficient on the age variable is negative in seven of the ten regressions, which could be explained from the supply side – if states with a higher average age have more expensive healthcare it would be more costly to offer health-related fringe benefits – but also from the demand side – older people might demand more benefits. The coefficient on the variable "high school education" is positive in seven of the ten regressions, weakly supporting the idea that educated employees demand more benefits.[51] States with a larger percentage of the workforce unionized offer more benefits, as the coefficient on union is positive in nine of the ten regressions and significant in four. The variable that measures healthcare costs does not have an expected sign because higher healthcare costs make the premiums on health-related insurance more expensive, but they also increase the advantage of having insurance. As expected, there is ambiguity; the coefficient on healthcare costs is negative in two of the six

[51] Life insurance, firm-financed medical and firm-financed life insurance were the three regressions that had negative estimated coefficients on the high school education variable.

regressions for health-related fringe benefits. It is statistically significant only with a positive sign, as in the case of dental, vision and hearing care; and firm-financed medical insurance, possibly demonstrating that the demand for health-related insurance has more influence on the offer of a benefit than the cost of premium.

The base year for the year dummy variables is the first year in the sample, 1980. In general, the year dummies are positive in the early years of the sample and negative after TRA 86, as would be expected. This is not true in the case of the dental care regression, where positive year dummies indicate that there is a greater chance of the benefit being offered with each subsequent year in the sample, showing that year dummy variables capture more than just the tax story. This increase in the prevalence of dental care is not surprising – Figure 3 shows that dental care is the only benefit offered more frequently after TRA 86. The year dummies on the firm-financed life insurance regressions are always positive. There is no consistently large negative coefficient on the dummy variables immediately after TRA 86, in 1986 or 1988 (there is no data from 1987), but, the negative year dummies increase in magnitude and significance as they approach the 1990s. If we were to assume that time dummies capture only tax effects, this would suggest that when the decision to offer benefits does respond to tax policy, it is a gradual, not immediate response. This makes sense, given that contracts are probably negotiated with insurance companies several years in advance. However, year dummy variables could also be capturing general trends, business cycles for example. The nine census divisions are used as regional dummy variables. There is no one division that consistently offers more benefits than the others, but the magnitude of the positive coefficients is greatest and most frequently significant in the New England, Pacific and South Atlantic divisions.

The coefficient on the wage variable is positive and statistically significant at the five percent level in all ten regressions. This suggests that higher income people are more likely to be offered benefits. This is surprising if the tax exclusion for employer-sponsored benefits is understood as a compensating differential story, yet there are competing theories. In the case of a compensating differential, employers would offer a *greater proportion* of total compensation as benefits in high-tax states, as opposed to salary. If this were the case, the coefficient on the wage variable should be negative. However, the positive coefficient on the wage variable along with the positive relation between taxes and benefits suggests that benefits are a normal good. This is reasonable because workers care about their after-tax wage, so they will demand higher wages in high-tax states. It also raises the possibility that total compensation is simply higher in high-tax states. This will be explored in the next section when a measure of cost-of-living is added to the regressions.

These results do differ from Gentry and Peress (1994) in that a smaller number of the blue-collar regressions have significant tax variables. The tax coefficient is not significant in my regressions for medical insurance, life insurance and dental, vision and hearing care.[52] In the case of medical and life insurance, this lack of a tax effect can be explained by the fact that these benefits are almost ubiquitously offered. 91 percent of blue-collar employees were offered medical insurance in my sample and 91 percent were offered life insurance, as shown in Table 2. It is well-known that the tax exclusion works, incentivizing firms to offer basic health insurance plans, as discussed in the Introduction. Taxes are expected to affect the degree of generosity of benefits packages as well, a cause of concern in Congress, which has dubbed generous ones

[52] I considered the possibility that my wage variable was knocking out the tax effect and, therefore, might be responsible for the differences between my work and Gentry and Peress (1994). This is not the case because my model run without the wage variable produces similar results. Eliminating the wage variable actually makes my estimated tax coefficient slightly *less* significant.

"Cadillac plans."[53] This degree of generosity can refer to high premiums solely for medical insurance or high premiums due to an all inclusive benefits package.[54] For example, 91 percent of employees were offered medical insurance, but only 68 percent were offered dental care. Concomitantly, tax policy has more of an effect on the offer rate of dental care than medical insurance. In the case of vision and hearing care, the same story does not apply; these benefits are considered very fringe and offered much less frequently – for example, 35 percent of employees in the sample were offered vision care. It is possible that these regressions do not show a significant tax effect because they do not have the power that other regressions do. The BLS did not start collecting data on these benefits until 1988, so the sample size is much smaller than in my other regressions, though drug and alcohol treatment programs have the same small sample size and show a large tax effect. Gentry and Peress did not find a significant tax effect on hearing or drug and alcohol treatment benefits.

The last regression in Table 5 is for paid sick leave, a taxed benefit. This is used as a falsification check because the coefficient on the tax variable is not expected to be significant, considering that the benefit enjoys no tax advantage. The estimated tax coefficient is positive – showing evidence for the substitution story – and the p-value for the paid sick leave regression is 0.223. This should be directly compared to the pension plan regression, per Royalty (2000), because they use the same non-health-related model – Equation 3. The p-value in the pension regression is 0.003 and the estimated coefficient is negative, clearly showing more of a tax effect than paid sick leave. This check suggests that the method is not leaving out any important state-level unobservables that could be correlated to the decision to offer benefits.

[53] The term "Cadillac" usually refers to the cost of the premium, not what the insurance plan covers. (Gold, 2010)
[54] (Kramer, 2010)

Table 5. Fringe Benefits for Blue-Collar Workers

	Medical	Dental	Life	Pension	Vision	Hearing	Drug & Alcohol
ln(1-TAX)	-1.063	-1.345	0.123	-3.062***	2.175	1.404	-5.423**
	(1.710)	(0.966)	(1.150)	(1.036)	(1.636)	(2.243)	(2.466)
ln(Healthcare Costs)	-0.263	0.538*			0.782*	1.042*	-0.432
	(0.529)	(0.299)			(0.405)	(0.561)	(0.610)
ln(Real Hourly Wage)	1.594***	1.610***	1.458***	0.892***	0.986***	0.852**	1.172***
	(0.295)	(0.167)	(0.214)	(0.193)	(0.249)	(0.343)	(0.375)
Age	-0.0643	-0.0505**	-0.105***	-0.0612**	0.00440	-0.0502	-0.0485
	(0.0452)	(0.0256)	(0.0329)	(0.0297)	(0.0405)	(0.0558)	(0.0611)
High School Education	0.0304	0.0647***	-0.00164	0.0388**	0.0438**	0.0415	0.0696**
	(0.0262)	(0.0148)	(0.0188)	(0.0171)	(0.0221)	(0.0302)	(0.0333)
College Education	0.00690	-0.0837***	-0.0123	-0.0504*	-0.0755*	-0.0969*	-0.0429
	(0.0473)	(0.0267)	(0.0341)	(0.0304)	(0.0409)	(0.0560)	(0.0616)
Advanced Education	-0.168**	0.101**	-0.0633	0.0294	0.101	0.0782	-0.0277
	(0.0735)	(0.0415)	(0.0539)	(0.0482)	(0.0626)	(0.0858)	(0.0943)
Union	0.0315	0.00356	-0.0306*	0.0105	0.0475***	0.0883***	0.00271
	(0.0218)	(0.0123)	(0.0157)	(0.0141)	(0.0167)	(0.0229)	(0.0252)
Constant	6.925	-3.726	3.671	11.83***	-19.88***	-17.57**	22.95**
	(6.558)	(3.694)	(4.710)	(4.241)	(5.983)	(8.168)	(9.017)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	338	339	338	337	200	196	200
Adjusted R-squared	0.534	0.700	0.460	0.528	0.673	0.520	0.332

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5 Continued. Fringe Benefits for Blue-Collar Workers

	Medical From Firm	Life From Firm	Pension From Firm	Paid Sick Leave
ln(1-TAX)	-2.059*	-2.047**	-2.292***	1.337
	(1.069)	(0.868)	(0.879)	(1.095)
ln(Healthcare Costs)	0.726**			
	(0.331)			
ln(Real Hourly Wage)	1.121***	0.798***	0.613***	0.851***
	(0.185)	(0.161)	(0.163)	(0.203)
Age	0.00833	0.0124	-0.01000	0.0103
	(0.0283)	(0.0248)	(0.0252)	(0.0313)
High School Education	-0.00457	-0.0180	0.0322**	-0.0403**
	(0.0164)	(0.0142)	(0.0145)	(0.0179)
College Education	0.0240	0.0378	-0.0294	0.144***
	(0.0296)	(0.0257)	(0.0258)	(0.0324)
Advanced Education	-0.155***	-0.102**	0.00249	-0.0913*
	(0.0460)	(0.0407)	(0.0409)	(0.0513)
Union	0.0775***	0.0277**	0.0186	0.0141
	(0.0136)	(0.0118)	(0.0120)	(0.0149)
Constant	1.735	8.591**	7.074*	-7.840*
	(4.089)	(3.555)	(3.599)	(4.484)
Year dummies	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes
Observations	339	338	337	338
Adjusted R-squared	0.809	0.510	0.649	0.563

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

White-Collar Workers

The regression estimates of Equation 2, health-related benefits, and Equation 3, non-health-related benefits, for white-collar workers are in Table 7. The estimated coefficient on the tax price variable is negative in seven of the ten regressions and statistically significant in two. Drug and alcohol treatment program and firm-financed life insurance plans are the two benefits that show a white-collar tax effect. Overall, there is less of a tax effect seen for white-collar workers than for blue-collar, indicating that taxes are not as important determinants of the decision to offer benefits to white-collar workers. In fact, vision care has a positive and statistically significant estimated tax coefficient, suggesting that vision care is offered more often in low tax states. An alternative explanation for the unexpected result in the vision care regression is that vision care might be included in general medical insurance plans in high tax states, driving up the premium. The higher medical insurance premium that has been bumped up due to inclusion of vision care would be discounted more because it is a high tax state, and since some form of vision care is offered in the medical insurance plan, there would actually be a negative correlation between taxes and stand alone vision care plans.

The wage variable is statistically significant in six regressions, but the sign of the significant coefficient varies and is negative in two of the six regressions and positive in four. Importantly, the estimated coefficient on the union variable is only positive and statistically significant in one regression, compared to four regressions for blue-collar workers. No trends are observed with the other explanatory variables. Year and census division dummy variables show similar trends as in the blue-collar regressions. The estimated tax coefficient in the paid sick leave regression is positive and insignificant, again serving as a falsification check. The

positive sign on the estimated tax price coefficient suggests that employers do substitute away from taxed benefits in high-tax states.

To see the effect of a one percentage point increase in the marginal tax rate on the offer rate of drug and alcohol treatment programs and firm-financed life insurance, I evaluated the mean probability these two benefits. As seen in Table 6, increasing the marginal tax rate by one percent results in a 0.86 percent increase in the offer rate of drug and alcohol treatment programs and a 0.47 percent increase for firm-financed life insurance.

Table 6. Increase in Offer Rate of White-Collar Benefits Due to a 1% Increase in the Marginal Tax Rate

Drug and Alcohol Treatment	0.8616 %
Firm-Financed Life Insurance	0.4680 %

This finding that the offer of benefits to white-collar workers is not as sensitive to tax policy, or not sensitive to the variables included in this regression, is not as surprising as it first appears. The regressive nature of the tax exclusion makes it worth more to higher-income workers who are in higher tax brackets and this is likely why, as shown in Table 2, white-collar workers are offered benefits more often than their blue-collar counterparts – with the exception of vision and hearing care and firm-financed medical insurance. My model measures the *sensitivity* of the offer rates to marginal changes in tax policy. So while the white-collar results show that marginal changes in taxes do not have as large an impact on the rate of benefit offering for white-collar workers, this does not mean that white-collar employers are not responding to the tax exclusion for benefits.

Though the tax effect is small compared to blue-collar workers, my finding actually shows more of a white-collar tax effect than Gentry and Peress do – none of their white-collar

regressions had statistically significant estimated tax coefficients. One of their possible explanations for why white-collar workers are less sensitive to marginal changes in taxes was that white-collar workers are a smaller, more diverse group of employees. Table 3 shows that the total number of white-collar workers covered in the surveys was 24,500,000, compared to 36,300,000 blue-collar workers, so this indeed could be one possible explanation. This question of why the method does not pick up a tax effect for white-collar workers will be addressed again later, in light of results from the model which includes a cost-of-living measure and the pooled model.

Table 7. Fringe Benefits for White-Collar Workers

	Medical	Dental	Life	Pension	Vision	Hearing	Drug & Alcohol
ln(1-TAX)	-1.809	-0.325	-1.787	-0.591	3.678***	0.981	-6.355**
	(2.044)	(1.039)	(1.289)	(1.186)	(1.365)	(2.050)	(3.073)
ln(Healthcare Costs)	0.0302	0.790*			0.598	-0.124	0.707
	(0.828)	(0.421)			(0.483)	(0.730)	(1.076)
ln(Real Hourly Wage)	-2.050***	0.994**	0.0966	-1.125**	1.241***	1.562**	0.670
	(0.756)	(0.384)	(0.546)	(0.501)	(0.447)	(0.671)	(0.954)
Age	-0.246***	-0.0449	-0.0806	-0.181***	0.0333	0.0122	-0.296***
	(0.0705)	(0.0358)	(0.0506)	(0.0464)	(0.0458)	(0.0687)	(0.0977)
High School Education	0.0457	0.116***	0.00417	0.0250	0.0384	0.0455	0.142**
	(0.0423)	(0.0215)	(0.0284)	(0.0262)	(0.0265)	(0.0398)	(0.0588)
College Education	-0.121*	-0.101***	-0.0172	-0.0763*	-0.146***	-0.0479	-0.141
	(0.0720)	(0.0366)	(0.0507)	(0.0453)	(0.0440)	(0.0660)	(0.0971)
Advanced Education	-0.0167	0.142***	-0.0284	0.0395	0.237***	0.129	0.113
	(0.107)	(0.0544)	(0.0765)	(0.0684)	(0.0647)	(0.0970)	(0.146)
Union	0.0546	0.0233	-0.0110	0.00645	0.0209	0.0671**	0.00872
	(0.0335)	(0.0170)	(0.0224)	(0.0206)	(0.0185)	(0.0277)	(0.0423)
Constant	24.54***	-13.35***	14.50***	12.96***	-26.66***	-13.34*	25.17**
	(7.455)	(3.791)	(5.081)	(4.668)	(4.675)	(6.979)	(10.28)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	308	308	306	308	178	174	176
Adjusted R-squared	0.596	0.739	0.424	0.417	0.771	0.590	0.422

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7 Continued. Fringe Benefits for White-Collar Workers

	Medical From Firm	Life From Firm	Pension From Firm	Paid Sick Leave
ln(1-TAX)	-1.855	-1.587*	0.734	0.960
	(1.126)	(0.870)	(0.815)	(0.827)
ln(Healthcare Costs)	0.891*			
	(0.456)			
ln(Real Hourly Wage)	0.184	1.185***	-0.210	2.292***
	(0.417)	(0.368)	(0.344)	(0.350)
Age	-0.00971	0.0603*	-0.0248	-0.0304
	(0.0388)	(0.0341)	(0.0319)	(0.0324)
High School Education	0.0745***	0.0178	0.0262	0.000764
	(0.0233)	(0.0191)	(0.0180)	(0.0182)
College Education	-0.127***	-0.0643*	-0.131***	0.0316
	(0.0397)	(0.0340)	(0.0311)	(0.0323)
Advanced Education	0.0910	0.104**	0.132***	0.0264
	(0.0589)	(0.0514)	(0.0470)	(0.0489)
Union	0.0248	0.000252	0.0172	7.38e-05
	(0.0184)	(0.0151)	(0.0142)	(0.0144)
Constant	-2.224	1.691	-0.423	-9.239***
	(4.109)	(3.430)	(3.208)	(3.259)
Year dummies	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes
Observations	308	308	308	308
Adjusted R-squared	0.659	0.364	0.635	0.548

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Blue-Collar Workers with Cost-of-Living Measure

The regression estimates of Equation 5, health-related benefits, and Equation 6, non-health-related benefits, for blue-collar workers are in Table 9. Overall, in comparison to the results from Equations 2 and 3, these regressions show that taxes have a slightly smaller effect on the offer rate of benefits when accounting for cost-of-living in the place where the benefit is offered. Seven of the ten regressions have a negative coefficient on the tax price variable, the same number seen in the results without the cost-of-living measure. Additionally, the pension regression is somewhat less significant with a p-value of 0.032 as opposed to 0.003 in the earlier model. This leaves the tax price coefficient statistically significant in four of the ten regressions: pension plans, drug and alcohol treatment programs, firm-financed life insurance, and firm-financed pension plans. The insignificance of the tax price variable on the other regressions is not surprising in light of the previous explanations. The near-universal offering of medical and life insurance likely explains the lack of tax effect in those regressions. The tax price coefficient in the paid sick leave regression is negative and insignificant, confirming that this model does not miss state-level unobservables but showing evidence against the substitution story.

I evaluated the mean probability of each benefit, as in the baseline regression, to see the effect of a one percentage point increase in the marginal tax rate, as in Table 8. A one percentage point increase in the marginal tax rate will increase the percentage of workers offered pension plans by 0.41 percent. The effect of the same tax increase is 0.31 percent for drug and alcohol treatment programs, 0.37 for firm-financed life insurance and 0.44 percent for firm-financed pension plans. I would argue that this seemingly small increase *is* practically significant. Four tenths of a percent of the 181,078 blue-collar workers evaluated in the 1995 Charlotte-Gastonia-Rock Hill survey is 737 people. If the states of North Carolina and South

Carolina increased their marginal tax rate by one percent, those 737 people would likely get offered pension plans when they had not previously. Changes in state tax rates greater than one percent are also not atypical; in Ohio, for example, where the income tax was eliminated from 1984-1986, it was introduced in 1987 at 4.72 percent. This likely resulted in about two percent more of the working population being offered pension plans. Expanding these numbers to a national level shows that a one percent increase in the Federal marginal tax rate would result in 915,300 more Americans being offered pension plans, assuming there are roughly 225 million Americans under 65 years of age.[55]

Table 8. Increase in Offer Rate of Blue-Collar Benefits Due to a 1% Increase in the Marginal Tax Rate

Pension Plans	0.4068 %
Drug and Alcohol Treatment	0.3148 %
Firm-Financed Life Insurance	0.3738 %
Firm-Financed Pension Plans	0.4351 %

Quality-adjusted rent, the measure of cost-of-living, is negative in eight of the ten regressions and statistically significant in four of the eight. This means that there is a lesser chance of being offered benefits in areas with a high cost-of-living than in cheaper areas. It is possible that the cost-of-living measure is correlated to healthcare costs, and if so, places with higher rents would be expected to have higher premiums on their insurance, which could explain the negative sign. This negative effect supports the compensating differential story that benefits are a substitute for income as components of compensation packages and pretax compensation in the form of income is higher in high cost-of-living areas. If you consider two people with the

[55] If we take the population of the U.S. to be 300 million and, given the average life expectancy is around 80, assume that the population is split evenly in the age groups, roughly one quarter are above 65 years of age. Thus, 75% of 300 million is 225 million people that are eligible for employer-sponsored insurance.

same wage in 1989, one of whom lives in New York City (Rent=$9084) and the other in Huntsville, Alabama (Rent=$2996.1), the person living in New York will demand a greater proportion of their compensation in the form of income, rather than benefits, simply to pay their rent.

Trends similar to those seen in the baseline regressions are found for other explanatory variables as well. The estimated wage coefficient is positive and statistically significant at the five percent level in all ten regressions. Union is positive and statistically significant at the five percent level in four regressions. The year dummy variables are very similar to the baseline regression dummy variables: the coefficients are negative and increasing in magnitude in the later years for all benefits except dental care and firm-financed life insurance. The census division dummy variables differ from the baseline regression in that, in this model, New England has the highest coefficient in the great majority of the regressions and is significant in four of the ten.

Table 9. Fringe Benefits for Blue-Collar Workers Including a Cost-of-Living Measure

	Medical	Dental	Life	Pension	Vision	Hearing	Drug & Alcohol
ln(1-TAX)	-0.0445	-1.129	0.269	-2.246**	1.581	1.389	-4.963*
	(1.718)	(0.984)	(1.180)	(1.043)	(1.666)	(2.304)	(2.526)
ln(Healthcare Costs)	-0.204	0.550*			0.715*	1.041*	-0.380
	(0.522)	(0.299)			(0.405)	(0.565)	(0.614)
ln(Real Hourly Wage)	1.883***	1.671***	1.497***	1.104***	0.835***	0.848**	1.289***
	(0.306)	(0.175)	(0.224)	(0.198)	(0.264)	(0.366)	(0.400)
Age	-0.0669	-0.0510**	-0.105***	-0.0630**	0.00695	-0.0501	-0.0505
	(0.0446)	(0.0256)	(0.0330)	(0.0291)	(0.0404)	(0.0560)	(0.0612)
High School Education	-0.00390	0.0575***	-0.00632	0.0132	0.0580**	0.0419	0.0587
	(0.0281)	(0.0161)	(0.0206)	(0.0183)	(0.0235)	(0.0325)	(0.0357)
College Education	0.0821	-0.0678**	-0.00223	0.00611	-0.0992**	-0.0974	-0.0245
	(0.0526)	(0.0301)	(0.0385)	(0.0339)	(0.0431)	(0.0595)	(0.0653)
Advanced Education	-0.234***	0.0865**	-0.0719	-0.0195	0.117*	0.0786	-0.0408
	(0.0756)	(0.0433)	(0.0560)	(0.0493)	(0.0631)	(0.0872)	(0.0956)
Union	0.0321	0.00368	-0.0305*	0.0112	0.0504***	0.0883***	0.000458
	(0.0215)	(0.0123)	(0.0157)	(0.0139)	(0.0167)	(0.0231)	(0.0253)
ln(Quality-Adjusted Rent)	-0.757***	-0.160	-0.103	-0.564***	0.319*	0.00781	-0.247
	(0.244)	(0.140)	(0.181)	(0.160)	(0.191)	(0.264)	(0.290)
Constant	9.395	-3.159	4.060	13.89***	-20.03***	-17.57**	23.07**
	(6.517)	(3.725)	(4.765)	(4.205)	(5.954)	(8.193)	(9.026)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	338	339	338	337	200	196	200
Adjusted R-squared	0.547	0.700	0.459	0.545	0.677	0.517	0.331

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9 Continued. Fringe Benefits for Blue-Collar Workers Including a Cost-of-Living Measure

	Medical From Firm	Life From Firm	Pension From Firm	Paid Sick Leave
ln(1-TAX)	-1.633	-2.039**	-1.576*	-0.255
	(1.084)	(0.891)	(0.884)	(1.044)
ln(Healthcare Costs)	0.750**			
	(0.330)			
ln(Real Hourly Wage)	1.241***	0.801***	0.799***	0.435**
	(0.193)	(0.169)	(0.168)	(0.199)
Age	0.00726	0.0124	-0.0116	0.0141
	(0.0282)	(0.0249)	(0.0247)	(0.0292)
High School Education	-0.0189	-0.0183	0.00966	0.0106
	(0.0177)	(0.0155)	(0.0155)	(0.0182)
College Education	0.0555*	0.0384	0.0202	0.0342
	(0.0332)	(0.0291)	(0.0287)	(0.0340)
Advanced Education	-0.183***	-0.102**	-0.0404	0.00194
	(0.0477)	(0.0423)	(0.0418)	(0.0495)
Union	0.0778***	0.0277**	0.0193	0.0130
	(0.0136)	(0.0119)	(0.0118)	(0.0139)
ln(Quality-Adjusted Rent)	-0.316**	-0.00584	-0.495***	1.117***
	(0.154)	(0.137)	(0.136)	(0.160)
Constant	2.856	8.613**	8.877**	-12.07***
	(4.104)	(3.599)	(3.563)	(4.217)
Year dummies	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes
Observations	339	338	337	338
Adjusted R-squared	0.811	0.508	0.662	0.621

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

White-Collar Workers with Cost-of-Living Measure

The regression estimates of Equation 5, health-related benefits, and Equation 6, non-health-related benefits, for white-collar workers are in Table 11. This model replicates the finding of the baseline model that marginal changes in taxes do not influence the decision to offer benefits for white-collar workers as strongly as they do for blue-collar workers. The estimated tax price coefficient is negative in seven of the ten regressions and statistically significant at the ten percent level only in the drug and alcohol treatment regression. Evaluated at the mean, a one percent increase in the marginal tax rate translates into a 0.88 percent increase in the offer of drug and alcohol treatment programs for white-collar workers, see Table 10. The estimated coefficient on the tax price variable is positive and statistically significant at the five percent level for the vision care regression. The estimated coefficient on the wage variable is positive in eight of the ten regressions and significant in four of the eight. This is a similar degree of significance as seen in the baseline white-collar regression for the wage variable, indicating that, amongst white-collar workers, benefits are a normal good and that the amount of the two forms of compensation – pay and benefits – are correlated, even when cost-of-living is controlled for.

Table 10. Increase in Offer Rate of White-Collar Benefits Due to a 1% Increase in the Marginal Tax Rate

Drug and Alcohol Treatment	0.8765 %

The quality-adjusted rent variable is negative in seven regressions and significant in four of the seven. This reaffirms the compensating differential story: when cost-of-living is higher, fewer benefits are offered, so it seems that compensation is substituted away from benefits

towards income in high cost-of-living areas. There is a strong correlation between home ownership and income, meaning that fewer white-collar workers would be expected to rent than blue-collar workers, raising the possibility that this is not an appropriate measure of white-collar cost-of-living. However, Chen and Rosenthal's (2008) cost-of-living measure includes owner-occupied housing values that were converted to rents, so it is suitable.

The coefficient on the union variable is positive and statistically significant at the ten percent level in two regressions and the five percent level in another compared to three at the one percent level and one at the five percent level for blue-collar workers, but that would be expected because traditionally a lower proportion of white-collar workers are union members than blue-collar workers. The adjusted R^2's are very similar to those in the baseline regressions. The paid sick leave regression has a positive and insignificant estimated coefficient on the tax price variable, serving as a falsification check and suggesting that employers do substitute towards tax-advantaged components of their benefits packages in high-tax states.

Table 11. Fringe Benefits for White-Collar Workers Including a Cost-of-Living Measure

	Medical	Dental	Life	Pension	Vision	Hearing	Drug & Alcohol
ln(1-TAX)	-1.411	-0.178	-1.789	-0.0568	3.546**	0.898	-5.792*
	(2.070)	(1.054)	(1.313)	(1.195)	(1.399)	(2.103)	(3.158)
ln(Healthcare Costs)	0.0213	0.787*			0.601	-0.122	0.677
	(0.828)	(0.421)			(0.484)	(0.733)	(1.078)
ln(Real Hourly Wage)	-1.639*	1.146***	0.0937	-0.558	1.135**	1.496*	1.060
	(0.833)	(0.424)	(0.602)	(0.548)	(0.505)	(0.759)	(1.076)
Age	-0.246***	-0.0448	-0.0806	-0.180***	0.0334	0.0123	-0.295***
	(0.0704)	(0.0359)	(0.0506)	(0.0460)	(0.0459)	(0.0689)	(0.0978)
High School Education	0.0252	0.109***	0.00432	-0.00345	0.0431	0.0484	0.124*
	(0.0457)	(0.0233)	(0.0311)	(0.0285)	(0.0285)	(0.0427)	(0.0631)
College Education	-0.0836	-0.0869**	-0.0174	-0.0244	-0.153***	-0.0522	-0.117
	(0.0788)	(0.0401)	(0.0553)	(0.0496)	(0.0466)	(0.0700)	(0.102)
Advanced Education	-0.0500	0.130**	-0.0282	-0.00685	0.242***	0.132	0.0993
	(0.111)	(0.0563)	(0.0789)	(0.0704)	(0.0656)	(0.0985)	(0.148)
Union	0.0618*	0.0260	-0.0110	0.0164	0.0194	0.0662**	0.0130
	(0.0340)	(0.0173)	(0.0229)	(0.0208)	(0.0188)	(0.0282)	(0.0427)
ln(Quality-Adjusted Rent)	-0.430	-0.159	0.00306	-0.592**	0.0973	0.0606	-0.359
	(0.366)	(0.187)	(0.268)	(0.242)	(0.214)	(0.321)	(0.454)
Constant	26.27***	-12.71***	14.51***	15.51***	-26.85***	-13.48*	25.69**
	(7.593)	(3.866)	(5.224)	(4.742)	(4.706)	(7.042)	(10.31)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	308	308	306	308	178	174	176
Adjusted R-squared	0.596	0.739	0.422	0.427	0.770	0.588	0.420

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11 Continued. Fringe Benefits for White-Collar Workers Including a Cost-of-Living Measure

	Medical From Firm	Life From Firm	Pension From Firm	Paid Sick Leave
ln(1-TAX)	-1.365	-1.079	1.017	0.657
	(1.130)	(0.871)	(0.825)	(0.836)
ln(Healthcare Costs)	0.880*			
	(0.452)			
ln(Real Hourly Wage)	0.691	1.718***	0.0912	1.974***
	(0.454)	(0.399)	(0.378)	(0.383)
Age	-0.00947	0.0597*	-0.0247	-0.0300
	(0.0384)	(0.0335)	(0.0317)	(0.0322)
High School Education	0.0492**	-0.00878	0.0111	0.0166
	(0.0250)	(0.0206)	(0.0196)	(0.0198)
College Education	-0.0805*	-0.0176	-0.104***	0.00374
	(0.0430)	(0.0365)	(0.0343)	(0.0351)
Advanced Education	0.0500	0.0647	0.108**	0.0501
	(0.0603)	(0.0521)	(0.0486)	(0.0501)
Union	0.0336*	0.00933	0.0225	-0.00534
	(0.0186)	(0.0151)	(0.0144)	(0.0145)
ln(Quality-Adjusted Rent)	-0.529***	-0.566***	-0.314*	0.338**
	(0.200)	(0.177)	(0.167)	(0.170)
Constant	-0.101	4.187	0.931	-10.73***
	(4.144)	(3.464)	(3.273)	(3.327)
Year dummies	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes
Observations	308	308	308	308
Adjusted R-squared	0.667	0.384	0.638	0.553

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Pooled Sample with Worker Type Dummy Variable

Regression estimates of Equation 7, health-related benefits, and Equation 8, non health-related benefits, are in Table 13. This model provides the simplest picture of how marginal changes in tax policy influence the offer rate of benefits. The estimated tax price coefficient is negative in nine of the ten regressions – vision is once again the outlier. This coefficient is statistically significant at the one percent level in four regressions and at the ten percent level in one other. Thus, in the pooled sample the theme that was repeated in the two previous models is clearly apparent: taxes influence the offer rates of some benefits but not others. Medical insurance and life insurance exhibit no tax effect, probably due to their widespread prevalence; and vision and hearing show no tax effect. Firm-financed pension plans show no tax effect in this model, unlike in the baseline specification for blue-collar workers. It is possible that white-collar workers have alternative savings vehicles available to them and therefore do not demand firm-financed pension plans; when the white-collar sample is added to the blue-collar sample, the firm-financed blue-collar pension plan tax effect is eliminated. The estimated tax price coefficient on the paid sick leave regression is positive and statistically insignificant, as expected, and again, showing evidence for the substitution story.

The effects of a one percentage point increase in the marginal tax rate, evaluated at the mean probability, are in Table 12. Increasing the marginal tax rate one percent results in an offer increase of 0.31 percent for dental care, 0.48 percent for pension plans, 0.70 percent for drug and alcohol treatment program, 0.72 percent for firm-financed medical insurance and 0.47 percent for firm-financed life insurance.

Table 12. Increase in Offer Rate of Benefits For All Workers Due to a 1% Increase in the Marginal Tax Rate

Dental Care	.3138 %
Pension Plans	.4794 %
Drug and Alcohol Treatment	.6990 %
Firm-Financed Medical Insurance	.7230 %
Firm-Financed Life Insurance	.4706 %

The worker type dummy variable, Blue, is equal to one if that observation is an average of blue-collar workers. The estimated coefficient on the worker type dummy is positive in eight of the ten regressions – medical and life insurance are the outliers. It is statistically significant at the five percent level in six of the eight. This means that the offer of benefits to blue-collar workers is more responsive to marginal changes in taxes than the offer to white-collar workers is, confirming the results from the separate white- and blue-collar regressions. Again, similar trends are seen for other explanatory variables; the estimated coefficient on the wage variable is positive and statistically significant at the one percent level in all ten regressions. The healthcare costs variable shows support for the demand story again, with higher healthcare costs correlated to a higher rate of benefit offering. Union is positive in nine of the ten regressions and statistically significant at the five percent level in five of the nine, reaffirming that unions play an important role in bargaining for benefits.

On the whole, marginal changes in tax policy influence the benefits that are on the intensive margin. Benefits that are commonly offered do not show a tax effect, probably because employers must offer them to attract good workers so the tax rate is of little consequence. According to the summary statistics, less than 7 percent of employers do not offer medical or life insurance. It is interesting that the two extremely fringe benefits – 35 percent of employers offer vision care and only 17 percent hearing care – are two of the three benefits that are more

common for blue-collar workers than white-collar. The union variable is always positive and statistically significant at the five percent level for vision and hearing for blue-collar workers, in the pooled model, the baseline specification and the baseline specification with a cost-of-living adjustment. Thus, it seems that these benefits are more responsive to union bargaining than tax policy.

The benefits that consistently show tax effects in all three models are pension plans, drug and alcohol treatment programs, firm-financed life insurance and either firm-financed pension plans or firm-financed medical insurance. Pension plans and drug and alcohol treatment programs are not ubiquitously offered: 78 percent of employees had pension plans offered to them in my sample and 86 percent drug and alcohol treatment programs. I would argue that this middle range makes it easier for employers to respond to changes in tax policy because not offering a drug and alcohol treatment program will not make them lose employees, but on the other hand, if it is cheap, why not give the benefit and boost company morale. It also appears that when firms make a decision to offer a certain benefit, life insurance for example, tax policy is important in determining if they finance the benefit completely or if they offer it as a cost-sharing plan between the firm and the employee.

Table 13. Fringe Benefits for Pooled Sample with Worker Type Dummy Variable

	Medical	Dental	Life	Pension	Vision	Hearing	Drug & Alcohol
ln(1-TAX)	-1.758	-1.078*	-1.154	-2.103***	1.771*	-0.101	-6.470***
	(1.223)	(0.643)	(0.818)	(0.719)	(1.004)	(1.397)	(1.798)
Blue-Collar dummy	-0.282	0.781***	-0.524**	0.296	0.701***	0.970***	1.176**
	(0.324)	(0.170)	(0.221)	(0.195)	(0.256)	(0.355)	(0.457)
ln(Healthcare Costs)	-0.263	0.604**			0.903***	0.730*	-0.0123
	(0.463)	(0.243)			(0.311)	(0.437)	(0.553)
ln(Real Hourly Wage)	0.765***	1.342***	0.682***	0.678***	1.181***	0.946***	0.953***
	(0.225)	(0.118)	(0.163)	(0.143)	(0.174)	(0.242)	(0.306)
Age	-0.128***	-0.0485**	-0.0937***	-0.0983***	0.0241	-0.0153	-0.136**
	(0.0401)	(0.0211)	(0.0291)	(0.0255)	(0.0310)	(0.0432)	(0.0544)
High School Education	0.0460**	0.0871***	0.00401	0.0403***	0.0478***	0.0471**	0.0982***
	(0.0233)	(0.0122)	(0.0165)	(0.0146)	(0.0171)	(0.0238)	(0.0304)
College Education	-0.0558	-0.0979***	-0.0187	-0.0711***	-0.112***	-0.0753*	-0.0876
	(0.0414)	(0.0217)	(0.0297)	(0.0256)	(0.0305)	(0.0425)	(0.0541)
Advanced Education	-0.0848	0.127***	-0.0418	0.0456	0.164***	0.102	0.0523
	(0.0633)	(0.0333)	(0.0463)	(0.0400)	(0.0459)	(0.0639)	(0.0820)
Union	0.0472**	0.0149	-0.0164	0.0125	0.0273**	0.0706***	0.00655
	(0.0187)	(0.00984)	(0.0133)	(0.0117)	(0.0123)	(0.0171)	(0.0221)
Constant	12.67***	-7.179***	10.91***	9.977***	-20.85***	-12.16**	24.39***
	(4.560)	(2.385)	(3.144)	(2.762)	(3.523)	(4.882)	(6.168)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	646	647	644	645	378	370	376
Adjusted R-squared	0.580	0.759	0.605	0.562	0.707	0.546	0.517

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13 Continued. Fringe Benefits for Pooled Sample with Worker Type Dummy Variable

	Medical From Firm	Life From Firm	Pension From Firm	Paid Sick Leave
ln(1-TAX)	-2.042***	-2.074***	-0.495	0.486
	(0.715)	(0.571)	(0.562)	(0.666)
Blue-Collar dummy	1.776***	0.896***	0.149	-1.566***
	(0.189)	(0.155)	(0.152)	(0.180)
ln(Healthcare Costs)	0.833***			
	(0.270)			
ln(Real Hourly Wage)	1.355***	1.039***	0.521***	0.450***
	(0.131)	(0.114)	(0.112)	(0.133)
Age	0.0115	0.0352*	-0.0155	-0.00266
	(0.0234)	(0.0203)	(0.0200)	(0.0237)
High School Education	0.0269**	-0.00540	0.0351***	-0.0295**
	(0.0136)	(0.0115)	(0.0114)	(0.0135)
College Education	-0.0383	-0.00313	-0.0714***	0.118***
	(0.0242)	(0.0207)	(0.0201)	(0.0241)
Advanced Education	-0.0547	-0.0156	0.0548*	-0.0722*
	(0.0370)	(0.0323)	(0.0313)	(0.0376)
Union	0.0566***	0.0140	0.0192**	0.0108
	(0.0109)	(0.00931)	(0.00916)	(0.0109)
Constant	-2.862	5.852***	0.327	-2.050
	(2.651)	(2.195)	(2.161)	(2.562)
Year dummies	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes
Observations	647	646	645	646
Adjusted R-squared	0.765	0.482	0.627	0.842

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Conclusion

Overall, I find that employers do respond to tax policy when deciding which fringe benefits to offer their employees. This effect is seen primarily cross-sectionally, by taking advantage of the between-state variation in marginal tax rates. While employers of both blue- and white-collar workers responded to the large change in the Federal marginal tax rate in 1986, the cross-sectional variation is more pronounced for blue-collar workers. Additionally, tax policy impacts the components of generous benefits packages such as dental care and pension plans more than basic benefits like medical and life insurance. These findings are very important for the recent healthcare reform debate in Congress. Since the aim of many congressmen was to reduce the "bells and whistles" coverage found in so-called "Cadillac plans," but to ensure that everyone has basic coverage, adjusting the income tax slightly would achieve this goal for blue-collar workers. However, since much of the overinsurance in "Cadillac plans" comes from generous fee-for-service medical insurance plans, those will need to be reigned in as well, and since taxes do not influence the extensive margin, they will not be of great help. The recent House amendment that exempted stand alone vision and dental care from the "Cadillac" premium level could be understood as allowing more generous health-related benefits packages, however, many dental care plans cover regular visits to dentists that prevent expensive visits to oral surgeons that would have to be covered by the medical insurance. In the same sense, it is cheaper to see an optometrist whose care is covered under vision care than an ophthalmologist, who would fall under medical. Understood this way, more rare fringe benefits like dental and vision care can actually help keep health expenditures lower.

Table 14 displays the elasticities with respect to tax price (1-TAX) for the benefits that show significant tax effects from the baseline model and the pooled model. As mentioned in the

Literature Review, most of the existing work on the topic of taxes and their relation to fringe benefits focuses on basic health insurance, rather than more fringe benefits like dental care. Therefore, the only basis of comparison is to tax-price offer elasticities for health insurance; Bernard and Selden find (-0.556), Royalty (-.734) and Gruber (-.648), to which my elasticities are sometimes smaller and sometimes larger in absolute value.

Table 14. Elasticity with Respect to Tax Price for Benefit Offering

Benefit	Blue-Collar Marginal Effect	Elasticity	White-Collar Marginal Effect	Elasticity	Pooled Marginal Effect	Elasticity
Dental Care					0.314	-0.329
Pension Plans	0.565	-0.602			0.479	-0.440
Drug and Alcohol Treatment	0.337	-0.314	0.862	-0.623	0.699	-0.580
Firm-Financed Medical Insurance	0.625	-0.903	0.468	-0.375	0.723	-1.00
Firm-Financed Life Insurance	0.376	-0.389	0.468	-0.375	0.471	-0.433
Firm-Financed Pension Plans	0.641	-0.795				

An interesting and unexpected story emerges about how total compensation differs in states with different tax rates. Benefits are offered to a larger percentage of the working population in high-tax states, as expected. The positive and very statistically significant wage variable means that higher income people are more likely to get benefits, suggesting that benefits are a normal good, contrary to the Roback model's compensating differential story. When a cost-of-living measure is added to the baseline regression the consistently negative coefficient implies that benefits are lower in high cost-of-living areas, which makes sense because workers get utility from their after-tax wage, so they will demand more compensation in the form of income. This result supports the compensating differential story with respect to cost-of-living but not taxes; it also supports another theme that has emerged in my results, that employee demand is likely the most important determinant of benefit offering. Several of my variables

attempt to pick up this employee demand – age, education, healthcare costs and unionization – but this qualitative factor is not easy to measure.

In addition to serving as a validation of my method, the regressions for the taxed benefit – paid sick leave – reveal an interesting trend pertaining to the composition of a firm's benefits package. The positive coefficient on the tax price variable in the paid sick leave regression, which occurs in every one of my models except blue-collar with cost-of-living adjustment, suggests that employers substitute away from taxed benefits in high tax states. Other examples of taxed benefits are bonuses, long-term care benefits, cash provided for meals and reimbursement for commuting costs. This estimated coefficient is not significant in any of the paid sick leave regressions, but further study of paid sick leave and other taxed benefits might confirm this trend which is intuitively appealing.

While the expected tax effect is found for blue-collar workers, it remains perplexing that neither I nor Gentry and Peress (1994) found an equivalent impact of marginal changes in tax policy on white-collar workers. As mentioned above, this result is puzzling because the nature of the tax exclusion for employer-sponsored benefits makes it worth more to people in higher marginal tax brackets. I would argue that it makes sense that white-collar workers are not as sensitive to small changes in taxes when it comes to the offer of their benefits because their marginal tax rates are always high enough to merit being offered the benefit. Perhaps there is some tax price threshold – around 30 percent – above which it always makes sense to offer benefits and it does not matter if the marginal tax rate is 31 percent or 34 percent.

Anne Beeson Royalty (2000) finds a tax effect for health insurance using data from 1988 and 1993, two years represented in my sample as well. Although she includes income in the regressions, she does not report the results, so it is not possible to directly compare white- and

blue-collar workers to an aggregated group. However, the magnitude of the effects she finds are much larger; for example, a one percent increase in the state tax rate raises the probability that a worker is eligible for health insurance by 0.8 percent – for comparison, my dental care marginal effect was 0.3 percent. Jonathon Gruber, also using years in my sample, finds that a one percentage point decrease in the tax price would result in a 0.94 percent increase in the offer of health insurance.

This method that measures the proportion of employees offered a benefit does not show as much of a tax effect for white-collar workers for four reasons. First, the sample size of white-collar workers is much smaller in the *Area Wage Survey* than that of blue-collar workers. I have 36,300,000 blue-collar workers represented in my sample and 24,500,000 white-collar workers. This could reflect less accuracy in the white-collar surveys, or it could be representative of the relative numbers of white- and blue-collar workers in the U.S.. The later is likely the case, as data from the Kaiser Family Foundation show that 61.9 percent of workers in the U.S. were blue-collar in 2008.[56]

Second, the advantage of using grouped data is that they capture the collective choice aspect of a firm's decision to offer benefits. I believe that a few influential individuals make this decision at the white-collar level as opposed to a vote, as is common in blue-collar unions and, therefore, individual data might be better suited to measure white-collar workers. Although I control for the percentage of workers in a state that are union members, and this variable is significant in the blue-collar regressions but not the white-collar ones, this does not provide information on how active those unions are at collective bargaining. I suspect that my methodology is not picking up all of the influence that unions exercise in bargaining for benefits, particularly in high tax states.

[56] (Kaiser, 2009c)

Third, this method assumes that employers make benefit-offering decisions separately in each state after considering that state's marginal tax rate. However, given the large number of national and international employers in the U.S. today, this assumption may not be valid. In other words, this method works best for local and state-wide employers. Management of a company that is in more than a few states might set a uniform benefits package that is based on the income tax rate in the state in which the headquarters is located. It is probable that the number of firms with a presence in multiple states has increased in the last twenty years in the U.S., and the newer data is, therefore, more susceptible to this measurement error than the data used in Gentry and Peress (1994). This would explain the discrepancy between their results and my own, though we use a similar method and overlapping data.

Fourth, white-collar workers have inherently different characteristics than blue-collar workers. They are professionals with specific skills that cannot be put to use everywhere and are, therefore, more mobile and would easily relocate for a new job. Of Gruber and Madrian's (2004) estimate that between 10 and 35 percent of job transfers are prohibited by job lock, it would be interesting to know what percentage of that is white-collar workers. However, since a greater proportion of white-collar workers are offered all benefits except hearing care, vision care and firm-financed medical insurance, there is a greater chance that if a white-collar worker moves to another company, he or she will be offered benefits there as well – and they are likely to demand them inelastically. Overall, I would guess that job lock is a minor concern for white-collar workers in comparison to blue-collar workers. White-collar workers are also likely more conscious of taxes, since they face a higher marginal rate and might chose to live in a state with low income tax. This would leave a smaller proportion of white-collar workers in high-tax states who would have less influence in the benefits decisions. Most importantly, more white-collar

jobs are with firms that have a presence in more than one state, so the assumption discussed directly above is violated more strongly by white-collar workers than by blue-collar.

In conclusion, this analysis shows that tax policy influences employers of primarily blue-collar workers when they are deciding what benefits to offer. Unlike Gentry and Peress (1994), who find that tax policy influences both the extensive margin of whether an employer offers basic benefits and the intensive margin of how many benefits they offer, I only find a tax effect on the latter margin. I find less of tax effect for white-collar workers; though this result is counterintuitive, possible explanations for it have been mentioned above. Thus, tax policy is a potent tool to manipulate the degree of generosity healthcare benefits, life insurance and pension plans that employees receive, and policy-makers should be cognizant of this.

Appendix

Appendix I: Details on the *Area Wage Surveys*

The following was taken directly from the appendix of the *Area Wage Survey* in 1980 and describes the qualifications used to determine benefits.

"Hospitalization, surgical, and medical insurance plans reported here in these surveys provide full or partial payment for basic services rendered. Hospitalization insurance covers doctors' fees for home, office, or hospitals calls. Plans restricted to post-operative medical care or a doctor's care for minor ailments at a worker's place of employment are not considered to be medical insurance. Dental insurance plans provide normal dental service benefits, usually for fillings, extractions, and X-rays. Plans which provide benefits for only oral surgery or repairing accident damage are not reported. Retirement pension plans provide for regular payments to the retiree for life. Included are deferred profit-sharing plans which provide the option of purchasing a lifetime annuity."

The following describes the computer programmer and janitorial professions according to the *Area Wage Survey* in 1980.

“Computer Programmer, Business: converts statements of business problems, typically prepared by a systems analyst, into a sequence of detailed instructions which are required to solve the problems by automatic data processing equipment. Working from charts or diagrams, the programmer develops the precise instructions which, when entered into the computer system in coded language, cause the manipulation of data to achieve desired results. Work involves most of the following: Applies knowledge of computer capabilities, mathematics, logic employed by computers, and particular subject matter involved to analyze charts and diagrams of the problem to be programmed; develops sequence of program steps; writes detailed flow charts to show order in which data will be processed; converts these charts to coded instructions for machine to follow; tests and corrects programs; prepares instructions for operating personnel during production run; analyzes, reviews, and alters programs to increase operating efficiency or adapt to new requirements; maintains records of program development and revisions. (NOTE: Workers performing both systems analysis and programming should be classified as systems analysts if this is the skill used to determine their pay.) Does not include employees primarily responsible for the management or supervision of other electronic data processing employees, or programmer primarily concerned with scientific and or engineering problems.

Janitor, Porter, or Cleaner: Cleans and keeps in an orderly condition factory working areas and washrooms, or premises of an office, apartment house, or commercial or other establishment. Duties involve a combination of the following: sweeping, mopping or scrubbing, and polishing floors; removing chips, trash, and other refuse; dusting equipment, furniture, or fixtures; polishing metal fixtures or trimmings; providing supplies and minor maintenance services; and cleaning lavatories, showers, and restrooms. Workers who specialize in window washing are excluded.”

Appendix II: Example TAXSIM Input

1	1. Case ID (arbitrary, but must be a non-negative numeric)
1980	2. Tax year (4 digits between 1960 and 2013, but state must be zero if year is before 1977 or after 2008. We don't have code for state laws before 1977.) Indexed tax parameters are inflated by 2.5%/year after 2007.
1	3. State (SOI codes. These run from 1 for Alabama to 51 for Wyoming and are not the Census or PSID codes. See state list, and also item two above.). Use zero for "no state tax calculation".
2	4. Marital Status (1. single 2. joint 3. head of household 8. Dependent taxpayer)
1	5. Dependent Exemptions (including children of all ages, but see #19 below)
0	6. Number of taxpayers over 65 years of age.
22157	7. Wage and salary income of Taxpayer (include self-employment).
11079	8. Wage and salary income of Spouse (include self-employment).
0	9. Dividend income (qualified dividends only for 2003 on).
0	10. Other property income, including interest, rent, alimony, fellowships non-qualified dividends and other income or loss not otherwise enumerated here. Adjustments such as Keogh and IRA can be entered here as negative income.(+/-)
0	11. Taxable Pensions
0	12. Gross Social Security Benefits
0	13. Other non-taxable transfer Income such as welfare, municipal bond interest, and child support that would affect eligibility for state property tax rebates but would not be taxable at the federal level.
0	14. Rent Paid (used only for calculating state property tax rebates)
0	15. Property taxes paid. This is a preference for the AMT and is also used to calculate state property tax rebates.
0	16. Itemized deductions other than mortgage, state income tax and local property tax. If you have medical expenses remember to only include the excess over 3%,5% or 7,5% of AGI (for years 60-82, 83-86 and 87+). These are regarded as preferences for the AMT.
0	17. Child care expenses.

0 18. Unemployment compensation received.

1 19. Number of dependents under age 17 (for child credit, not more than item 5).

0 20. Mortgage Interest and possibly other deductions not a preference for the AMT, including charitable contributions, casualty losses in excess of 10% of AGI and medical expenses between 7.5% and 10% of AGI.

0 21. Sort Term Capital Gains or losses. (+/-)

0 22. Long Term Capital Gains or losses. (+/-)

Appendix III: Regression Results Using Simple Linear Probability Model

Simple Linear Probability Model: Fringe Benefits for Blue-Collar Workers

	Medical	Dental	Life	Pension	Vision	Hearing	Drug & Alcohol
ln(1-TAX)	-6.356	-23.24	2.350	-50.34***	40.40	-0.971	-38.58
	(14.42)	(18.53)	(8.610)	(14.81)	(32.64)	(29.36)	(27.97)
ln(Healthcare Costs)	-0.484	9.056			15.55*	14.80**	-0.136
	(4.464)	(5.740)			(8.077)	(7.342)	(6.922)
ln(Real Hourly Wage)	7.310***	30.38***	10.66***	14.46***	22.54***	10.61**	13.99***
	(2.490)	(3.202)	(1.601)	(2.753)	(4.965)	(4.486)	(4.255)
Age	-0.581	-1.114**	-0.817***	-0.829*	-0.0237	-0.972	-0.311
	(0.381)	(0.490)	(0.246)	(0.424)	(0.809)	(0.730)	(0.693)
High School Education	0.378*	1.015***	0.0172	0.721***	0.917**	1.167***	0.545
	(0.221)	(0.284)	(0.141)	(0.244)	(0.440)	(0.396)	(0.377)
College Education	-0.434	-1.554***	-0.0301	-0.779*	-1.613**	-1.393*	-0.209
	(0.399)	(0.513)	(0.255)	(0.435)	(0.815)	(0.733)	(0.699)
Advanced Education	-0.785	2.107***	-0.748*	0.497	1.925	0.462	-0.662
	(0.620)	(0.797)	(0.403)	(0.688)	(1.248)	(1.123)	(1.070)
Union	0.147	0.101	-0.191	0.286	1.022***	1.453***	0.302
	(0.184)	(0.236)	(0.117)	(0.202)	(0.333)	(0.300)	(0.286)
Constant	117.1**	-0.390	93.09***	235.3***	-336.5***	-151.4	196.0*
	(55.31)	(70.87)	(35.27)	(60.62)	(119.4)	(106.9)	(102.3)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	338	339	338	337	200	196	200
R-squared	0.645	0.746	0.554	0.700	0.741	0.630	0.429

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Simple Linear Probability Model Continued: Fringe Benefits for Blue-Collar Workers

	Medical From Firm	Life From Firm	Pension From Firm	Paid Sick Leave
ln(1-TAX)	-26.81	-33.60**	-47.29**	27.12
	(21.70)	(14.53)	(18.56)	(23.42)
ln(Healthcare Costs)	15.70**			
	(6.719)			
ln(Real Hourly Wage)	23.61***	13.69***	12.19***	19.78***
	(3.748)	(2.701)	(3.451)	(4.355)
Age	0.210	0.215	-0.268	0.250
	(0.574)	(0.416)	(0.531)	(0.670)
High School Education	-0.140	-0.443*	0.628**	-0.779**
	(0.332)	(0.238)	(0.305)	(0.384)
College Education	0.506	0.991**	-0.433	2.816***
	(0.600)	(0.431)	(0.545)	(0.694)
Advanced Education	-3.354***	-2.320***	-0.268	-1.308
	(0.933)	(0.680)	(0.863)	(1.097)
Union	1.551***	0.493**	0.368	0.152
	(0.277)	(0.198)	(0.253)	(0.320)
Constant	18.04	203.6***	201.5***	-120.1
	(82.96)	(59.52)	(75.97)	(95.95)
Year dummies	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes
Observations	339	338	337	338
R-squared	0.838	0.581	0.688	0.614

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Simple Linear Probability Model: Fringe Benefits for White-Collar Workers

	Medical	Dental	Life	Pension	Vision	Hearing	Drug & Alcohol
ln(1-TAX)	-21.95**	-3.877	-8.416	-9.237	83.69***	13.01	-5.315
	(10.13)	(17.96)	(5.571)	(12.06)	(29.16)	(27.21)	(17.99)
ln(Healthcare Costs)	5.934	11.55			8.898	-4.012	3.873
	(4.103)	(7.277)			(10.31)	(9.689)	(6.299)
ln(Real Hourly Wage)	-10.53***	20.51***	3.877	-8.631*	25.95***	20.57**	2.493
	(3.744)	(6.640)	(2.358)	(5.094)	(9.551)	(8.910)	(5.587)
Age	-0.907***	-0.504	0.0120	-1.326***	0.556	-0.450	-0.871
	(0.349)	(0.619)	(0.218)	(0.472)	(0.978)	(0.912)	(0.572)
High School Education	0.360*	1.388***	0.0425	0.409	0.852	0.868	0.501
	(0.209)	(0.371)	(0.123)	(0.267)	(0.566)	(0.528)	(0.344)
College Education	-0.844**	-1.326**	-0.0416	-1.228***	-3.215***	-0.462	-0.579
	(0.357)	(0.633)	(0.218)	(0.461)	(0.940)	(0.876)	(0.568)
Advanced Education	0.521	2.123**	0.126	1.249*	5.265***	0.958	0.624
	(0.530)	(0.939)	(0.329)	(0.696)	(1.381)	(1.287)	(0.857)
Union	0.0458	0.197	-0.161*	0.0656	0.376	0.975***	0.0419
	(0.166)	(0.294)	(0.0968)	(0.210)	(0.394)	(0.368)	(0.248)
Constant	199.3***	-153.4**	120.1***	177.7***	-507.1***	-119.5	81.93
	(36.94)	(65.50)	(21.96)	(47.49)	(99.84)	(92.63)	(60.19)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	308	308	308	308	178	174	176
R-squared	0.700	0.715	0.337	0.611	0.813	0.719	0.485

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Simple Linear Probability Model Continued: Fringe Benefits for White-Collar Workers

	Medical From Firm	Life From Firm	Pension From Firm	Paid Sick Leave
ln(1-TAX)	-35.11	-23.62*	6.704	21.92*
	(23.47)	(12.86)	(15.87)	(12.70)
ln(Healthcare Costs)	19.33**			
	(9.509)			
ln(Real Hourly Wage)	3.364	17.62***	-1.915	29.26***
	(8.677)	(5.442)	(6.701)	(5.375)
Age	-0.335	1.179**	-0.349	-0.530
	(0.809)	(0.504)	(0.621)	(0.497)
High School Education	1.576***	0.201	0.532	0.0675
	(0.485)	(0.283)	(0.351)	(0.279)
College Education	-2.622***	-0.674	-2.652***	0.461
	(0.827)	(0.503)	(0.606)	(0.497)
Advanced Education	1.735	1.393*	2.819***	0.369
	(1.227)	(0.760)	(0.916)	(0.751)
Union	0.565	-0.0281	0.175	0.0265
	(0.384)	(0.223)	(0.276)	(0.221)
Constant	-10.79	72.67	64.69	-98.82**
	(85.60)	(50.69)	(62.48)	(50.06)
Year dummies	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes
Observations	308	308	308	308
R-squared	0.709	0.423	0.691	0.530

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Simple Linear Probability Model with Cost-of-Living Adjustment: Fringe Benefits for Blue-Collar Workers

	Medical	Dental	Life	Pension	Vision	Hearing	Drug & Alcohol
ln(1-TAX)	3.286	-21.38	5.575	-36.55**	32.25	4.043	-34.79
	(14.43)	(18.90)	(8.798)	(14.79)	(33.38)	(30.10)	(28.68)
ln(Healthcare Costs)	0.0653	9.161			14.62*	15.31**	0.293
	(4.388)	(5.750)			(8.110)	(7.380)	(6.968)
ln(Real Hourly Wage)	10.04***	30.90***	11.51***	18.04***	20.46***	11.88**	14.96***
	(2.567)	(3.364)	(1.674)	(2.814)	(5.281)	(4.785)	(4.538)
Age	-0.605	-1.118**	-0.825***	-0.860**	0.0114	-0.996	-0.327
	(0.375)	(0.491)	(0.246)	(0.413)	(0.809)	(0.731)	(0.695)
High School Education	0.0530	0.952***	-0.0859	0.288	1.111**	1.048**	0.454
	(0.236)	(0.309)	(0.154)	(0.259)	(0.471)	(0.425)	(0.405)
College Education	0.277	-1.417**	0.192	0.176	-1.939**	-1.195	-0.0574
	(0.442)	(0.578)	(0.287)	(0.481)	(0.863)	(0.777)	(0.741)
Advanced Education	-1.414**	1.985**	-0.937**	-0.329	2.156*	0.323	-0.769
	(0.635)	(0.832)	(0.418)	(0.699)	(1.263)	(1.139)	(1.086)
Union	0.153	0.102	-0.188	0.299	1.062***	1.428***	0.283
	(0.181)	(0.237)	(0.117)	(0.197)	(0.335)	(0.302)	(0.288)
ln(Quality-Adjusted Rent)	-7.164***	-1.378	-2.263*	-9.523***	4.387	-2.672	-2.038
	(2.049)	(2.685)	(1.351)	(2.268)	(3.826)	(3.454)	(3.288)
Constant	140.5**	4.496	101.7***	270.0***	-338.6***	-150.1	197.0*
	(54.74)	(71.59)	(35.54)	(59.62)	(119.3)	(107.0)	(102.5)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	338	339	338	337	200	196	200
R-squared	0.659	0.747	0.558	0.717	0.743	0.631	0.431

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Simple Linear Probability Model with Cost-of-Living Adjustment Continued: Fringe Benefits for Blue-Collar Workers

	Medical From Firm	Life From Firm	Pension From Firm	Paid Sick Leave
ln(1-TAX)	-16.92	-33.32**	-32.29*	-8.849
	(21.94)	(14.91)	(18.67)	(22.14)
ln(Healthcare Costs)	16.26**			
	(6.675)			
ln(Real Hourly Wage)	26.40***	13.77***	16.08***	10.38**
	(3.905)	(2.837)	(3.551)	(4.211)
Age	0.185	0.214	-0.302	0.337
	(0.570)	(0.417)	(0.521)	(0.618)
High School Education	-0.473	-0.452*	0.156	0.371
	(0.359)	(0.260)	(0.327)	(0.386)
College Education	1.236*	1.010**	0.606	0.339
	(0.671)	(0.486)	(0.607)	(0.722)
Advanced Education	-3.999***	-2.337***	-1.167	0.796
	(0.966)	(0.708)	(0.882)	(1.051)
Union	1.557***	0.493**	0.383	0.126
	(0.275)	(0.199)	(0.249)	(0.295)
ln(Quality-Adjusted Rent)	-7.340**	-0.195	-10.36***	25.24***
	(3.117)	(2.290)	(2.862)	(3.399)
Constant	44.06	204.3***	239.3***	-215.7**
	(83.10)	(60.24)	(75.24)	(89.42)
Year dummies	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes
Observations	339	338	337	338
R-squared	0.841	0.581	0.701	0.673

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Simple Linear Probability Model with Cost-of-Living Adjustment: Fringe Benefits for White-Collar Workers

	Medical	Dental	Life	Pension	Vision	Hearing	Drug & Alcohol
ln(1-TAX)	-22.94**	-3.288	-8.454	-3.227	83.30***	19.34	1.070
	(10.28)	(18.23)	(5.676)	(12.13)	(29.91)	(27.80)	(18.38)
ln(Healthcare Costs)	5.956	11.53			8.908	-4.194	3.531
	(4.108)	(7.290)			(10.34)	(9.685)	(6.275)
ln(Real Hourly Wage)	-11.56***	21.12***	3.837	-2.254	25.64**	25.61**	6.913
	(4.134)	(7.335)	(2.600)	(5.558)	(10.79)	(10.03)	(6.261)
Age	-0.907***	-0.504	0.0120	-1.323***	0.556	-0.457	-0.868
	(0.350)	(0.620)	(0.219)	(0.467)	(0.981)	(0.911)	(0.569)
High School Education	0.411*	1.357***	0.0444	0.0882	0.866	0.647	0.298
	(0.227)	(0.403)	(0.134)	(0.289)	(0.609)	(0.565)	(0.367)
College Education	-0.937**	-1.270*	-0.0450	-0.644	-3.235***	-0.138	-0.309
	(0.391)	(0.694)	(0.238)	(0.504)	(0.997)	(0.925)	(0.593)
Advanced Education	0.604	2.074**	0.129	0.727	5.279***	0.738	0.469
	(0.549)	(0.973)	(0.340)	(0.715)	(1.403)	(1.302)	(0.859)
Union	0.0280	0.207	-0.162	0.178	0.372	1.042***	0.0900
	(0.169)	(0.299)	(0.0987)	(0.211)	(0.401)	(0.373)	(0.248)
ln(Quality-Adjusted Rent)	1.070	-0.636	0.0419	-6.660***	0.283	-4.626	-4.063
	(1.819)	(3.227)	(1.155)	(2.454)	(4.564)	(4.243)	(2.643)
Constant	195.0***	-150.9**	119.9***	206.4***	-507.7***	-108.6	87.74
	(37.69)	(66.88)	(22.58)	(48.13)	(100.6)	(93.11)	(60.04)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	308	308	308	308	178	174	176
R-squared	0.701	0.715	0.337	0.622	0.813	0.722	0.493

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Simple Linear Probability Model with Cost-of-Living Adjustment Continued: Fringe Benefits for Blue-Collar Workers

	Medical From Firm	Life From Firm	Pension From Firm	Paid Sick Leave
ln(1-TAX)	-23.50	-16.75	11.83	18.24
	(23.45)	(12.91)	(16.08)	(12.89)
ln(Healthcare Costs)	19.07**			
	(9.373)			
ln(Real Hourly Wage)	15.37	24.84***	3.524	25.40***
	(9.431)	(5.912)	(7.368)	(5.903)
Age	-0.329	1.172**	-0.347	-0.526
	(0.797)	(0.497)	(0.618)	(0.496)
High School Education	0.977*	-0.159	0.259	0.260
	(0.518)	(0.305)	(0.383)	(0.305)
College Education	-1.523*	-0.0416	-2.154***	0.123
	(0.893)	(0.542)	(0.668)	(0.541)
Advanced Education	0.765	0.855	2.374**	0.657
	(1.252)	(0.772)	(0.947)	(0.771)
Union	0.775**	0.0948	0.270	-0.0393
	(0.385)	(0.224)	(0.280)	(0.224)
ln(Quality-Adjusted Rent)	-12.54***	-7.671***	-5.680*	4.103
	(4.150)	(2.627)	(3.253)	(2.623)
Constant	39.49	106.5**	89.17	-116.9**
	(86.00)	(51.34)	(63.81)	(51.26)
Year dummies	Yes	Yes	Yes	Yes
Census Division dummies	Yes	Yes	Yes	Yes
Observations	308	308	308	308
R-squared	0.718	0.440	0.694	0.534

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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