Health Care Tax Policy

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1 Introduction

Currently, the vast majority of health insurance in the United States is purchased through employer administered plans. These plans are given as compensation to employees however they are entirely tax exempt from personal income taxes. Sheils and Haught (2005) have shown that state and local tax expenditure on health care cost the state and federal government $209.9 billion in 2004. Approximately half of this amount this total is lost due to the exclusion of employer provided health insurance from the federal income tax [5].

In the absence of externalities, economists generally recommend an income tax or its theoretical equivalent—a value added tax without any exceptions for certain goods. Having exceptions to tax rules changes consumer behavior by distorting individuals' Marginal Rate of Substitution (MRS) and may lead to over-consumption of the tax-subsidized good.

The paper will examine whether or not health care is an exception to this rule of 'no exceptions' to the personal income tax. Although the purchase health care insurance in developing countries may create positive externalities, in OECD countries contagious diseases do not make up a large percentage of health expenditures. I will assume that there are no health care externalities in my model. One problem we will run into with health insurance is that of adverse selection. This paper develops a model in which taxing compensation in the form of health insurance at a lower rate than pecuniary earnings is Pareto improving in certain contexts where adverse selection is a problem.

2 Model

2.1 Firms

In this model, there are two types of firms: big firms and small firms. The two firms sell completely differentiated products where there is no substitutability between the two goods produced. One can think of the large firm as mining company or a natural resource extraction outfit and the small firm as a custom tailor. The price of one good will have no effect on the demand for the other good, except as though its wealth effect on consumers. The firms have the following profit function which is a variation of a model by Cutler and Madrian (1997) [2]:

$$p_j F_j(NL) - w_j NL - (1+\lambda_j)\pi_p h_c N - AN^{\alpha}\mathbf{1}(h_c > 0), \qquad s.t. \quad L \leq \bar{L} \tag{1}$$

N is number of workers employed and L is number of hours per year each employee works. It is impossible for firms to employ workers more hours than there are in a day, so L can be no greater than $\bar{L}$. [1] The employee wages are set at w_j. The subscript j is equal to either s in the small businesses profit function or b in the large businesses profit function.

The third and fourth term represent the additional costs employers incur if they provide health insurance. π_p is the actuarially fair value of one unit of health insurance. For instance, if the average chance that someone in the worker pool will become ill is 1% and the cost of treating the illness is $100, then $\pi_p = 1$. To simplify the analysis, I assume there is only one disease which affects workers. The $(1+\lambda_j)$ term represents the load factor which is decided by insurance companies. This is the premium insurers charge for administrative costs and additional charges to prevent adverse selection. I assume that $\lambda_b < \lambda_s$. There are two justifications for this. The first is that large firms with more employees have a smaller risk of adverse selection than do smaller firms. Secondly, insurance companies have lower costs per employee enrolled for large firms than for small firms. The overhead costs for insurance firms to administer employer-based insurance plans get spread over more employees in large firms. Gruber (2001) [4] states that a 1988 Congressional Research Service report finds that loading factors on health insurance are 35% higher for the smallest firms than the largest firms.

The final term represents the cost that businesses incur in order to administer health insurance to their employees. This could either be the need

[1] Capital is excluded from this model, but its inclusion would not change the outcome. Firms would simply set the marginal product of capital equal to the interest rate.

to hire additional 'backroom' human resource employees to administer the insurance plan, or hiring an employee benefits consulting firm to supervise the plan. I assume $\alpha \in (0,1)$ so that cost increases as more employees receive health care, but these cost increases occur at a continually decreasing rate. $\mathbf{1}(h_c > 0)$ is an indicator function which is set equal to 1 if the employer offers any health insurance and is set equal to 0 if the employer does not offer health insurance.

Firms are profit maximizers so for large businesses we have the first order conditions are:

$$F_b^{'}(NL) = w_b/p_b \tag{2}$$

$$F_b^{'}(NL) = \frac{w_b}{p_b} + \frac{(1+\lambda_b)\pi_p h_c}{p_b} + \frac{A\mathbf{1}(h_c > 0)}{N^{1-\alpha}p_b} \tag{3}$$

I assume that the F_b is such that large business employ many employees. Since $\lim_{N\to\infty} \frac{A}{N^{1-\alpha}p_b} = 0$, I assume that the fixed cost of administering benefits has no impact for large firms on the hiring decision of the marginal worker.

And similarly for small businesses we have:

$$F_s^{'}(NL) = w_s/p_s \tag{4}$$

$$F_s^{'}(NL) = \frac{w_s}{p_s} + \frac{(1+\lambda_s)\pi_p h_c}{p_s} + \frac{A\mathbf{1}(h_c > 0)}{N^{1-\alpha}p_s} \tag{5}$$

Since small businesses by definition have few employees, the F_s production function will be such that N will not be 'large' and thus the final fixed cost term will be non-trivial in terms of its marginal decision regarding the number of employees to hire.

2.2 Workers

Workers are utility maximizers. There are two dimensions upon which we can differentiate workers. The first is whether the individual is employed in a small firm or a large firm. I assume that the two labor markets are completely differentiated and it is impossible for workers employed at a small firm to switch to a big firm and vice versa. For instance, a mining extraction firm would never hire a tailor for any positive wage. Similarly, a custom suit tailor store would never hire a geological engineer at positive wage. Another justification for this assumption is that certain people enjoy working for a small firm—because they feel they contribute more to the 'bottom line'—or for a large firm—because the firm has name recognition.

The second dimension upon which workers are separated is their risk of illness. There are two types of workers, those with a high risk of sickness and those with a low risk of sickness. Their risk of getting sick is π_L for low risk workers and π_H for high risk workers. In both the large firm and small firm worker pool, half of the potential employees are low risk and half are high risk. Their utility function is based on a model by Thomasson (2000) [6]:

$$max_{c,h,l} \quad (1-\pi_i)c + \pi_i[c - S + \beta ln(1+h+h_c)] \tag{6}$$
$$s.t. \quad c + (1+\lambda_{ind})\pi_i h + w_j l \leq w_j \bar{L} + Y$$
$$s.t. \quad l + L = \bar{L}$$

c represents a general basket consumer goods. S represents the disutility from getting sick. l is hours of leisure and L is the hours of labor supplied. h is the amount of health insurance purchased by the individual and h_c is the amount of health insurance given by a worker's employer. Y represents non-labor income. λ_{ind} is the load factor workers face when they privately purchase insurance. Here, $\lambda_{ind} > \lambda_s > \lambda_b$ for the same reasons listed above as to why $\lambda_s > \lambda_b$. The first order conditions, will give us the following demand equations.

$$h_0^* = \frac{\beta}{(1+\lambda_{ind})} - 1 - h_c \tag{7}$$

$$L^* = \bar{L} \qquad l = 0 \tag{8}$$

$$c_0^* = w_j^o \bar{L} + Y - (1+\lambda_{ind})\pi_i h_0^*$$
$$c_0^* = w_j^o \bar{L} + Y - \pi_i[\beta - (1+\lambda_{ind}) - (1+\lambda_{ind})h_c] \tag{9}$$

I would like to note a few implications of this model that are important. First, labor is supplied completely inelastically. This assumption is not realistic, however conventional wisdom holds that labor supply for male, prime-aged head of households is fairly inelastic. Secondly, the marginal utility of income is set equal to unity. While this may or may not be true, my analysis focuses only on the decision to purchase health care against buying a entire basket of goods. Thus, this assumption should not be particularly troublesome. Also, I assume that the taste for health insurance β is constant across individuals. Theoretically, this is not problematic, but in reality the degree of risk aversion varies greatly, especially in relation to age. Despite, these simplifications, this model should be able to reveal key insights regard the health care purchase decision.

3 Equilibrium

Firms now must decide 1) whether or not to offer insurance and 2) if they do offer insurance, at what level should they set h_c. Workers supply labor inelastically in terms of hours. Since firms incur increased fixed costs as the number of workers (N) increase, but do not incur the fixed cost when hours (L) increases, it is optimal for them to have each worker labor supply equal to $\bar{L}$. Since workers supply labor inelastically, this equilibrium is stable. Let w_j^o be the equilibrium wage if firms did not offer insurance. Firms will only provide health insurance if:

$$w_j^o \geq w_j^{'} + \frac{(1+\lambda_j)\pi_p h_c}{\bar{L}} + \frac{A}{N^{1-\alpha}\bar{L}} \tag{10}$$

This is the firms' incentive compatibility constraint. For large firms, this amounts to a simple tradeoff between monetary compensation and health insurance since $\frac{A}{N^{1-\alpha}\bar{L}} \approx 0$. Worker preference will determine the equilibrium amount of h_c. Various studies such as Goldstein and Pauly (1976) have looked at how employee preference are aggregated—whether by insider-outsider modelling or by the median voter theory—but this consideration is outside the scope of this paper [3]. Small firms need to contend with the fact that providing insurance will create a non-trivial administrative cost since $\frac{A}{N^{1-\alpha}\bar{L}} \gg 0$

In equilibrium, workers are now faced with a discontinuous budget constraint. If firms set $h_c = 0$, the budget constraint is the same as above. If $h_c > 0$, demand for c becomes:

$$c_1^* = w^{'}\bar{L} + Y - \pi_i - (1+\lambda_{ind})\pi_i h^*$$

If we substitute in the for the new wage subject to the firm's incentive compatibility constraint, we have:

$$c_1^* = Y + w^o\bar{L} - (1+\lambda_j)\pi_p h_c - \frac{A}{N^{1-\alpha}} - (1+\lambda_{ind})\pi_i h_1^*$$

Let us assume that firms set h_c equal to the h_0^*, which is private health insurance demanded when $h_c = 0$. This implies that the amount of private insurance demanded when firms offer health insurance at $h_c = h_0^*$ will be zero ($h_1^* = 0$). This will be a sustainable equilibrium if and only if $c_1^* \geq c_0^*$

for both high and low risk groups. Thus, in order for workers to accept the wage-insurance offer over the prior wage with no insurance offering, it is a necessary condition that

$$[(1+\lambda_{ind})\pi_i - (1+\lambda_j)\pi_p]h_0^* > \frac{A}{N^{1-\alpha}} \tag{11}$$

4 Adverse Selection Problems

Let us examine the previous condition in detail. For the large business, this amounts to

$$[(1+\lambda_{ind})\pi_i - (1+\lambda_b)\pi_p] > 0 \tag{12}$$

I assume that the load factor for large businesses λ_b is significantly small so that $(1+\lambda_{ind})\pi_L > (1+\lambda_b)\pi_H$. This implies that even if there is adverse selection and all the high risk people accept the insurance offer ($\pi_p = \pi_H$), the cost savings on the load factor will make it optimal for even low risk individuals to accept the offer.

Empirically, we see that large firms offer insurance to most workers—even low wage workers. This model does not take into account the possibility that workers have different skill levels, but the same conclusions are maintained if we simply reapply the analysis on each labor skill pool sub-market. On the other hand, fewer small firms offer insurance—even to their higher paid employees [4]. Let us see why.

Again, it is a necessary condition for employees to accept insurance to have:

$$[(1+\lambda_{ind})\pi_i - (1+\lambda_s)\pi_p]h^* > \frac{A}{N^{1-\alpha}} \tag{13}$$

Let us assume that:

$$[(1+\lambda_{ind})\pi_L - (1+\lambda_s)\pi_H]h^* < \frac{A}{N^{1-\alpha}},$$

but

$$[(1+\lambda_{ind})\pi_L - (1+\lambda_s)\pi_p]h^* > \frac{A}{N^{1-\alpha}}.$$

In essence, this condition states that if there is adverse selection, low risk employees will not want to accept the insurance offer if only high risk employees make up the insurance pool. Other small firms could offer a wage of w_s^o without health insurance and they would attract all the low risk workers. On the other hand, if $\pi_p = \pi_{p0} = \frac{\pi_L + \pi_H}{2}$, so that there equal number of high and low risk workers in the insurance pool, then the cost savings in the load factor will outweigh both the fixed cost to administer the insurance and the higher actuary value of insurance.

Thus, it there are two possible equilibria depending on the initial value of π_p. The separating equilibrium is not Pareto efficient. For the high risk workers, they do not gain the pooling benefits when $\pi_p = \pi_{p_0}$ compared to the separating equilibrium. Further, they must pay a high load factor on their insurance. Low risk workers gain more utility from the pooling equilibrium than then separating equilibrium as well since I assume that the savings in terms of the load factor outweighs extra costs from including high risk workers in their pool. As long as the costs were not prohibitive, finding a mechanism to encourage low-risk workers to participate in the employer-based insurance scheme would be socially optimal.

5 Adding taxes to the model

5.1 Reworking the equilibrium

We can see that it is possible that we can reach an inefficient outcome in health care provision due to the problem of adverse selection. We will now proceed to examine the same model but now implementing taxes. This analysis is extremely topical. *The Boston Globe* reports that the Massachusetts House of Representatives has passed a proposed bill which would levy a payroll tax of between 5% and 7% on firms that do not offer health insurance. This could be viewed as a tax subsidy for those who do offer insurance to employees. Employers with 10 or less employees are exempt from this tax whether or not they offer insurance [1]. In this model, we will analyze the general fact that in the United States, compensation from employers received in the form of health care insurance is tax deductable. We will see that this *may* lead to a Pareto improving outcome.

Let us assume that the government raises revenue only through a tax on wages. The new optimal amount of consumption without employer provided insurance is:

$$c_0^* = (1-t)w^o\bar{L} + Y - (1+\lambda_{ind})\pi_i h$$

Individuals who purchase insurance on their own do not receive a tax deduction on health care.

Now let us examine what happens when firms offer health insurance. Using the same techniques as above, we will substitute the firms incentive compatibility constraint into the c_1^* function. The result is:

$$c_1^* = Y + (1-t)w_j^o\bar{L} - (1-t)(1+\lambda_j)\pi_p h_c - (1-t)\frac{A}{N^{1-\alpha}} - \hat{t}(1+\lambda_j)\pi_p h_c$$

$$c_1^* = Y + (1-t)w_j^o\bar{L} - (1-t+\hat{t})(1+\lambda_j)\pi_p h_c - (1-t)\frac{A}{N^{1-\alpha}}$$

I assume that firms again will set $h_c = \frac{\beta}{(1+\lambda_{ind})} - 1$, and thus consumer will set $h^* = 0$ when firms offer insurance. $\hat{t}$ is the the tax rate on worker compensation received in the form of health care. If $\hat{t} = t$, then health insurance is taxed at the same rate as wages. If $\hat{t} = 0$, then health insurance is fully tax-exempt. Thus, it is a necessary condition for workers to prefer to receive insurance from their employer if:

$$[(1+\lambda_{ind})\pi_i - (1-t+\hat{t})(1+\lambda_j)\pi_p]h^* \geq \frac{A(1-t)}{N^{1-\alpha}} \tag{14}$$

With taxes now implemented, we can see that adverse selection will still be a problem. If health care received from employers is taxed at the same rate as wages, then using the same assumptions as before, we can see that:

$$[(1+\lambda_{ind})\pi_L - (1+\lambda_s)\pi_H]h^* < \frac{A(1-t)}{N^{1-\alpha}}$$

but

$$[(1+\lambda_{ind})\pi_L - (1+\lambda_s)\pi_{p0}]h^* > \frac{A(1-t)}{N^{1-\alpha}}.$$

When taxes are added, adverse selection still occurs. In this scenario, low risk workers prefer group insurance if the worker pool is split evenly between low and high risk individuals. When the insurance pool is made up of only high risk workers, low risk workers would prefer wages of w_s^o and in equilibrium there will be small firms that offer then this wage without any group insurance. Again, this is not Pareto optimal since low-risk workers would prefer the lower wage with group insurance in the pooled case, and high risk workers always prefer the group insurance.

5.2 Making Employer Provided Health Care tax Deductible

If employer provided group health insurance is completely tax deductible $\hat{t} = 0$, we now have a new condition for low-risk, small business employees to accept the insurance offer.

$$[(1+\lambda_{ind})\pi_L - (1-t)(1+\lambda_j)\pi_H]h^* > \frac{A(1-t)}{N^{1-\alpha}}$$

If this condition holds, low risk workers will accept the insurance offer from small businesses and π_p will change from π_H to π_{p_0}. Since labor is supplied inelastically, the tax is non-distorting. The tax is simply a transfer between individuals with no efficiency effects. Both low risk and high risk workers will be better off under these assumptions and a Pareto optimum will have been reached.

The key to this analysis is that without the tax subsidy, low risk workers would not enter into group insurance, but with the subsidy they would. The policy maker may want to target the tax subsidy only to workers at small businesses, since for large businesses all employees prefer group insurance no matter what the insurance pool is. One would worry that either 1) workers would switch to working only at small firms or 2) firms would reduce their size to gain the tax benefit. Neither of these problems poses a serious challenge to specifically subsidzing workers of small firms in this model. Workers have skills that are only suited for small or large firms and mobility between the two sectors is not possible. Even if mobility was possible, the lower load factor for large businesses may outweigh the tax benefits workers get from working at a large firm. For firms, any desire to reduce their size to take advantage of the tax benefit to workers would increase their fixed cost term per worker $\frac{A}{N^{1-\alpha}}$ and increase their load factor the insurance company charges. The reduced firm size would only occur for firms who are on the fringe of what the government would classify as a "small business." Thus, targeting employees of small firms for the tax benefit or giving workers at small firms an larger subsidy will be Pareto optimal in this model.

5.3 Comparative Statics

One risk of having the tax subsidy is that employers may provide 'too much' insurance. When health insurance is tax subsidized, firms could reduce wages and increase health insurance above the private optimum (h^*) as long as workers both high and low risk workers were left with the same utility level. In order for workers to be at the same utility level as when $h_c = h^*$, it is necessary that:

$$c_2^* + \pi_i \beta ln(1 + h_c^{'}) \geq c_1^* + \pi_i \beta ln(1 + h^*)$$

$h_c^{'}$ is the new level of health insurance. Substituting in for the consumption demand formula, we have:

$$(1-t)\bar{L}[w_j^2 - w_j^o] - (1 - t + \hat{t})(1 + \lambda_j)\pi_p[h_c - h^*] + ln(\frac{1 + h_c}{1 + h^*})^{\beta \pi_i} > 0$$

Now differentiating the above equation with respect to $\hat{t}$.

$$\frac{\partial h_c}{\partial \hat{t}} = \frac{(1-t)\bar{L}\frac{\partial w_j^2}{\partial \hat{t}} + [\bar{L}(w_j^2 - w_j^o) + (1+\lambda_j)\pi_p(h_c - h^*)]\frac{\partial t}{\partial \hat{t}} - [(1+\lambda_j)\pi_p(h_c - h^*)]}{(1-t+\hat{t})(1+\lambda_j)\pi_p - \frac{\pi_i \beta}{(1+h_c)}}$$

Now we will evaluate at $w_j^2 = w_j^o$,$h_c = h^*$, $\hat{t} = t$.

$$\frac{\partial h_c}{\partial \hat{t}} = \frac{(1-t)\bar{L}\frac{\partial w_j^o}{\partial \hat{t}}}{(1+\lambda_j)\pi_p - \frac{\pi_i \beta}{(1+h^*)}} \tag{15}$$

The tax rate on insurance $\hat{t}$ is implicity a subsidy to health insurance if $\hat{t} < t$. One would expect that as $\hat{t}$ decreases, employers would provide more compensation in the form of health insurance than in the form of wages. The subsidy does not effect firms directly and thus we would expect $\frac{\partial w_j^o}{\partial \hat{t}} \geq 0$.

In order for $\frac{\partial h_c}{\partial \hat{t}} < 0$, it must be the case that $(1+\lambda_j)\pi_p < \frac{\pi_i \beta}{(1+h^*)}$. We can plug in the demand function for h^* and we will have that it is a necessary condition for $\frac{\partial h_c}{\partial \hat{t}} < 0$ that:

$$\pi_i(1+\lambda_{ind}) - (1+\lambda_j)\pi_p > 0$$

If this condition looks familiar, it should be. It is the same as the conditions needed for workers to accept the health group health insurance offer in equation (13) excluding the fixed costs. Thus, if the group insurance provides a better 'deal' to workers than individual insurance, we will expect to see the employer offered insurance h_c increase as the tax rate on employer-provided insurance decreases. In other words, increasing the tax expenditure on group health insurance increases the amount of group health insurance offered.

6 Conclusion

This paper has shown that in certain circumstances, making compensation in the form of health care insurance tax exempt or taxed at a lower rate can be Pareto improving. This depends on the initial value of π_p as well as the different load factors for large firms, small firms and non-group insurance. If a pooling equilibrium would take place in the absence of the tax subsidy, then the making employer provided health insurance tax exempt is unnecessary.

In this paper, the major omission is that labor is supplied completely inelastically. Future work should consider what is the social welfare impact of tax-preferred health insurance in the presence of elastic labor supply. If leisure is a normal good, increasing tax rates will decrease the labor supply in which case the tax expenditure will have uncertain effect on overall welfare. If only small businesses workers receive tax-free health insurance, it may cause the labor supply for small business workers to be less than that of large firm employees who do not receive tax preferential treatment on their group insurance.

Further, this paper assumes that people with health insurance and those without are equally productive on the job in terms of their marginal product of labor. If people with health insurance can prevent illnesses which would decrease their marginal productivity of labor, firms may have an incentive to offer insurance in order to maximize profits. Preventive medicine for contagious diseases is also omitted, but this analysis can be treated using traditional externality arguments. Health insurance for immunizations of contagious diseases could be subsidized at a different rate than traditional insurance due to the externality argument. Even a superficial analysis reveals that the market for health insurance does not correspond to the classical Marshallian market. Due to problems of externalities and adverse selection, examined here as well as issues moral hazard and informational asymmetries which have not been discussed, health care is a unique market where traditional *laissez faire* economic theory may lead to a Pareto inferior outcome. The fact that *laissez faire* policy may not be Pareto optimal does not mean it should be abandoned unless other alternatives are proven to be increase social welfare significantly.

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