Health Insurance, Obesity, and Its Economic Costs

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Background

According to the literature, the obese contract chronic diseases at a higher rate than the non-obese, and consequently pay more for medical care. The lifetime medical costs related to diabetes, heart disease, high cholesterol, hypertension, and stroke among the obese are $10,000 higher than among the non-obese. Among the overweight, lifetime medical costs can be reduced by $2,200 to $5,300 following a 10-percent reduction in body weight. Obesity also has externalities associated with it—namely, mortality and health insurance costs. Because medical costs are higher for the obese and premiums do not depend on weight, lighter people in the same pool pay for the food/exercise decisions of the obese. Furthermore, the negative health effects of obesity decrease the ability of the obese to pay for government-mandated social programs. Bhattacharya and Sood's paper focused on such health insurance externalities.

Methods and Findings

The authors first develop a model of weight loss and health insurance under two alternative regimes. Regime 1 allows underwriting on weight, and premiums are a function of weight. Regime 2 does not allow this, and premiums do not depend on weight. The authors then analyze welfare under each regime and estimate the change in prevalence of overweight and obesity when Regime 2 changes to Regime 1.

In the model, each consumer has an initial endowment of weight. Consumers can decide on how much weight to lose. Losing weight decreases the probability of falling sick, which in turn decreases expected medical care costs. However, losing weight (exercising, eating less food) causes consumers to lose some utility. Consumers can also purchase insurance to insure against health shocks and decide on consumption (of net calories—that is, calorie intake minus calorie expenditure) after observing their health state. If consumers are fully insured, consumption is the same regardless of their health state.

Regime 1 has two incentives for weight loss. First, weight loss increases expected consumption of net calories because it reduces the probability of falling sick and lowers insurance premiums. Further, as premiums depend on weight, there is no moral hazard problem—the tendency of policyholders to take less care to reduce hazards against which they are insured. Because consumers face the full costs of their weight choice through the health insurance premium, they choose to lose weight even when fully insured, and thus weight loss is at the socially optimal level. Full insurance is optimal when premiums are actuarially fair.

In contrast, under Regime 2, consumers choose their weight without taking into account the effect of their choices on premiums. Premiums are set at the expected level of medical expenditures for the whole insurance pool. As long as consumers have some insurance, but not full insurance, weight loss increases consumption by reducing the probability of falling ill. However, unlike in Regime 1, Regime 2 has no incentive for weight loss through decreased premiums because premiums are independent of weight. Thus, weight loss lowers premiums for everyone in the insurance pool by lowering the expected level of medical expenditures, but consumers ignore this when making individual weight decisions. Weight loss creates a positive externality and is underprovided because consumers are not explicitly rewarded for the benefit they generate. Under Regime 2, full insurance is not socially optimal and consumer heterogeneity is not a necessary condition for this result.

A comparison of weight loss under the alternative regimes reveals that with full insurance, there is no incentive for weight loss when underwriting on weight is not allowed—consumption is the same regardless of the health state. However, if underwriting on weight is allowed, consumers can increase their expected utility as weight loss decreases their own premiums. With less than full insurance, feedback effects introduced by premium changes via the copayment rate are possible—that is, as consumers move closer to self-insurance or no insurance, the effect of premiums on weight loss decreases and less positive externality is created. Although weight loss is likely to be higher under Regime 1, this is ultimately an empirical issue.

To estimate welfare loss, the authors ran a simulation model under the two different regimes. The simulation setup consists of consumers choosing from one of three weight categories—normal, overweight, and obese. The choice of weight determines the distribution of medical expenditures. Differences among consumers are generated from different initial endowments of weight—overweight or obese—and the probability distribution of health shocks (likelihood of getting sick). The effect of weight on this probability distribution depends on different explanatory variables. Simulation parameters include the probability distribution of initial weight, disutility from weight loss, coinsurance, and consumers' utility.

For a given set of parameters of the weight distribution under each regime, expected medical expenditures and welfare loss from not allowing weight-based underwriting (CV) is estimated. Solutions are presented for the actuarially fair and unfair case.

Bhattacharya and Sood report the effects of copayment rates and the cost of losing weight on the different estimations. Optimal weight decreases with cost sharing. Weight is uniformly higher when weight-based underwriting is prohibited (except with no insurance). Per capita medical expenditures are lower with actuarially fair premiums. The difference between actuarially fair and unfair cases is not large, beyond modest copayment levels. At full insurance, the externality is largest, while at no-insurance the results for actuarially fair and unfair coincide. A modest copayment can substantially control the welfare loss when underwriting weight is not used. When losing weight has no cost, everyone does it—even when weight

underwriting is not used. When losing weight is costly, no one does it—even when underwriting is adopted.

Medical expenditures grow more sharply with the cost of weight loss when weight underwriting is prohibited. Welfare loss from the negative externality generated by the lack of weight underwriting grows sharply with the cost of losing weight. It peaks when the costs of losing weight start to become prohibitive, even with actuarially fair premiums. According to the authors, the best estimate of welfare loss is $150 per capita.

Obese and overweight people with health insurance impose significant negative externalities on normal weight people in the same insurance pool. This externality arises because weight-based underwriting of health insurance premiums is not practiced. However, the simulation results indicate that modest copayment can limit these external effects.

Discussion

The model developed by Bhattacharya and Sood is similar to the Ehrlich and Becker (1972) type model of insurance, self-protection, and moral hazard. When health insurers do not underwrite on weight, people are heavier than Pareto optimum.[3] Furthermore, if weight gain promotes poor health, people are also sicker than Pareto optimum. The goal of this study was to estimate the impact of absent or imperfect underwriting on weight and health.

[3]A Pareto optimum refers to a situation where there is no way to reallocate resources in such a way that you can make someone better off without making someone else worse off.

Theoretically, the implications of allowing underwriting in Regime 1 are that the insurance market internalizes the externality associated with obesity. Weight is socially optimal, and, with actuarially fair pricing, full insurance is also optimal. In contrast, when underwriting is prohibited in Regime 2, people ignore the impact of weight on others' premiums and as a result weight loss and full insurance are Pareto suboptimal.

Future Research

Inevitably, the chosen structure of the model imposes restrictions on the finding. A key next step is to understand the impact of each structural assumption, either through theoretical investigation or sensitivity analysis. Conventional intuition about the economics of moral hazard is based on "price effects." Insurance lowers the return on protection, and with underwriting, insurance raises financial return on protection. But two income effects are worth considering. Without underwriting, low-risk types subsidize high-risk types. Introducing underwriting makes high-risk types poorer and low-risk types richer. This effect is complicated by the ambiguity of income effects: Weight loss does not always increase with income. Thus, introducing nonmonotonic effects of income on weight is important. Transferring resources from the no-loss to the loss state can make a person "wealthier"—this is the standard income effect. If protection is a normal good, then it creates some complementarity in insurance/protection. The strength of the income effect will depend on actuarial fairness of pricing and the nature of consumer's absolute risk-aversion (CARA, constant absolute risk aversion, or DARA, decreasing absolute risk aversion). A suggested

sensitivity analysis is to introduce unfair pricing, by degrees, and investigate the impact. The current model should be extended to include weight gain and weight loss, as well as nonmonotonic preferences for weight. Further, actuarially unfair pricing should be considered and the impact of CARA and DARA utility investigated. Ultimately, a realistic structural model needs to be estimated.