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Trading Bankruptcy for Health: A Discrete Choice Experiment

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A B S T R A C T

Background: Although nearly two-third of bankruptcy in the United States is medical in origin, a common assumption is that individuals facing a potentially lethal disease opt for cure at any cost. This assumption has never been tested, and knowledge of how the American population values a trade-off between cure and bankruptcy is unknown. **Objectives:** To determine the relative importance among the general American population of improved health versus improved financial risk protection, and to determine the impact of demographics on these preferences. **Methods:** A discrete choice experiment was performed with 2359 members of the US population. Respondents were asked to value treatments with varying chances of cure and bankruptcy in the presence of a lethal disease. Latent class analysis with concomitant variables was performed, weighted for national representativeness. Sensitivity analyses were undertaken to test the robustness of the results. **Results:** It was found that 31.3% of the American population values cure at all costs. Nevertheless, for 8.5% of the US population, financial solvency dominates concerns for health in medical decision making. Individuals who value cure at all costs are more likely to have had experience with serious disease and to be women. No demographic characteristics significantly predicted individuals who value solvency over cure. **Conclusions:** Although the average American values cure more than financial solvency, a cure-at-all-costs rubric describes the preferences of a minority of the population, and 1 in 12 value financial protection over any chances of cure. This study provides empirical evidence for how the US population values a trade-off between avoiding adverse health outcomes and facing bankruptcy. These findings bring to the fore the decision making that individuals face in balancing the acute financial burden of health care access.

Keywords: discrete choice analysis, health care costs, medical bankruptcy.

Introduction

That the American health care system is expensive is well known [1]. Nevertheless, discussing the out-of-pocket costs of care is often anathema, because any implications of care rationing are thought to defy a respect for health [2,3]. As Hall stated, “When we are ill, we desperately want our doctors to do everything within their power to heal us, regardless of the costs involved” [4]. This cure-at-all-costs presupposition has led to thorny ethical debates [4] but has rarely been tested [3].

In the United States, 62% of bankruptcy is medical, and, despite the fact that most medical costs are paid for by insurers, more than 75% of medically bankrupt patients were insured at the time of their catastrophic medical bill [5]. Although financial risk falls on all patients, medical bankruptcy is more frequent among the poor and patients with life-threatening conditions [6,7].

The World Health Organization [8], the United Nations [9], and the World Bank [10] have called for financial protection in health, but medical impoverishment persists, in part because individuals are willing to risk debt for medical care [11–13] and because health systems pay less attention to financial risk than to clinical risk. Although the high incidence of medical bankruptcy shows that some patients will face financial hardship to seek medical care [14–20], other potential patients choose noncompliance or to forgo care altogether because of high costs [21–23]. In patients with serious conditions, these decisions can be lethal [23,24].

Patients then face an implicit trade-off between financial protection and health protection, and health policies do not affect these two domains equally. The Oregon Medicaid Experiment, for example, provided coverage to previously uninsured Oregonians. After 2 years, improvements in health outcomes were limited, but significant improvement was seen for every reported measure of medical impoverishment [25]. Similarly, recent evidence from states that expanded Medicaid in 2014 also shows a short-lived increase in medical utilization [26] and improvements in financial risk protection [27], but no change in self-reported health [27,28].

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The design of policy interventions would benefit from an understanding of how patients make this implicit trade-off, given that not all patients are willing to face the double burden of financial and medical toxicity [29].

How much bankruptcy risk individuals are willing to shoulder in seeking care is unknown, nor is it known how individual characteristics such as age, income, family composition, health status, and education influence this decision. This article explores these questions using a discrete choice experiment (DCE).

Methods

A DCE was performed with the goal of determining how much increased risk of bankruptcy an individual would be willing to face for an increased chance of cure. DCEs, described in detail elsewhere [30,31] and in the Appendix in Supplemental Materials found at http://dx.doi.org/10.1016/j.jval.2017.07.006, are grounded in random utility theory. Formally, let Y represent the choice between two alternatives 0 and 1. Then:

$$Y = I(U_1 > U_0),$$

where $I(\cdot)$ represents an indicator function, taking the value of 1 if the expression in parentheses is true and 0 otherwise, and U_1 and U_0 represent the utilities of the two alternatives.

Because utility is unobservable, U_i for each choice i is decomposed into a deterministic (observable) portion V_i, and a random (unobservable) portion η_i:

$$U_i = V_i + \eta_i$$

Given a set of observed choices among alternatives and an assumption about the underlying error distribution, V_i can be estimated.

This article's hypothesis was that when cure from a lethal condition was possible, individuals would be willing to trade high risks of financial catastrophe to seek it—that is, in short, patients would value cure "regardless of the costs involved" [4]. Secondarily, we hypothesized that preferences would be influenced by age, sex, income, family structure, and experience with serious disease.

Examined Models

Three possible utility functions were evaluated in the study. The first (as well as the simplest and the most commonly used) is linear. In such a formulation, the utility for individual n of an alternative j is:

$$U_{n\,j} = \beta_1 \mathrm{SOLV}_j + \beta_2 \mathrm{CURE}_j + \eta_{n\,j}, \tag{1}$$

where CURE_j represents the probability of cure for the jth alternative and SOLV_j represents the probability of remaining solvent (i.e., 1 – the probability of bankruptcy).

Because each DCE question offered respondents two choices ($j = 1$ or 2), the respondent would select the first choice if $U_{n1} > U_{n2}$. From the responses to the survey, population-level values for β_1 and β_2—and therefore a population utility function—can be estimated.

Nevertheless, the simple linear model is not intuitive: if, for example, an individual has a very low chance of survival, he or she might be more inclined to take larger financial risks than if he or she had a high chance of survival. A multiplicative formulation would allow this nuance:

$$U_{n\,j} = \mathrm{SOLV}_j^{\beta_1} \times \mathrm{CURE}_j^{\beta_2} \times \varepsilon_{n\,j}. \tag{2}$$

A utility function grounded in expected utility theory [32] would also allow the aforementioned intuitive interaction:

$$\begin{aligned} U_{n\,j} = {} & \mathrm{SOLV}_j \mathrm{CURE}_j \beta_0 + (1-\mathrm{SOLV}_j)\mathrm{CURE}_j \beta_1 + \mathrm{SOLV}_j (1-\mathrm{CURE}_j)\beta_2 \\ & + (1-\mathrm{SOLV}_j)(1-\mathrm{CURE}_j)\beta_3 + \varepsilon_{n\,j}. \end{aligned} \tag{3}$$

In this formulation, β_0 through β_3 represent an individual's utility for a state of being *after* the choice has been made. β_0 represents his or her utility for being cured and remaining financially solvent. In β_1, the individual has been cured but has gone bankrupt as a result. Similarly, β_2 represents the utility for remaining solvent but succumbing to the lethal disease, whereas β_3 represents utility for bankruptcy and death.

Because utilities are unique up to positive affine transformations, two of the β values in Equation 3 can be set arbitrarily. An obvious choice is $\beta_0 = 1$ (for "Cured and Solvent") and $\beta_3 = 0$ (for "Dead and Bankrupt"). These choices simplify Equation 3 to:

$$\begin{aligned} U_{n\,j} = {} & \mathrm{SOLV}_j \mathrm{CURE}_j + (1-\mathrm{SOLV}_j)\mathrm{CURE}_j \beta_1 \\ & + \mathrm{SOLV}_j (1-\mathrm{CURE}_j)\beta_2 + \varepsilon_{n\,j}. \end{aligned} \tag{4}$$

Because β_1 and β_2 represent states that are worse than "Cured and Solvent" but, in theory, better than "Dead and Bankrupt," it is expected that they take values between 0 and 1. Nevertheless, note that this formulation does not constrain β_1 and β_2 to any value. An individual who viewed "Dead and Not Bankrupt" as worse than "Dead and Bankrupt," for example, would have β_2 less than 0.

Further discussions of the theoretical underpinning of these models can be found in the Appendix in Supplemental Materials.

Class and Model Selection

Latent class analysis allows for the possibility that there is more than one value across the population for each β utility (or "taste") parameters [33]. Specifically, latent class analysis assumes that the population is made up of distinct segments ("classes"), each with their own values for β_1 and β_2 Moreover, the likelihood that an individual falls into one or another class can be predicted by that individual's demographic characteristics. The probability π_{cn}, that individual n falls into class c can be calculated as a fractional logit model:

$$\pi_{cn} = \frac{\exp(\theta_c z_n)}{\sum_{a=1}^{C-1} \exp(\theta_a z_n)}, \tag{5}$$

where C is the total number of classes and z_n represents individual demographic characteristics. The best-fitting model, encompassing both class number and utility function formulation, can be selected using, in the case of this study, the Bayesian information criterion. Note that latent class analysis does not assign each individual to a particular class, but assigns to each individual a probability of membership in every class.

Survey Design

Paired-comparison surveys give respondents a choice between two discrete scenarios, differentiated along parameters of interest [31]. In this study, the survey instructed respondents to imagine that they had a hypothetical condition, lethal without treatment. They were asked to choose between two treatments, identical in every way except for their probability of a cure and their risk of driving the individual into bankruptcy. "Cure" and "bankruptcy" were explicitly defined. Respondents were told that the disease may or may not return after "cure" but that they could not know this at present, just as they could not know if some future event would drive them into bankruptcy.

Each probability of interest had five levels—10%, 25%, 50%, 75%, and 90%. Because the presence of certainty may introduce cognitive bias [34], and because no realistic medical intervention would have either a 0% or 100% chance of cure or bankruptcy, the ends of the scale were not included.

At the start of the survey, respondents were asked to rank the following possible outcomes of a choice, presented in random order: "Cured and Not Bankrupt," "Cured and Bankrupt," "Dead and Not Bankrupt," and "Dead and Bankrupt." Participants then