Valuing Improvements in Lifetime Endowments in Markets with No Borrowing

KEVIN D. FRICK*

Abstract

The objective is to determine whether single period data regarding willingness to pay for improvements in lifetime endowments when consumers cannot borrow can be used to measure the net present value of the improvements. When consumers who discount utility at the real interest rate can borrow and save, the willingness to pay for improvements in lifetime endowments is the net present value of the improvements. A single period measure of the willingness to pay for improvements in lifetime endowments without borrowing is at least as large as the improvement in the period in which the individual has the opportunity to obtain the stream of improvements. The sum of single period measures is an upper bound for the net present value of improvements in lifetime endowments. (JEL I1)

Introduction

Willingness to pay for benefits is the standard measure in economic theory-based program evaluation [Kenkel, 1997]. An exact measure of the value of benefits allows for the calculation of net benefits, that is, benefits minus costs. A bound on the benefits would at least indicate whether a program has any chance of having a positive net benefit. In some policy settings, such as continuation of an experimental program, bounding the value of the benefits may be sufficient for making decisions. Numerous methods can be used to assess patients' levels of willingness to pay for benefits of a health intervention [Boardman et al., 1996; Tolley et al., 199@]. Economists prefer to use observable behavior to measure willingness to pay or compensating variation [Chernew et al., 1997]. Precise measurement of willingness to pay is likely to be more difficult than it otherwise would be when the time period over which benefits occur does not correspond to the time period over which resources are available or can be transferred, for example, there are lifetime benefits from a single treatment and the economy does not provide opportunities for borrowing. Credit constraints have been shown to alter optimal multiple-period health insurance contracts [Frick, 1998]. Given this, credit constraints may also affect the willingness to pay for lifetime benefits of a health

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intervention. Examples of health interventions for which this might be important include ophthalmic surgical procedures that occur at a point in time and need to be paid for at that time, although the benefits of avoiding blindness will last a lifetime. In a recent study, Frick et al. [2001] calculated a conservative estimate of the lifetime cost-of-illness associated with a blinding condition in the Gambia and the willingness to pay for surgery to prevent the condition from progressing to blindness. The latter figure was inferred from single period, observational travel cost data. The results unexpectedly indicated that the willingness to pay was less than the cost of illness, directly contradicting a prior theoretical analysis suggesting that under general conditions the cost of illness should be the lower bound for the willingness to pay [Berger et al., 1994]. There are several potential reasons for this finding which include the lack of basic research on the travel cost method in health economics [Clarke, 1998]; the fact that the travel cost method used did not include a disutility of travel; difficulty placing a value on the time of individuals in subsistence agriculture settings; difficulty measuring the productivity of individuals in subsistence agriculture settings; and difficulty of measuring the effect of visual acuity loss on the productivity of individuals in subsistence agriculture settings. Further, the presence of tight credit constraints may affect the inferred willingness to pay. Severe credit constraints are common in developing countries and may be common in some communities in the United States in which citizens with limited incomes cannot access the regular credit system and can only acquire credit at businesses such as pawn shops [Hampel, 2000]. This paper’s objective is to determine whether single period data regarding willingness to pay for improvements in lifetime endowments can be used to draw conclusions about the net present value of the lifetime improvements when the consumers cannot borrow. To do this, the next section uses theory to compare the willingness to pay for improvements in lifetime endowments at a point in time when consumers can borrow and save with the net present value of the improvements and compares these results with the single period willingness to pay with no borrowing or saving. The following section ties together the theoretical discussion of the willingness to pay for improvements in lifetime endowments and the use of observational, single period data to place a value on the benefits that can arise from a new policy. The final section discusses the findings.

### Multiple Period Willingness to Pay with Credit Available

The theoretical model in this paper abstracts away from the health example that motivated this study. The model assumes that consumers have monetary endowments in each of two periods with no risk. An individual with endowments $y_0$ and $y_1$ who discounts future utility at the real rate of interest ($r$) and who can borrow or save across time periods to maximize utility will choose consumption levels in each period ($C_t$) to maximize lifetime utility:

$$\max U(C_0) + \frac{1}{1+r}U(C_1) \quad s.t. \quad y_0 + \frac{1}{1+r}y_1 = C_0 + \frac{1}{1+r}C_1$$

The first order conditions (not shown) indicate that the marginal utility of consumption will be identical in the two periods; thus, the consumer will choose to consume the same amount in each period. The consumer will borrow and save accordingly, although these do not appear explicitly in the problem. If the individual receives an improvement in her endowment that would either raise or not change the endowment in each period, then the consumer would face the following maximization problem using $w_t$ to denote the improvements in endowment:

$$\max U(C'_0) + \frac{1}{1+r}U(C'_1) \quad s.t. \quad y_0 + w_0 + \frac{1}{1+r}(y_1 + w_1) = C'_0 + \frac{1}{1+r}C'_1$$