

Shadow Prices in Evaluating Social Programs

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BENEFIT-COST ANALYSIS REQUIRES MANY SHADOW VALUES--Consider a Benefit Cost Analysis of the Federal Section 8 Program

- The handout indicates a full set of benefit and cost components of Section 8 voucher reciprocity.
- These benefits and costs can accrue to program benefit recipients, to nonrecipients (including the government), and to society.
- Social benefits and costs are the sum of the recipient and nonrecipient benefits and costs.
- The components in **red** are impacts directly estimated in the research project.
- The components in *purple* are impacts for which no monetary estimate is feasible.
- The components in *green* are impacts which can be estimated using shadow prices.

An Example of the Need for Shadow Prices: Nonmarket Gains from Additional Schooling for A Person

- Assume that years of schooling gain are estimated as an effect of a social policy.
- The question is how to value this increased schooling.
- Items 1 and 2 are “private marketed returns” (obtained from returns to schooling literature).
- Items 3-11 are “nonmarketed private returns.”
- Items 11-14 are primarily “public or social returns”

Shadow Values are Needed for the Nonmarketed Returns

(See Handout)

Consider a Few of These Nonmarketed Gains from Additional Own Schooling

- External Nonmarketed Effects Within Family
 - Increased Spouse Productivity
 - Greater Child Health and Education
- Improved Own Nonmarketed Outcomes
 - Better Health, Longer Life Expectancy, Lower Probability of Disablement
 - Improved Consumer Decisions; Better Marital Matches
- External Public Goods Effects
 - Reduced Crime; Greater Community Involvement

A Method for Estimating the Value of the Private Nonmarketed Impacts

- There is a method to estimate the marginal value of schooling attributable to the private nonmarketed components of these effects (*categories 3 - 11*). See Haveman and Wolfe (1984).
- This method exploits the relationship (derived from economic theory) between schooling and marketed inputs in producing non-market outcomes.
- Using this method, existing studies that establish a relationship between education and a non-market outcome (such as health or consumer efficiency) can be used to estimate the marginal value of schooling.
- These studies must have a reliable coefficient estimate relating schooling to the outcome of interest (say, health), as well as variables with market values also likely to be associated with that outcome.
- Physician visits, spending on police in the community, private music lessons, income, assets are all examples of such variables.

The Formula

- A well-known result in economics is that efficient producers will equate the ratio of the marginal product to input price, across all inputs. This relationship also holds in the production of the nonmarket outcome, with schooling (SCH) and at least one other marketed input (X). That is,

$$MP_{SCH} / P_{SCH} = P_X / MP_X$$

P_{SCH} is the implicit price or willingness to pay for additional schooling in producing the non-market outcome.

- A little rearranging yields the following formula:

$$P_{SCH} = MP_{SCH} / MP_X * P_X$$

- If the marginal products of schooling and the other input are equal, the implicit willingness to pay for schooling will be equal to the price of the other input. If the marginal product of schooling is double that of the other input, the implicit value of schooling is twice the unit price of the other input.

An Example

- Consider an estimated equation relating mother's education and dollar valued household income on the number of times a child repeats a grade (*category 4.*)
- Using the estimated coefficients, an additional dollar of family income reduces the probability that child will repeat a grade by .0002. Mother's education is estimated using dummy variables. A mother having a high school diploma (relative to not having one) reduces the probability that child will repeat a grade by .062.
- Using the above formula, the marginal monetary value of a mother's having a high school diploma on the probability that the daughter will repeat a grade is **\$310**:
$$-.062 / -.0002 * \$1 = \$310 \quad [1992\$]$$

A Few Estimates of the Marginal Willingness to Pay for NonMarketed Effects of Own Schooling

- (Gains in children's cognitive achievement)—up to \$517 per year for an additional year of own schooling (using family income).
- (Gains in own health)—a one-time payment of \$8,950 for an additional year of own schooling (using family assets).
- (Gains in the efficiency of consumer choices)—\$290 for an additional year of schooling (using household income).