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Nonmarket Outcomes of Schooling

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Abstract

Most studies of the benefits of education focus on market outcomes, particularly labor market returns. But the rewards of education are not limited to success at finding a job and earning money; schooling also affects nonmarket outcomes, such as one's health and the cognitive development of one's children. The authors discuss several nonmarket outcomes of education that have been confirmed by researchers and estimate the value that an additional year of schooling has on some of those outcomes.

Nonmarket Outcomes of Schooling

Evaluations of the appropriate level of investment in schooling have typically focused on market outcomes, particularly labor market returns. In this paper the focus is on nonmarket effects. These effects add to the returns to schooling and must be considered in evaluating the optimum level of public-sector investment in schooling.

Traditionally, the amount of schooling provided has heavily depended on the public sector. For children up to the age of sixteen (older in some states), schooling is mandatory and is provided by the public sector. At levels of education beyond grade twelve—after high school completion—schooling tends to be provided by the public and private sectors; for certain students and programs, private education is also subsidized by public funds. In the cases of elementary and secondary education, public colleges and universities, and public subsidies, the price charged tends to be far below the marginal cost of schooling. Evaluation of the appropriate level of public investment in education requires an analysis of all returns to schooling, including nonmarket effects. This paper disregards the traditional returns to market activities as it examines the nonmarket impacts of education.

To date there have been two broad-based studies of the nonmarket effects of schooling, Haveman and Wolfe (l984) and Michael (1982). This paper updates their results where possible and utilizes them in an attempt to develop a full picture of the impact of education.

What are some nonmarket effects of education?

- There appears to be a positive relationship between one's education and one's own health status.
- There appears to be a positive association between schooling and the health status of one's family members.
- There appears to be a positive link between one's own schooling and the schooling received by one's children.

• Schooling appears to contribute to the efficiency of choices made, such as consumer choices. One can view this as contributing to family well-being in a manner resembling increased family income.

• Schooling appears to influence fertility choices. In particular, it seems to influence the decisions of one's female children concerning giving birth out of wedlock as a teenager.

We discuss these and other effects in detail, below, as well as illustrate a method for estimating the value of these effects.

NONMARKET EFFECTS OF EDUCATION

Of the $377,500 million spent on schooling in 1990, 81.2 percent were public dollars, including 92.2 percent of the expenditures for elementary and secondary education. This large absolute and proportional public expenditure indicates that schooling has been largely financed by the public sector, with very little being contributed by the private sector. This lack of private market activity means that we have little evidence concerning what the beneficiaries are willing to pay for education—or what the value of an additional year of schooling is to individuals.

The traditional form of evaluation has focused on market returns, particularly labor market returns, for an additional year of schooling. This focus presents a problem: it neglects a large number of benefits (or costs) lying beyond labor market returns. By looking at the nonmarket impacts of education, we act upon Haveman and Wolfe's (1984) belief that a "full accounting must consider all of schooling's effects, positive and negative, not simply those recorded in a single market" (p. 379).

In Table 1, we list a number of schooling benefits, along with existing research on the magnitude of these benefits. In general, these studies control for other characteristics such as age, race, and income (where appropriate) in estimating the magnitude of schooling benefits. The first two benefits reflect the traditional measures—labor market productivity and nonwage labor market

TABLE 1

Catalogue of Outcomes of Schooling

Outcome		Economic Nature	Existing Research on Magnitude
1.	Individual market productivity	Private; market effects; human capital investment	Extensive research on the magnitude of market earnings (Schultz 1961; Hansen 1963; Becker 1964; Mincer 1962; Conlisk 1971)
2.	Nonwage labor market remuneration	Private; market and nonmarket effects	Some research on differences in fringe benefits and working conditions by education level (Duncan 1976; Lucas 1977; Freeman 1978; Smeeding 1983)
3.	Intrafamily productivity	Private; some external effects; market and nonmarket effects	Relationship between wife's schooling and husband's earnings apart from selectivity is established (Benham 1974)
4.	Child quality: level of education and cognitive development	Private; some external effects; market and nonmarket effects	Substantial evidence that child education level and cognitive development are positively related to mother's and father's education (Dawson 1991; Haveman, Wolfe, and Spaulding 1991; Wachtel 1975; Murnane 1981; Sandefur, McLanahan, and Wojtkiewicz 1989; Ribar 1993)
5.	Child quality: health	Private; some external effects	Substantial evidence that child health is positively related to parents' education (Edwards and Grossman 1979; Wolfe and Behrman 1982; Shakotko, Edwards, and Grossman 1981; Behrman and Wolfe 1987; Grossman and Joyce 1989)
6.	Child quality: fertility	Private; some external effects	Consistent evidence that mother's education is related to a lower probability that daughters will give birth out of wedlock as teens (Sandefur and McLanahan 1990; An, Haveman, and Wolfe 1993; Antel 1988)

(table continues)

TABLE 1, continued

Outcome		Economic Nature	Existing Research on Magnitude
7.	Own health	Private; modest external effects	Considerable evidence that own schooling positively affects one's health status (Leigh 1981; Berger and Leigh 1989; Leigh 1983; Kemna 1987; Grossman and Joyce 1989; Kenkel 1991); also increases life expectancy (Feldman et al. 1989); also lowers prevalence of severe mental illness (Robins 1984)
8.	Spouse's health	Private; modest external effects	Some evidence that own schooling influences spouse's health as well as decreases mortality (Auster, Leveson, and Sarachek 1969; Grossman 1975; Grossman and Jacobowitz 1981)
9.	Consumer choice efficiency	Private; some external effects; nonmarket effects	Some evidence that schooling leads to more efficient consumer activities (Michael 1972; Rizzo and Zeckhauser 1992; Benham and Benham 1975; Pauly 1980). Home-production schooling may have long-term impacts (Corman 1986)
10.	Labor market search efficiency	Private; nonmarket effects	Some evidence that costs of job search are reduced and regional mobility increased with more schooling (Greenwood 1975; Metcalf 1973; DaVanzo 1983)
11.	Marital choice efficiency	Private; nonmarket effects	Some limited evidence of improved sorting in marriage market (Becker, Landes, and Michael 1977)
12.	Attainment of desired family size	Private	Evidence that contraceptive efficiency is related to schooling (Michael and Willis 1976; Ryder and Westoff 1971; Easterlin 1968; Rosenzweig and Schultz 1989)
13.	Charitable giving	Private and public; nonmarket effects	Some evidence that schooling increases donations of both time and money (Hodgkinson and Weitzman 1988; Mueller 1978; Dye 1980)

(table continues)

TABLE 1, continued

Outcome		Economic Nature	Existing Research on Magnitude
14.	Savings	Private; some external effects	Controlling for income, some evidence that more schooling is associated with higher savings rates (Solomon 1975)
15.	Technological change	Public	Some evidence that schooling is positively associated with research, development, and diffusion of technology (Nelson 1973; Mansfield 1982; Wozniak 1987)
16.	Social cohesion	Public	Descriptive evidence to suggest that schooling is positively associated with voting (Campbell et al. 1976; Gintis 1971); with reduced alienation and social inequalities (Comer 1988)
17.	Less reliance on income (and in-kind) transfers	Private and public	More education associated with reduced dependence on transfers during prime working years (Antel 1988; An, Haveman, and Wolfe 1993; Kiefer 1985)
18.	Crime reduction	Public	Some evidence that schooling is associated with reduced criminal activity (Yamada, Yamada, and Kang 1991; Ehrlich 1975)

Source: Updated and adapted from Haveman and Wolfe (1984).

remuneration. We then shift to direct influences on other members of the household. The third impact listed is the relationship between a wife's schooling and her husband's earnings; as stated in the table, there is a positive association between the two.

The educational level of the next generation is clearly tied to the schooling of the parents (item 4). Children of parents who graduated from high school are themselves far more likely to graduate from high school than are children of less well educated parents. Further schooling of the parents increases this probability (Sandefur, McLanahan, and Wojtkiewicz 1989). Better-schooled parents appear to have children with a higher level of cognitive development as well as children with higher future earnings.

Increased schooling of parents, particularly mothers, seems to lead to improved health among infants and children (item 5). Two measures of this are lower infant mortality rates and lower rates of low birth-weight babies among mothers with more schooling. Another is the higher rate of vaccinations among children of better-educated parents.

Level of schooling seems to be connected to the probability that one's child will give birth out of wedlock as a teenager (item 6). Children living with mothers who have at least a high school education appear to be significantly less likely than other children to become teen parents out of wedlock (see, for example, Sandefur and McLanahan 1990; An, Haveman, and Wolfe 1993).

For the individual, increased schooling appears related to better health and increased life expectancy (item 7). This may be due to occupational choices (choosing occupations with relatively lower occupational hazards), locational choices (electing to live in less polluted areas), more information or skills in acquiring health-related information, better nutrition, fewer health-reducing behaviors (cigarette smoking), and/or more appropriate medical care usage. The improvement might, of course, simply reflect a third factor which "causes" both more schooling and better health. However, the statistical relationship between the two appears quite strong. A study using sibling data from

Nicaragua in both fixed and random effect models found evidence that the relationship between more schooling and better health is not due to unobserved or unmeasured factors but instead is causal (Behrman and Wolfe 1987). Part of the benefit of better health is reflected in higher labor market earnings; nevertheless, clearly part of the value of better health—from reduced pain and suffering, reduced mortality, lower medical care expenditures, less time allocated to treatment of illness—is not likely to be included in traditional labor market measures. Some of the benefits of better health are likely to have externalities ranging from reduced spread of contagious disease to increased utility of others (i.e., those who have other persons' health in their utility function). Some studies have also discovered that one's schooling has a positive impact on the health of one's spouse (item 8).

A related benefit is the development of lifestyle habits that promote good health. Although economists are hesitant to see a causal link, a study in the Journal of Political Economy suggests that persons with more schooling are less likely to smoke, and among persons who do smoke, those with more schooling smoke less per day. An additional year of schooling reduces average daily cigarette consumption by 1.6 for men and 1.1 for women. The better educated are also less likely to be heavy drinkers and tend to engage in more exercise per week (about 17 minutes for each additional year of schooling) than the less well educated (Kenkel 1991).

An additional benefit accruing to the "better schooled" individual is increased consumer efficiency (item 9). Michael (1982) found that a person with an additional year of schooling was significantly more efficient as a consumer. He then translated this into terms of additional income. Similarly, Benham and Benham (1975), analyzing only one market, eyeglasses, found that persons with more schooling tended to pay less for glasses than those with less schooling. Rizzo and Zeckhauser (1992) found that the charge per unit of time that an M.D. spent with a patient was lower for better-educated individuals than for those less well educated.

Items 10 through 12 in Table 1 refer to one's success in making choices involving the labor market, marriage, and family size. In all of these cases more schooling has a positive influence, probably through gaining information that promotes more efficient decisions. Part of this gain may be simply in the ability to accomplish better matches—in the labor market, for example—but another part may be in the reduction of time spent in the search. Studies of assortative mating suggest that schooling leads to "better" choices regarding marital partners (Becker, Landes, and Michael 1977). Better-educated people tend to be more successful in having the precise number of offspring that they desire. It is likely that more schooling enables one to gather information on how to avoid unwanted births and possibly also to reduce the probability of subfecundity.

Beyond the gains to one's self and family are broad gains to society that may go unmeasured. There is evidence that the amount of time and money devoted to charity is positively associated with the amount of schooling one has, after controlling for income, the other primary determinant of donations (item 13). For example, one study found that college graduates volunteered nearly twice as many hours and donated 50 percent more of their income than high school graduates (Hodgkinson and Weitzman 1988). The positive contribution to savings (item 14) has a public-good aspect to the extent that the capital market is imperfect and aggregate savings are less than optimal. Greater education may lead to social cohesion and may enable one to use new technologies. Wozniak (1987) argues that "early adopters [of new technology] must acquire and process a better quality and larger quantity of information than others" (p. 104). His results on a group of farmers provide some evidence that "increases in education enhance innovative ability" and that with "an additional year of schooling the likelihood of . . . being an early adopter increases by about a percentage point (or about 3 percent)" (p. 107). Persons with more schooling are expected to make informed choices when voting, and to participate in their communities.

There are other ways in which attaining a high level of education may enhance the public good. For instance, there is evidence that more schooling is associated with a lower probability of receiving transfer benefits, either disability-related benefits such as Social Security Disability or welfare (AFDC) (item 17). Recent analyses have found that higher education of mothers reduces the probability that their daughters will, if eligible for welfare benefits, elect to receive them. Studies of applicants for disability transfers also find that more education decreases the probability of receiving disability-related transfers. Criminal activity may also decrease as schooling increases (item 18).

All of these, then, are areas in which there has been some (in many cases limited) research on the nature of the relationship between schooling and nonmarket impacts. Some impacts pertain to the individual and their family, while others relate to society. Among the largest influences are the impacts of parents' schooling on their children, particularly in terms of health, schooling, childbearing, and on one's own health. Schooling also affects efficiency in consumption and the ease with which one uses new, sophisticated products, such as personal computers, or adapts to changes in the workplace. There also appear to be gains that benefit society in general, such as social cohesion and crime reduction. One is left with the impression that schooling has substantial benefits beyond those usually tabulated by measures of labor market productivity and fringe benefits. On the other hand, schooling may also have substantial costs that are largely noneconomic, such as job-related stress.

ON ESTIMATING THE VALUE OF NONMARKET IMPACTS OF EDUCATION

In order to translate these benefits into guidance for the public sector decisions on allocation of resources to education, it would be useful to be able to value the full set. Haveman and Wolfe (1984) developed a method to estimate the marginal value of schooling. Using their method involves estimating the productive relationship between each outcome listed in Table 1 and incremental schooling. It also requires estimating the productive relationship between each of the outcome

measures and another input. The latter input should be one that is competitively marketed. Once these marginal productivities are estimated, they are combined with the private cost of the privately purchased input in order to estimate the implicit willingness to pay for an additional year of schooling. We used this approach to generate estimates of the value of nonmarket impacts in Table 2. We converted a small number of impacts into the marginal relationship or further into a willingness-to-pay estimate, basing our results on coefficients obtained from the studies listed in the third column of the table.

These estimates are provided only to illustrate a possible procedure for valuing nonmarket effects of schooling. In their 1984 article, Haveman and Wolfe tentatively concluded that a conservative estimate of the value of non–labor market influences is "of the same order of magnitude as estimates of the annual marketed, earnings-based effects of one more year of schooling." Official estimates do not then capture the full returns to education.

TABLE 2

Estimates of the Annual Value (Willingness to Pay) or Impact of Additional Schooling

Outcome	Value or Impact	Source of Coefficients
Cognitive development of children	$650–$3,900 per year in future family income for an additional year of schooling	*Murnane (1981)[1]; *Edwards and Grossman (1979)[2]
Consumption efficiency	$220 in household income for an additional year of schooling. Save approximately $4.20 per pair of eyeglasses for an additional year of schooling	*Michael (1975); Benham and Benham (1975)[3]
Own health	$6,750 in increased net family assets for an additional year of schooling	*Lee (1982)
	1.6 (1.1) fewer cigarettes smoked per day men (women) for an additional year of schooling. Thirty-four more minutes of exercise per two weeks	Kenkel (1991)[4]
	1.85 (1.25) (1.37) greater relative risk of death from heart disease, those with 8–11 years of schooling compared to those with 12 or more, males 45–64 (65–74) (females 65–74)	Feldman et al. (1989)[5]
Reduction in criminal activity	$130 reduction in per capita expenditure on police for an additional mean year of schooling in community	*Ehrlich (1975)

Source: *Table 2, Haveman and Wolfe 1984, p. 396. All other values and impacts estimated by authors based on coefficients in studies listed in third column of table. All values in 1988 dollars.

[1]Based on measurement of cognitive development on Iowa Test of Basic Skills using children in grades 3–6 whose families participated in the NIT experiment in Gary, Indiana. For conversion see Haveman and Wolfe (1984).

[2]Based on data from cycle II of the Health Examination Survey using mean of estimated value of mother's and father's education.

[3]Based on 1970 Health Interview Survey (HIS); n = 10,000, of which 1,625 obtained eyeglasses in 1970.

[4]Based on 1985 Supplement to the HIS on Health Promotion and Disease Prevention; n = 14,177 males and 19,453 females.

[5]Based on 62,405 persons in Matched Records Study, whites only.

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