

The Social Benefits of Education: New Evidence on an Old Question*

W. Craig Riddell
Department of Economics
University of British Columbia

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1. Introduction

Education has numerous consequences for individuals and society. For many people, there is some "consumption value" from the educational process. Human beings are curious creatures, and they enjoy learning and acquiring new knowledge. Education also has considerable "investment value." Those who acquire additional schooling generally earn more over their lifetimes, achieve higher levels of employment, and enjoy more satisfying careers. Education may also enable people to more fully enjoy life, appreciate literature and culture, and be more informed and socially involved citizens.

An important distinction is that between the private and the social returns to education. Private returns refer to benefits received by the individual who acquires the additional schooling.ⁱ These include economic benefits such as higher lifetime earnings, lower levels of unemployment, and greater job satisfaction. They may also include consequences such as improved health and longevity. Social returns refer to positive (or possibly negative) consequences that accrue to individuals other than the individual or family making the decision about how much schooling to acquire. They are therefore benefits (possibly also costs) that are not taken into account by the decision-maker. If such "external benefits" are substantial, they could result in significant under-investment in education in the absence of government intervention.

Many observers have suggested that schooling has substantial social benefits, and on this basis have advocated government involvement in the financing and provision of education. Indeed, when discussing education policy, many classical economists departed from their usual *laissez faire* position on the appropriate role of government. For example, in *The Wealth of Nations*, Adam Smith states:

"The state derives no inconsiderable advantage from the education of the common people. If instructed they ... are less liable to the delusions of enthusiasm and superstition, which among ignorant nations, frequently occasion the most dreadful disorders" (Book V, Part III, Article 2)

A more contemporary illustration of this point is Milton Friedman's position on the role of government in schooling:

"A stable and democratic society is impossible without widespread acceptance of some common set of values and without a minimum degree of literacy and knowledge on the part of most citizens. Education contributes to both. In consequence, the gain from the education of a child accrues not only to the child

or to his parents but to other members of the society; the education of my child contributes to other people's welfare by promoting a stable and democratic society." (Friedman, 1955)

This paper summarizes recent evidence on the social benefits of education. In the past, many observers and policy makers have suggested that investing resources in education is likely to yield substantial benefits to society at large. Indeed, the extensive government involvement in the financing and provision of education is to an important extent based on this belief. However, until recently empirical evidence on the magnitudes of such benefits has been lacking. Recent advances have allowed the consequences of education to be estimated in a credible fashion. As a result, we know much more about the private and social benefits of additional schooling than we did even a decade ago. The purpose of this paper is to provide an overview of these recent advances, and to examine the implications of this new evidence for education policy.

The paper is organized as follows. The next section briefly discusses the role of government in education. The rationales for government intervention in the provision and/or financing of education have been described elsewhere (see, for example, Haveman and Wolfe, 1984; Poterba, 1995; Behrman and Stacey, 1997; Wolfe and Haveman, 2001; Laidler, 2002), so it is not necessary to provide a detailed discussion here. However, because this issue is central to the main objective of the paper some discussion is warranted. In addition, a clear statement of the reasons why government involvement may improve matters is often helpful in assessing the form that such involvement should take. The next section discusses the challenges that one faces in obtaining credible estimates of the private and social consequences of education. Recent Canadian evidence on the private benefits to schooling is also briefly summarized. The magnitudes of the private returns provide a useful benchmark against which to compare estimates of the social benefits. The paper then reviews the current state of knowledge regarding the social benefits of education -- ranging from impacts on crime, health, volunteer activity and democratic participation to benefits associated with economic growth via the creation of new knowledge. This long section constitutes the main body of the paper. The last section concludes.

2. Rationales for Government Involvement in Post-Secondary Education

All Canadian jurisdictions are characterized by extensive government involvement in the provision and financing of education. This involvement may be justified on both efficiency and equity grounds. Efficiency gains result in an increase in society's total output of goods and services, and thus allow achievement of higher average living standards. Equity considerations relate not to the average standard of living, but to how society's total output is distributed among citizens.

One efficiency rationale -- arguably the principal such rationale -- was discussed in the introduction. This is based on the presence of benefits from education that accrue to society as a whole in addition to the private benefits that accrue to those receiving the education. A second argument for intervention is the observation that -- in the absence of interventions such as student loan programs -- individuals who might benefit from higher education but who do not have the financial resources to finance the investment are typically unable to use their potential human capital as collateral for a loan. As a consequence, the talents of the population may not be fully utilized and the total output of goods and services may fall short of its potential. In this respect there may be a case for governments to be involved in the financing of post-secondary education, especially for those from less advantaged backgrounds.

Both of these efficiency rationales involve a potential "market failure." The first arises because of positive "external benefits" associated with education -- social benefits that exceed private benefits. The second arises because of a failure in credit markets that results in some individuals being unable to finance productive investments. This feature of credit markets makes investments in human capital fundamentally different from those in physical capital. Institutions such as limited liability, financial markets such as equity, bond, and venture capital markets, and financial institutions such as banks generally ensure that investments in physical capital with a high potential payoff (after adjusting for risk) can be financed. Similar institutional arrangements do not exist for financing human capital investments -- in part because of the abolition of slavery and other forms of indenture.ⁱⁱ

In addition to human capital investments not being easily collateralized, the risks associated with these investments are inherently non-diversifiable. An individual

choosing to become, say, a pilot cannot diversify the risk associated with this occupation by selling claims on future income and purchasing claims on the future income streams of alternative occupations such as pharmacists, electricians and geologists. Inability to diversify risks is another way in which human capital investments differ from investments in physical capital.

Government intervention is also often justified on equity grounds -- that is, promotion of equal opportunity, social mobility, and a more equal distribution of economic rewards. Although important, these issues are not examined in this paper. However, some of the inter-generational effects of education -- which are discussed here -- are closely related to issues of equal opportunity and social mobility.

Even if there were no "market failures" relating to human capital acquisition -- that is, no social returns in excess of private returns and no credit market failures prohibiting individuals from financing productive human capital investments -- there may nonetheless be a role for some government intervention. This is the case because the market for higher education suffers from pervasive problems of incomplete information - a different type of market failure (Romer, 2000). Government intervention has the potential to improve the quantity and quality of information and thereby enable individuals to make more informed decisions.ⁱⁱⁱ

Before examining the evidence on social returns, I briefly discuss the challenges that one faces in estimating the private and social returns to education.

3. Estimating Private and Social Returns to Education

As many studies have documented, education is one of the best predictors of success in the labour market. More educated workers earn higher wages, have greater earnings growth over their lifetimes, experience less unemployment and work longer. Higher education is also associated with longer life expectancy, better health and reduced participation in crime.

The strong positive relationship between education and earnings is one of the most well established relationships in social science. Many social scientists have, however, been reluctant to interpret this correlation as evidence that education exerts a causal effect on earnings. According to human capital theory, schooling raises earnings

because it enhances workers' skills, thus making employees more productive and more valuable to employers. However, the positive relationship between earnings and schooling may arise because both education and earnings are correlated with unobserved factors such as ability, perseverance, and ambition (hereafter simply referred to as “ability”). If there are systematic differences between the less- and well-educated that affect both schooling decisions and labour market success, then the correlation between education and earnings may reflect these other factors as well. According to signaling/screening theory, such differences could arise if employers use education as a signal of unobserved productivity-related factors such as ability or perseverance (Spence, 1974). In these circumstances, standard estimates of the return to schooling are likely to be biased upwards because they do not take into account unobserved “ability”.

This “omitted ability bias” issue is of fundamental importance for the correct interpretation of the positive relationship between earnings and schooling. To the extent that estimates of the return to schooling are biased upwards because of unobserved factors, estimated average rates of return to education may substantially over-predict the economic benefits that a less-educated person would receive if he/she acquired additional schooling. The estimated average rates of return in the population reflect both the causal effect of schooling on productivity and earnings and the average return to the unobserved ability of the well-educated. However, if those with low levels of education are also, on average, those with low ability or ambition, they can only expect to receive from any additional schooling the return associated with the causal effect of schooling on earnings. That is, average rates of return in the population reflect the causal effect of schooling on earnings and the return to unobserved factors. The marginal return—the impact of additional schooling for someone with low levels of education—may be substantially below the average return. In these circumstances, education may not be very effective in improving the employment or earnings prospects of relatively disadvantaged groups.

Credible estimates of the causal effect of education on earnings are thus important. How can such estimates be obtained? The most reliable method would be to conduct an experiment. Individuals randomly assigned to the treatment group would receive a larger “dose” of education than those assigned to the control group. By following the two groups through time we could observe their subsequent earnings and

obtain an unbiased estimate of the impact of schooling on labour market success. Random assignment would ensure that, on average, treatment and control groups would be equally represented by “high ability” and “low ability” individuals.

In the absence of such experimental evidence, economists have tried to find quasi-experiments or “natural experiments” that isolate the influence of education from the possible effects of unobserved ability. A large number of such studies have recently been carried out, using data on identical twins or on sources of variation in education such as those implied by compulsory schooling laws or proximity to a college or university. Card (1999, 2000) provides a discussion of the issues in this literature as well as a review of empirical findings. A consistent result is that conventional estimates of the return to schooling tend, if anything, to *under-estimate* rather than over-estimate the causal impact of education on earnings. Thus conventional estimates appear to provide a lower bound for the causal impact of education on earnings.^{iv}

Many studies have used conventional multivariate regression methods to analyse the relationship between education and labour market outcomes such as earnings.^v Canadian studies obtain estimates of the “return to schooling” that are similar to those obtained in studies carried out in other developed countries: rates of return (in real terms, i.e. after adjusting for inflation) of approximately 8-10 percent for the labour force as a whole.^{vi} Such estimates compare favourably with rates of return on physical capital investments. In Canada, women tend to benefit more from education than men. For example, a recent study found real rates of return to investments in education of approximately 9% for females and 6% for males (Ferrer and Riddell, 2002). In addition to the effects of employment and earnings, a number of benefits discussed subsequently - - such as improved health and longevity -- are at least partly private in nature. As a consequence, there are strong incentives for individuals and families to invest in education.

The challenges one faces in estimating the social impacts of education are similar to those associated with determining the causal impacts on employment and earnings. For example, it has been known for some time that there is a strong positive correlation between education and health outcomes. Does this association arise because acquiring additional schooling causes individuals to adopt healthier lifestyles? Or does the

association arise because both education and health are related to some unobserved factors? For example, it is possible that people who are more "forward looking" choose to acquire more schooling and to pursue better health practices than do their more myopic counterparts who seek immediate gratification. In this case, the correlation between education and health may not reflect a causal influence.

Recent research on the social impacts of education has adopted a similar research strategy to that described above for analysing the private returns to schooling. That is, researchers have used quasi-experimental methods (or natural experiments) to isolate the causal impact of education from other influences on social outcomes. Many of these natural experiments reflect policy changes that took place many years ago, so the subsequent impacts on outcomes such as health, civic participation and even the well-being of children can be traced over time. An important source of variation in educational attainment in several countries is that due to changes in school leaving laws. The way in which these types of variations in education are utilized is described more fully in the next section.

4. Social returns to education

Social returns to education refer to positive or negative outcomes that accrue to individuals other than the person or family making the decision about how much schooling to acquire. They are therefore benefits (potentially also costs) that are not taken into account by the decision-maker. If such "external benefits" are quantitatively important they could result in significant under-investment in education in the absence of government intervention. A substantial amount of empirical evidence is now available on at least some of these outcomes. Several useful surveys of this literature have recently appeared, and I refer to these and some of the individual studies in this paper. Most of the empirical evidence comes from the U.S. Much of the earlier literature focused on the correlation between educational attainment and various outcomes. Recent contributions have paid much more attention to distinguishing between correlations and causal impacts.

The content of education clearly matters. In totalitarian societies schooling is often used as a form of indoctrination. The discussion here presumes that the nature of education is similar to that in Canada and other Western democracies.

I first discuss social benefits that take the form of market outcomes such as productivity, earnings and output of goods and services. This is followed by an examination of non-market outcomes such as health, civic participation and criminal activity.

4.1 Innovation, knowledge creation and economic growth

The factors that determine long term growth in living standards have received substantial attention in the past two decades. Much of this research has been dominated by "new growth theory" that emphasizes the contribution of knowledge creation and innovation in fostering advances in living standards over time.^{vii} The influence of these new perspectives has been reinforced by empirical evidence that supports the view that education plays an important role in economic growth (see, for example, Barro, 2001).

The importance of economic growth (growth in average living standards) deserves emphasis. Even apparently small differences in growth rates will, if they persist over extended periods of time, make huge differences to the living standards of the average citizen. For this reason many economists have noted that understanding the determinants of long term growth is one of the most significant economic problems. As stated for example by Lipsey (1996, p. 4):

All the other concerns of economic policy -- full employment, efficiency in resource use, and income redistribution -- pale into significance when set against growth...All citizens, both rich and poor, are massively better off materially than were their ancestors of a hundred years ago who were in the same relative position in the income scale. That improvement has come to pass not because unemployment or economic efficiency or income distribution is massively different from what it was a century ago but because economic growth has increased the average national incomes of the industrialized countries about tenfold over the period.

A central tenet of the new growth theories is that knowledge creation and innovation respond to economic incentives, and can thus be influenced by public policy. The education and skill formation systems play an important role in fostering innovation and advancing knowledge. There are three main dimensions to this role. One is related to the research function of educational institutions, particularly universities. Such research can be an important source of new ideas and advances in knowledge. The other dimensions are related to the teaching function of universities and colleges. These

educational institutions train many of the individuals who will make future discoveries. They also play a central role in the transfer of accumulated knowledge to new generations. According to this perspective, the human capital of the workforce is a crucial factor facilitating the adoption of new and more productive technologies.

The transfer of knowledge function should be reflected in the private returns to education. Those receiving education will become more productive and thus more valuable to employers. The "return" to this investment takes the form of higher earnings than would have been possible without additional education.

In contrast, there will generally be social benefits associated with encouraging innovation and scientific advances that arise from the "public good" nature of knowledge. The potential market failure associated with the public good nature of knowledge is recognized by adoption of patent laws and other institutional arrangements to encourage invention and innovation. In addition to these "dynamic externalities" that may contribute to greater growth in living standards over time, there may also be "knowledge spillovers" of a more static form if more educated individuals raise the productivity and earnings of those they work with or interact with in the community.

The magnitudes of these "knowledge spillovers" -- both the dynamic and static types -- has been the subject of substantial recent research. Davies (2002) provides a careful review of this literature. He concludes that there is substantial evidence of dynamic externalities associated with education, although he cautions that there remains considerable uncertainty about their magnitudes. These dynamic externalities appear to operate primarily via technology adoption and innovation. His estimate of the magnitudes of these growth-enhancing social returns in excess of private returns is 1-2 percentage points. This estimate is consistent with the results of a number of studies of the relationship between education and growth. For example, the ambitious study of both static and dynamic impacts of education on economic growth by McMahon (1999) covering 78 countries over the 1965-1990 period obtains estimates of total returns to education for the U.S. of 14% of which private returns constitute 11-13%. Comparable estimates for the U.K. are total returns of 15% and private returns of 11-13%.

Another noteworthy finding in this literature is that post-secondary education is relatively more important for explaining growth in OECD countries, while primary and

secondary schooling is more important in developing countries (Gemmell, 1995; Barro and Sala-i-Martin, 1995). This result is consistent with the view that tertiary education has a special role to play in preparing workers for technological adoption and innovation in the more advanced countries.

4.2 Knowledge spillovers

Static knowledge spillovers arise if more education raises not only the productivity of those receiving the education but also the productivity of those they work with and interact with. For example, in *The Economy of Cities*, Jane Jacobs (1969) argues that cities are an "engine of growth" because they facilitate the exchange of ideas, especially between entrepreneurs and managers. Such knowledge spillovers can take place through the exchange of ideas, imitation, and learning-by-doing. Evidence of the role of knowledge spillovers in technological change has resulted in substantial attention being focused on the clustering of the agents of innovation -- firms, end users, universities and government research facilities (Bekar and Lipsey, 2002).

Rauch (1993) was the first study of human capital spillovers employing cross-sectional evidence on U.S. cities. He found evidence that higher average education levels in cities is correlated with both higher wages of workers (even after controlling for the individual's own education) and higher housing prices. Similarly, Glaeser, Scheinkman and Shleifer (1995) found that income per capita grew faster in U.S. cities with high initial human capital in the post-war period. In one of several studies of specific industries, Zucker, Darby and Brewer (1998) note an impact of the concentration of outstanding scientists in particular cities on the location decisions of new biotech firms. These studies provide some indirect evidence of human capital externalities. However, they are not conclusive because cities with higher average schooling levels could also have higher wages for a variety of reasons other than knowledge spillovers. In addition, the direction of causation could be the reverse -- higher incomes could lead to more schooling. Recent contributions have used "natural experiments" and other techniques to assess whether there is evidence of knowledge spillovers that is causal in nature.

Acemoglu and Angrist (2001) use variation in educational attainment associated with compulsory schooling laws and child labour laws in the U.S. to examine whether there is evidence of external returns to higher average schooling at the state level.^{viii} They

find small (about 1%) social returns in excess of private returns but these are imprecisely estimated and not significantly different from zero. Because compulsory schooling laws principally influence the amount of secondary schooling received, these results suggest that there are not significant knowledge spillovers associated with additional high school education. However, subsequent studies by Moretti (1998, 2002, 2003a) and Ciccone and Peri (2002) find stronger evidence of externalities associated with post-secondary education (graduates of four-year colleges in U.S.). These studies use a variety of data sources and focus on spillovers at the city level. Moretti (2003b) provides a useful survey of evidence on these city-level spillovers. Although this literature is still in its infancy, the most recent research indicates moderately large social returns due to knowledge spillovers from post-secondary (college in U.S. or university in Canada) education. For example, Ciccone and Peri (2002) estimate social returns of 2%-8% in excess of private returns. A cautious assessment of this recent literature would be that there are social returns of 1%-2% associated with static knowledge spillovers from post-secondary education in advanced economies. Together with the growth-enhancing dynamic effects, this evidence suggests that social benefits associated with technological adoption, innovation, and productivity enhancement from knowledge spillovers may yield social returns in the range of 2-4%.

4.3 Non-market effects of education

The non-market benefits of education considered are consequences other than those received in the form of higher wages or non-wage benefits from working. Some of these non-market effects -- such as improved own health or child development -- may be considered private in nature, or at least private to the family, and thus may be taken into account by individuals in choosing the amount of education to acquire. If so, they should not be treated as social benefits. Nonetheless, they are benefits that accrue to the individual or family, and thus should be added to the private benefits associated with higher lifetime earnings. In addition, even effects such as improved health outcomes may be of some public value if they reduce reliance on publicly funded programs.

Berhman and Stacey (1997), McMahon (1997), Wolfe and Zuvekis (1997) and Wolfe and Haveman (2001) provide recent surveys of the literature that attempts to

quantify the social and non-market effects of education. This research analyzes data from both developed and developing countries. The empirical studies that these authors survey generally find considerable impacts of education on a wide variety of non-market and social benefits, even after controlling for such factors as income, age and race. These include:

- Effect of wife's schooling on husband's earnings.
- Effect of parents' education on child outcomes (intergenerational effects): education, cognitive ability, health, and fertility choices.
- Effect of education on own health and spouse's health.
- Effect of education on consumer choice efficiency, labour market search efficiency, adaptability to new jobs, marital choice, savings, and attainment of desired family size.
- Effect of education on charitable giving and volunteer activity.
- Effect of schooling on social cohesion: voting behaviour, reduced alienation and smaller social inequalities.
- Effect of education on reducing reliance on welfare and other social programs.
- Effect of schooling on reduced criminal activity.

Many of the studies also find relationships between the average education levels in the community and positive non-market benefits. For example, higher average education levels in the community (particularly young adults) lower school dropout rates of children. However, not all of this research is able to control appropriately for unobserved factors that may impact both education and these non-market outcomes. Thus considerable care needs to be exercised in treating correlations between education and various outcomes as being causal in nature.

Brief summaries of the state of knowledge relating to these non-market social benefits of education are provided below. Special attention is devoted to recent research, which has generally devoted considerable attention to trying to estimate the causal impacts of education on various outcomes.

4.4 Intergenerational effects

Parents' education has strong effects on children, resulting in large intergenerational effects. As a consequence, the benefits of higher education accrue over extended periods. Two recent surveys by Greenwood (1997) and Maynard and McGrath (1997) summarize the literature on these effects. The research shows an impact of parental education on a number of child outcomes, including:

- Higher parental education is associated with lower fertility, via increased efficiency of contraception, as well as via raising the age of both marriage and first pregnancy. The resulting lower population growth is positive for economic growth in developing countries.
- The incidence of teenage childbearing is much higher for children of less educated parents. Teenage parents have elevated probabilities of dropping out of high school, demonstrated lower parenting skills, and experience higher rates of poverty. This has subsequent negative impacts on the children of teenage parents as outcomes for these children are generally worse than for other children.
- Child abuse and neglect are also associated with parental education levels.
- Higher parental education is associated with more substantial family investments in children, and these investments have an effect far greater than the societal educational investments made when the child enters school. Children of more educated parents generally perform better in school and in the labour market, and have better health. These impacts are significant even after controlling for parental income. The higher family investments typically take the form of parental time and expenditures on children.
- Children of less educated parents generally cost more to educate, needing special compensatory programs, as well as being more likely to require expensive programs like foster care and juvenile diversion.
- Higher parental education is associated with lower criminal propensities in children. It is also associated with lower probabilities of parental abuse and neglect, which also may reduce criminal behaviour and the need for the removal of children from the home.
- Higher parental education is associated with improved child health.

Although many of these consequences are internal to the family, and thus should be treated as private benefits, a number of these intergenerational effects of education also have benefits for society. These include: lower education costs, less use of foster care and juvenile diversion, lower crime, lower health costs, and lower dependence on welfare transfers.

4.5 Health and longevity

Grossman and Kaestner (1997) and Wolfe and Haveman (2001) survey a huge amount of empirical research on the causal effects of education on health. The overriding conclusion of these authors is that the empirical evidence supports the belief that education has a causal impact on health outcomes in the U.S., other developed countries, and in developing countries. Many studies are careful in uncovering causal impacts rather than simply correlations between education and health outcomes (which are known to be strong). In addition, as noted previously, there is also considerable evidence that child health is positively related to parents' education (Wolfe and Haveman, 2001).

There is less evidence on the actual pathways by which education impacts health. Education may impact how individuals assess information on how to improve health, and it may increase the efficiency by which individuals use that information in lifestyle choices. It may also impact the rate of time preference of individuals, with more educated individuals discounting the future less, and thus undertaking actions that improve health (e.g. smoking less). In a widely cited study, Kenkel (1991) found that education is not only associated with better health outcomes but also superior health behaviours such as reduced smoking, more exercise and lower incidence of heavy drinking. Interestingly, however, the influence of schooling does not mainly operate through its impact on health knowledge -- the estimated impact of additional education did not decline substantially when controls were included for health knowledge. This suggests that the effect of education on health occurs mainly through the utilization of health knowledge rather than the acquisition of such knowledge.^{ix}

Recent research by Lleras-Muney (2002) reinforces the conclusion that there is a strong causal effect of education on mortality in the U.S. She finds that an extra year of schooling results in a decline in mortality of at least 3.6% over a ten-year period, an impact that is larger than prior estimates of the effect of education on mortality. To deal

with unobserved characteristics that impact both education and health she uses variation in educational attainment due to compulsory schooling laws as employed by Acemoglu and Angrist (2001) and others. This methodology results in estimates that focus on the impact of additional high school on mortality, rather than on higher levels of post-secondary education.

Lleras-Muney and Lichtenberg (2002) examine one of the mechanisms by which education may impact health outcomes. They investigate whether education is correlated with adoption of newer prescription drugs. If more educated people are more likely to adopt newer drugs, due to more information or better ability to learn, and those newer drugs improve health, then this may be one mechanism by which education leads to better health. They find that education is correlated with the purchase of drugs that are more recently approved, after controlling for the medical condition, individual income and health insurance status. The impact of education is generally felt only for chronic conditions, where prescriptions are bought regularly for the same condition. This suggests that the more educated are better able to learn from experience.

Although better health is principally a private return, it may also be a social benefit if it means less reliance by people on publicly provided health care or welfare payments. In this respect, there is an important difference between morbidity and mortality. From the perspective of the public finances, reduced morbidity has a positive effect whereas increased longevity is more likely to negatively affect publicly funded programs such as pensions and medical care.

4.6 Criminal activity

Until recently the evidence from empirical studies of the impact of education on crime was mixed. For example, in their reviews of the literature Witte (1997) and McMahon (1999) concluded that the available evidence does not find that education impacts crime once other factors are controlled for.^x However, recent work by Grogger (1998), Lochner (1999) and Lochner and Moretti (2004) focuses specifically on the role of education and does find an impact of schooling on crime. Higher education levels may lower crime by raising wage rates, which increase the opportunity cost of crime. Education may also raise an individual's rate of time preference (the extent to which future consequences are discounted), thus increasing the cost of any future punishment as

a result of crime. Lochner (1999) estimates the social value of high school graduation through reductions in crime, taking into account the costs of incarceration and costs to victims. The extra social benefits amount to almost 20% of the private returns to increases in high school completion. This may even be a conservative estimate as a number of crimes are not included in the analysis, nor are the potential benefits to citizens associated with feeling safe. In addition, some of the costs (such as criminal justice and law enforcement costs) are also not taken into account.

In subsequent research, Lochner and Moretti (2004) utilize a variety of data sets to examine whether increasing education levels cause reductions in crime among adult males in the U.S. They employ three sources of information: incarceration, arrests and self-reports of criminal activity. The authors find that higher education levels, particularly graduating from high school, consistently lower the probabilities of incarceration, of criminal arrests, and of self-reports of undertaking criminal activity. In U.S. Census data the probability of incarceration is negatively correlated with education levels, and is much higher for blacks than whites. This correlation may not be causal, however, if there are unobserved individual characteristics which both raise education and lower criminal activity. Following the methods used by Acemoglu and Angrist (2001) discussed previously, the authors employ compulsory school attendance laws as an independent source of variation in educational attainment. Their casual estimates of the impact of education on incarceration indicate that high school graduation lowers incarceration probabilities by 0.8 percentage points for white males and 3.4 percentage points for black males. Differences in educational attainment can explain as much as 23% of the black-white gap in male incarceration rates.

Data from the FBI's crime reports allows the impact of education on different types of crime to be estimated. Education was most effective in lowering violent crime rates like murder and assault, as well as motor vehicle theft. The third data set employed was a longitudinal survey that asked respondents about crimes they have committed. This source of information usefully supplements the data on arrests and incarceration because it is possible that more educated people commit as much crime as less educated people, but are better at avoiding arrest or obtaining lighter sentences. The evidence,

however, is that education has very similar impacts on self-reported criminal activity to that which it had on arrests and incarceration.

On the basis of this evidence, Lochner and Moretti (2004) calculate that raising the high school graduation rate by 1% will reduce the costs of crime by approximately \$1.4 billion dollars per year in the U.S.

4.7 Civic participation

The impact of education on civic participation has been analyzed by political scientists for a long time. The correlation between education and voting is strong. Higher education is also associated with greater charitable giving and more volunteerism. Helliwell and Putnam (1999) also find that education is correlated with typical measures of social capital: trust and social participation (club memberships, community work, hosting dinner parties). However, only recently have studies attempted to determine whether education exerts a causal influence on civic participation, or whether the correlation arises because both education and civic participation are jointly influenced by unobserved factors. Two recent papers that attempt to do so are Milligan, Moretti and Oreopoulos (2003) and Dee (2003).

Milligan, Moretti and Oreopoulos (2003) analyse the question of whether education improves citizenship. The authors focus on the U.S. and the U.K., but provide some results for Canada also. The main question is whether people who have more education are more likely to vote in elections. Analysis is also conducted on whether education raises the “quality” of people’s involvement in society. Here “quality” is measured by such things as whether people:

1. follow the news and political campaigns,
2. attend political meetings,
3. work on community issues,
4. try to persuade others to share their views,
5. discuss political matters with friends,
6. consider themselves politically active,
7. consider themselves close to a political party, and/or
8. trust the federal government.

As in previously discussed studies by Acemoglu and Angrist (2001) and Lochner and Moretti (2004), Milligan, Moretti and Oreopoulos (2003) use variation in educational attainment generated by compulsory school attendance laws and child labour laws. The estimates thus relate to the impact of additional secondary schooling on civic participation.

Generally the authors find that having a higher level of education does raise the probability of voting in the U.S., but not in the U.K. They suggest that this may be due to different voter registration methods in the two countries. In the U.S., registration is the responsibility of the individual, and thus many people are not registered. In the U.K., registration is undertaken by local authorities, and registration is required. Thus the vast majority of citizens are registered. If estimates of the impact of education on voting are made conditional on registration, the effect of education becomes much less in the U.S. There is little change in the U.K., as we would expect given the high level of registration. Canada has registration laws more closely resembling the U.K., and the impact of education on voting behaviour is much more muted than in the U.S. Having graduated high school raises the probability of voting by close to 30% in the U.S. (not conditional on registration), while the estimated impact is around 9% in Canada. The authors also find strong impacts of education on the measures of the “quality” of citizenship listed above.

Dee (2003) analyzes the impact of education on voting and civic behaviour in the U.S., using comparable methods to Milligan et. al. (2003) but with different data sources. He also finds a strong causal impact of education on voting behaviour, the probability of reading newspapers and support for free speech by various groups. Some of his results also provide evidence on the impact of post-secondary education on voting behaviour. For example, he finds that college entrance raises the probability of voter participation by approximately 20 to 30 percentage points. He also concludes that an additional year of high school increases the probability of voting in Presidential elections by around 7 percentage points. Education also increases certain measures of civic engagement and knowledge: the frequency of newspaper readership, and support for free speech by anti-religionists, communists and homosexuals. He also finds that additional education does

not increase support for free speech by militarists (someone who advocates outlawing elections and letting the military run the country) or racists.

In addition to these studies based on individual data, cross-country studies find that higher education has a positive effect on democratization and political stability -- the type of relationship suggested by the quotes from Adam Smith and Milton Friedman in the introduction to this paper. For example, McMahon (1999, 2001) finds significant effects of secondary schooling on measures of democratization, human rights, and political stability, after controlling for income per capita and military spending as a proportion of total public expenditure. McMahon also finds strong feedback effects on economic growth that operate through democratization and political stability.

4.8 Tax and transfer effects

Several studies discussed by Wolfe and Haveman (2001) find that those with more education are less likely to rely on public transfers, even when eligible for benefits. Indeed, evidence indicates that the mother's education even lowers take-up of welfare by eligible children. Although these consequences of education should not be ignored, the quantitatively most important effect is the impact of higher lifetime earnings on government tax receipts (Davies, 2002). For example, in Canada the modal marginal tax rate on university graduates -- taking into account sales, excise and income taxes -- is in excess of 50%. Thus each additional \$1,000 in labour market earnings generates an additional \$500 in tax revenue. Collins and Davies (2001) recently estimated the gap between before-tax and after-tax rates of return to a university bachelor's degree in Canada and the U.S. In Canada, for men and women together, the median reduction in the rate of return due to taxes was 1.9 percentage points. In the U.S. the corresponding reduction was 1.1 percentage points. On the basis of these calculations, Davies (2002) notes that the tax revenue associated with higher earnings adds approximately 2 percentage points to the social benefits of higher education.

Because of the progressive nature of income tax, the reductions in the rate of return due to taxation are larger at higher income levels. For example, Collins and Davies (2001) estimate reductions of 2.8 percentage points for Canadian men at the 90th percentile of the earnings distribution and 1.9 percentage points for corresponding U.S. men.

5.0 Summary and Conclusions

A central reason for public funding -- and in many cases also provision -- of education has been the belief that there are major social benefits from schooling, in addition to the private benefits. However, until recently evidence on the magnitudes of these external benefits has been lacking. Beginning in the 1960s and 1970s, with the availability of large micro data files on individuals, social scientists have confirmed that educational attainment is correlated with numerous individual and social outcomes such as lifetime earnings, health and civic participation. However, it remained unclear to what extent the positive correlation between schooling and outcomes such as earnings and health reflected a causal impact of education or was due to both schooling and individual outcomes being related to some unobserved factor. Resolution of this issue is crucial as the case for public subsidization rests on education causing social benefits to occur. Recent research using natural experiments and related statistical methods has strengthened the case for believing that the social benefits of education are substantial.

Summarizing the evidence surveyed in this paper yields the following approximate estimates of the social returns to schooling:

1. Dynamic externalities associated with economic growth	1-2 percentage points
2. Static knowledge spillovers	1-2 percentage points
3. Non-market external benefits	3-4 percentage points
4. Social benefits associated with taxation	2 percentage points
Total	7-10 percentage points

The quantitative estimate for non-market benefits is based on calculations by Wolfe and Haveman (2001) after removing benefits associated with intergenerational effects and health, both of which are arguably principally private to the individual or family. The other estimates were discussed previously.

These estimates suggest that the social benefits of education may be similar in magnitude to the private benefits associated with higher lifetime earnings, which are also in the range of 7-10 percent. If so, the social returns to education are substantial and justify significant public subsidization of this activity.

The estimated (real) social return of 7-10 percent is arguably a conservative estimate. After a detailed survey of the available evidence, Wolfe and Haveman (2001) conclude that the social return from non-market effects of schooling are of the same order of magnitude as the private returns to education from higher earnings. They do not, however, include the social benefits from higher tax revenue or the growth-enhancing effects of knowledge creation and innovation. On the other hand, they do include in their calculations the intergenerational effects and the impacts of education on health, both of which are excluded from the above estimates on the basis that they are principally private in nature. Similarly, Davies (2002) also concludes that the social returns are similar in size to the private returns. His estimates are similar to those above except that he estimates a value of zero for static knowledge spillovers. The main reason for this different conclusion is that Davies (2002) did not have access to the very recent research by Moretti (2002, 2003a) and Ciccone and Peri (2002) that finds evidence of knowledge spillovers associated with post-secondary education in U.S. cities. Davies' conclusion was principally based on earlier research by Acemoglu and Angrist (2001), who concluded that additional secondary schooling did not have positive external effects on the earnings of other workers in the same state.

Several additional observations are warranted. First, there remains considerable uncertainty about the magnitudes of the social benefits of schooling. In contrast to the substantial amount of research that has been carried out on the relationship between schooling and earnings, much less is known about the causal impact of education on other outcomes. This is particularly the case with respect to Canadian evidence. As indicated in the previous section, most of the evidence on causal impacts comes from U.S. studies. Some of the impacts of schooling may be universal in nature, but others are likely to depend on the social and institutional setting. This situation was evident in the case of civic participation, where education appears to have a much larger effect on voting behaviour in the U.S. than it does in Canada and the U.K., for reasons that seem to be related to systems of voter registration in the respective countries. It is quite possible that the magnitudes of the impacts of education on Canadian criminal activity and health outcomes are different from those in the U.S., even if the direction of the influence is the same in the two countries.

Second, there is substantial uncertainty about the size of the social benefits associated with post-secondary education. Much of the U.S. evidence on causal impacts of schooling uses as a source of independent variation in educational attainment the changes in compulsory school attendance laws and child labour laws. As discussed, these studies provide evidence on the causal impact of additional schooling at the secondary level. The clearest evidence of positive social benefits from post-secondary education is that associated with growth-enhancing effects from technological change and innovation and knowledge spillovers from more educated workers. There is also some evidence that post-secondary education enhances civic participation. Many of the studies of intergenerational effects also report evidence of significant impacts associated with post-secondary education.

A third observation is that I have not included in the above calculation of social benefits the evidence of intergenerational effects such as those on child development, health and education associated with the educational attainment of the parents. Nor have the effects on the individual's health behaviours and health outcomes (as well as those on the spouse) been included. Whether these are appropriately viewed as private or social benefits depends to an important extent on whether individuals take these consequences into account at the time they choose how much education to acquire. The case for regarding these consequences of additional schooling as private benefits is based on the argument that a rational individual should take these effects into account in making their educational choices (even if they do not yet have a spouse or children). Although many individuals appear to be motivated in part by career prospects in making their educational decisions, it is less clear that they take into account these other benefits. If they generally do not do so, there is a case for including these consequences as social benefits, as is done by scholars such as Wolfe and Haveman (2001). In these circumstances, the above estimates understate the social benefits from education. On the other hand, if we treat the intergenerational effects and health and longevity consequences as being strictly private benefits, then the total private benefits are much larger than is commonly believed. This conclusion may enhance the case for government involvement in the financing of post-secondary education, in order to help ensure that individuals from disadvantaged backgrounds can take advantage of investments with potentially high returns. In addition,

there may also be a case for governments providing more information than is currently available on the non-market consequences of additional schooling, rather than focusing principally on the consequences for future employment and earnings.

In summary, although more research on these issues is needed (especially more Canadian research), the value of the social benefits of education appears to be similar in size to the private market returns to education from higher lifetime earnings. Thus the benefits of education are considerable, and any decisions regarding public support for education should take these social and non-market benefits into account.

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Endnotes

ⁱ Because decisions relating to investments in education are often taken at the family rather than individual level, the private benefits may refer to those received by the family. This point is discussed more fully later.

ⁱⁱ There are a few exceptions. For example, the Canadian Armed Forces' Regular Officer Training Program (ROTP) provides heavily subsidized university education in return for a commitment to serve in the Armed Forces for a minimum amount of time (currently 5 years) following graduation.

ⁱⁱⁱ See Riddell (2003) for a discussion of these issues in the Canadian context.

^{iv} See Card (1999, 2000) for further discussion of this evidence, and Riddell (2002, 2004) for a review of Canadian evidence on causal impacts.

^v Earnings is the most commonly used measure of labour market success because it captures both the wage rate or "price" of labour services and employment (hours, weeks and years of work).

^{vi} These are before-tax rates of return. I discuss the impact of taxation below.

^{vii} Previous theories of economic growth placed greater emphasis on "inputs" into production -- i.e. on the accumulation of physical and human capital.

^{viii} Such laws result in variation in educational attainment (in this case, additional secondary schooling) that is independent of individuals' educational choices.

^{ix} An important exception is the case of smoking, where Kenkel (1991) found evidence of an important interaction between health knowledge and education. Those with more schooling reduced their smoking more for a given increase in knowledge of the consequences of smoking. He also points out that prior to the report of the U.S. Surgeon General in the 1960s (which had a major impact on knowledge about the health consequences of smoking) higher education was not related to lower incidence of smoking.

^x There is however strong evidence of a link between time spent productively occupied -- either employed or in school -- and crime.

The Social Benefits of Education: New Evidence on an Old Question

W. Craig Riddell
University of British Columbia

- Paper surveys new evidence on social benefits to education
- Private returns refer to benefits received by those acquiring the education
- Social returns refer to benefits (or costs) that are received by other individuals

- In making schooling decisions, individuals take into account the private costs and benefits
- Social benefits are thus not taken into account in individual educational decisions
- Social benefits could result in substantial under-investment in education

- Many observers have suggested that schooling has substantial social benefits, and have advocated government involvement in the financing and provision of education.
- For example, Adam Smith states:

"The state derives no inconsiderable advantage from the education of the common people. If instructed they ... are less liable to the delusions of enthusiasm and superstition, which among ignorant nations, frequently occasion the most dreadful disorders" (*The Wealth of Nations*)

- Milton Friedman's position on the role of government in schooling:

"A stable and democratic society is impossible without widespread acceptance of some common set of values and without a minimum degree of literacy and knowledge on the part of most citizens. Education contributes to both. In consequence, the gain from the education of a child accrues not only to the child or to his parents but to other members of the society..."
(Friedman, 1955)

- Extensive government involvement in education is often justified on the basis of social benefits.
- However, empirical evidence on the magnitudes of benefits has been lacking.
- Recent advances have allowed the consequences of education to be estimated in a credible fashion.
- As a result, we know much more about the private and social benefits of education than we did even a decade ago.

The empirical challenge

- Education is positively correlated with many outcomes such as earnings and health
- However these correlations do not imply that additional education *causes* greater earnings or improved health
- The positive correlation could arise because both variables are associated with some unobserved factors

- For example, those with greater ability or motivation may acquire more education *and* achieve higher earnings
- Similarly, those who are more “forward looking” may invest more in education and adopt healthier lifestyles
- These unobserved factors make it difficult to determine the causal impact of education

Addressing the empirical challenge

- The most reliable method would be to conduct a random assignment trial
- Those in the “treatment group” would receive a larger “dose” of education
- The earnings/health of the treatment and control groups would be tracked over time

Natural and quasi-experiments

- In the absence of experimental evidence, researchers have used “natural or quasi-experiments”
- These attempt to isolate the effects of education from unobserved factors like ability and motivation
- If carefully done, quasi-experimental studies can provide convincing evidence

Innovation, Knowledge Creation and Economic Growth

- Because of the "public good" nature of knowledge, there will generally be social benefits associated with encouraging innovation and scientific advances.
- These "dynamic externalities" may contribute to greater growth in living standards over time.
- There is substantial evidence of dynamic externalities associated with education. They appear to operate primarily via technology adoption and innovation.

- There may also be "knowledge spillovers" if more educated individuals raise the productivity and earnings of those they work with or interact with in the community.
- Such knowledge spillovers can take place through the exchange of ideas, imitation, and learning-by-doing.
- Recent research indicates moderately large social returns due to knowledge spillovers from post-secondary education.

Intergenerational Effects

- Parents' education has strong effects on children. Thus the benefits of higher education accrue over extended periods.
- Higher parental education is associated with greater family investments in children in the form of parental time and expenditures on children.
- Children of more educated parents generally perform better in school and in the labour market, and have better health.
- Higher parental education is also associated with lower criminal propensities in children, and less child abuse and neglect.

Health and Longevity

- Substantial amount of research concludes that education has a causal impact on health.
- There is less evidence on the actual pathways by which education impacts health outcomes.
- Although better health is principally a private return, it may also be a social benefit if it means less reliance on publicly provided health care.

Criminal Activity

- Until recently the empirical evidence on the impact of education on crime was mixed.
- However, recent work does find a substantial impact of schooling on crime in the U.S.
- Lochner and Moretti (2004) calculate that raising the high school graduation rate by 1% will reduce the costs of crime by approximately \$1.4 billion dollars per year in the U.S.

Civic Participation

- Strong correlation between education and voting, charitable giving and volunteerism.
- However, only recently have studies attempted to determine whether education exerts a causal influence on civic participation.
- Milligan, Moretti and Oreopoulos (2004) find that higher education does raise the probability of voting in the U.S., but not in the U.K. Differences may be due to different voter registration methods in the two countries.
- Canada has registration laws more closely resembling the U.K., and the impact of education on voting behaviour is more muted than in the U.S.
- Having graduated high school raises the probability of voting by close to 30% in the U.S., versus around 9% in Canada.
- They also find strong impacts of education on measures of “social involvement.”

Tax and Transfer Effects

- The quantitatively most important effect is the impact of higher lifetime earnings on government tax receipts.
- In Canada the modal marginal tax rate on university graduates -- taking into account sales, excise and income taxes -- is in excess of 50%.
- Thus each additional \$1,000 in earnings generates an additional \$500 in tax revenue.
- The tax revenue associated with higher earnings adds approximately 2 percentage points to the social benefits of higher education.

Summary of evidence

- The empirical evidence yields the following approximate estimates of the social rate of return to education:

• Dynamic effects on economic growth	1%-2%
• Knowledge spillovers	1%-2%
• Non-market benefits	3%-4%
• Tax and transfer effects	2%
• Total	7%-10%
- These estimates suggest that the social return to education is similar to the private returns associated with higher lifetime earnings, which are also in the range of 7-10 percent.
- Evidence suggests that the social returns to education are substantial and justify significant public subsidization of this activity.

Kevin Milligan quote

- “One thing I like about this literature is that we have made strides in quantifying what before was mostly just a hand-waving, slightly wishful argument made by public education advocates”