A Review of the Social and Non-Market Returns to Education

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Abstract

There are three distinct ways of defining returns to education. These are the private return, the social return and the labour productivity return. Here, we are most interested in the direct/private and indirect/social non-monetary aspects of learning, which are called 'non-monetary returns'. Non-monetary returns, along with economic returns (forming human capital) are one of the important contributors to GDP both directly and indirectly. Non-market returns are the combination of Private non-market effects and Community non-market effects. Measurement and methodology remain fundamental issues of concern to researchers. In the US the agreed approach is to measure education in terms of years of schooling while in the UK measurement is based upon qualifications gained. Education relates to wider economic and social effects and human welfare depends partly on earnings but also on moderation of crime costs, slower population growth, less poverty, a cleaner environment and other non-monetary outcomes that all trace back to education in various ways. Positive relationships between education and health, the health of family members, the schooling of one's children, life choices made, fertility choices and infant mortality exist. Education also has a positive effect on the environment and has a strong correlation in crime reduction.

1 Introduction

Blundell et al (2001) note that there are three distinct ways of defining returns to education. These are the *private* return, the *social* return and the *labour productivity* return. Social returns to an educational investment are said to indicate the desirability of this investment to society, Venniker (2000). Furthermore, since Becker (1964) and Schultz (1961) introduced the concept of human capital in the 1960's, education has mainly been seen as an investment. As a result, much is known about the private returns to education (relevant costs of tuition fees etc. less opportunity costs such as earnings). Knowledge about social returns is much more scarce. This is in part due to the complexities involved in measurement. Sianesi and Van Reenen (2000) comment that a whole host of methodological problems exist in estimating the impact of education on growth. However, they conclude that there is compelling evidence that human capital increases productivity suggesting that education really is productivity enhancing. Furthermore, the non-monetary (non-market) rates of return for both private and social rates of return are difficult to quantify. Few estimates of economic value exist. However, much has been done in recent years to look at non-market effects and Blundell et al (2001) suggest that the social return definition also highlights any externalities or spillover effects. It is these effects that we are most interested in here and will begin by setting non-market effects in the context of human capital.

2 Social Returns in Context

The OECD (2000) note that social benefits of learning may be either direct (e.g. improved health, social participation, social cohesion) or spillover effects such as a positive impact of increased skills on productivity or the wellbeing of others. Learning may be either direct and private or indirect and social. In addition it may or may not have a monetary value as Table 1 reveals.

Table 1: Classifying the impact of human capital

	Direct/Private (directly captured by individuals with higher levels of human capital)	**Indirect/Social** (aggregation of human capital across individuals, organisations and communities)
Monetary (sometimes referred to as economic)	Enhanced economic productivity of individuals	Enhanced economic output reflecting the effects on organisations, firms and societies (including interactions between different agents and spill-over effects)
Non-monetary	Improved health and other aspects of individual well-being	Social cohesion and well-being including the effect of spillovers

Source: OECD (2000)

Here, we are most interested in the direct/private and indirect/social *non-monetary* aspects of learning, which are called 'non-monetary returns'. The direct/private and indirect/social *monetary* returns to learning fall under 'economic returns'. It is important to realise that both concepts are equally important and work together as 'human capital'. Human capital acts as a joint agent with 'social capital' (the norms and networks facilitating collective action) to bring about economic and social development. This is graphically illustrated in Figure 1.

Figure 1: Key inter-relationships between human capital, social capital and human well-being
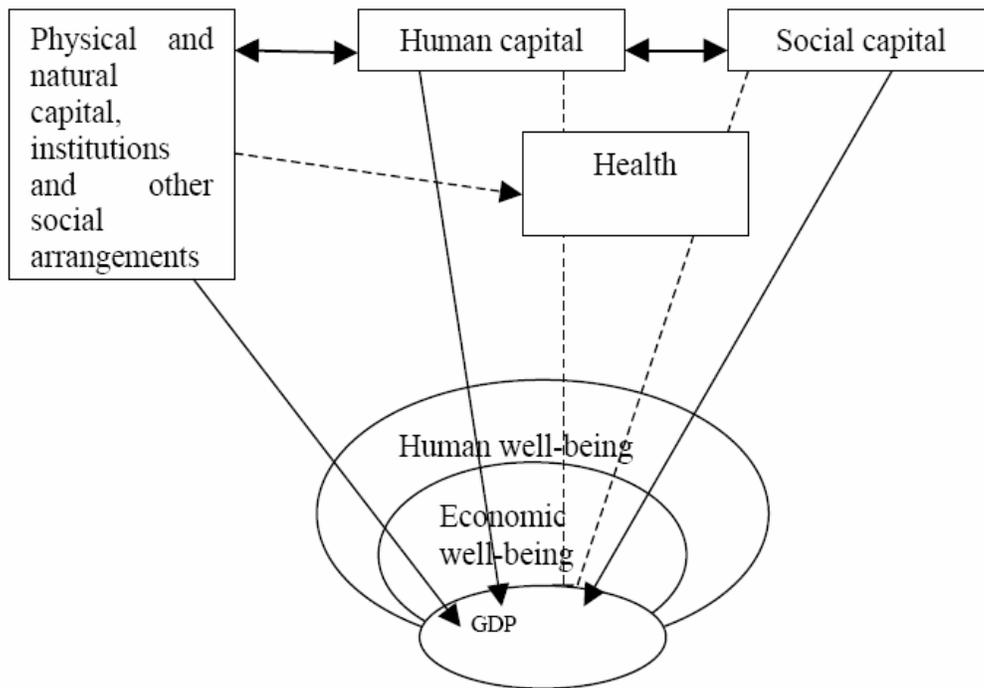
Source: OECD (2000)

Figure 1 reveals that non-monetary returns, along with economic returns (forming human capital) are one of the important contributors to GDP both directly and indirectly. How increasing returns to education and training can be increased by investing in better quality provision, smaller classes, more parental support etc are seen by the OECD as one of the important policy questions we need to ask. However, and most importantly, the OECD point out that an analysis of the impact of learning on various outcomes needs to take account of both the role of social capital and human capital. In other words we need to take account of the context in which learning takes place and the ways in which families, schools and communities generate social capital.

3 Educational Returns Defined

In Table 2 below Mingat and Tan (1996) detail the education costs and benefits to individuals and society. They note that individuals incur two types of costs (out of pocket and foregone production) while society incurs public subsidy and spillover effects in productivity. The benefits to individuals of education are said to be increased market productivity and private non-market effects. Society benefits with gains in technology and community non-market effects. Non-market effects are more widely known as 'externalities', in that the individual does not anticipate them.

Table 2: Generic education costs and benefits and their accrual to individuals and the rest of society

	INDIVIDUALS	SOCIETY
C O S T S	C1.<u>Direct costs</u> (including school fees)	C3. <u>Public subsidy</u> net of cost recovery and adjusted for possible deadweight losses of tax-financed public spending)
	C2.<u>Forgone production</u> Lost earnings or other production)	B3.<u>Spillover effects in worker productivity</u> (as when a person's education enhances the work productivity of his or her co-workers)
B E N E F I T S	B1.<u>Increased market productivity</u> as reflected in earnings or other work outputs)	B4.<u>Expanded technological possibilities</u> (such as those arising from the discovery, adaptation and use of new knowledge in science, medicine, industry, and elsewhere)
	B2.<u>Private non-market effects</u> (better personal health, expanded capacity to enjoy leisure, increased efficiency in job search and other personal choices)	B5.<u>Community non-market effects</u> (greater social equity, more cohesive communities, stronger sense of nationhood, slower population growth and related alleviation of environmental stress, reduced risks from infectious diseases, crime reduction, and so on)

Source: Mingat and Tan (1996)

When defined in terms of returns to education and learning, **non-market returns** are the combination of:

Private non-market effects
and
Community non-market effects

Private non-market effects

These non-market effects include the impact of education on personal health, capacity to enjoy leisure and efficiency in making a variety of personal choices. Another benefit of education that is recognised by Mingat and Tan (1996) is the option it creates for proceeding up the education ladder, a benefit that applies mainly to the lower levels of education.

Community non-market effects

The community level benefits of education as identified by Mingat and Tan include the possible contribution of education to improving social equity, strengthening national cohesiveness, reducing environmental stress through its effects on fertility and population growth and lowering crime rates. It also contributes to the production of community wealth.

4   Methodological and Measurement Issues

4.1 Issues of Measurement

The OECD (2000) notes that whilst progress has been made in the identification and measurement of the various social benefits education brings, it is often difficult to quantify these benefits and other spillover effects. However, there is reason to believe that much of the benefit derived from learning is social. This difficulty has meant that much of the research on returns to education focuses on the quantifiable and measurable aspects to the detriment of non-market rewards. Sloane et al (2003) note this problem in their investigation of returns to education in Wales. Whilst Sloane and colleagues recognise that private non-financial returns often improve the welfare of the individual through various effects, they go on to say that these effects are difficult to capture so are not considered any further in their report.

Most writers have concluded that the inability to measure externalities remains a major shortcoming. It is only recently that McMahon (and others) has tried to measure the total effect (market and non-market effects) of education on development and his review provides the most comprehensive work in this area (Psacharopoulos, 2003, Jandhyala 2001). His 1999 study looks at total returns to education by pooling annual observations from 78 countries between 1965 and 1995 and makes projections to 2035. In addition distributional effects and externalities operating at the household and community level are considered. However, McMahon still stresses that there is no guarantee that all externalities can be identified and furthermore, it takes time for education to produce significant effects on development.

A further issue to consider in the measurement of effects is one of separation. Mingat and Tan (1996) note that the two categories of private non-market effects and community non-market effects cannot always be completely separated. The community wide effects from education are not always separable from the non-market benefits that accrue to individuals. For example, Haveman and Wolfe (1995) found that parents in the US with more education had a smaller chance that their children would drop out of school and that their daughters would become unmarried teenage mothers. Such outcomes not only affect those directly involved personally but they also extend into the community possibly creating social problems. Sianesi and Van Reenen (2000) in their review of macro economic literature conclude that the available literature still only tentatively and marginally provides reliable findings on some of the spillover effects. Venniker (2000) also concludes that literature on the subject suggests that the only undisputed and strong evidence of positive non-market effects are of crime reduction.

4.2 Academic or Vocational Learning?

Sianesi and Van Reenen (2000) identified a number of issues relating to the measurement of human capital. The first of these is that studies tend to be based on formal educational attainment only, without considering wider definitions of human capital investment encompassing on-the-job training, experience and learning by doing, and ignoring its depreciation. They go on to express concern that the quality of education is not taken account of and different types of education may have different impacts. This point is particularly emphasised in the work of Schuller et al (2002) who report that teaching style (having adequate support and encouragement) and subject area are particularly important to aspects of learning that contribute to positive learning outcomes. Dearden et al (2000) in their work looking at economic academic and vocational qualifications in Britain come to similar conclusions. Their study utilized data from three large-scale surveys including the Labour Force Survey. Firstly they found that previous work looking at returns to qualifications in Britain usually focused on the highest qualification obtained by the individual. Also, almost all of the studies group together academic and vocational qualifications. As a result, it is often unclear in some studies whether there are differences in returns between academic and vocational qualifications. Furthermore international studies usually look at the returns on one full year of education. While the US literature argues that the type of qualification is not important, British studies argue that it is important to distinguish between types of qualifications. This British view is upheld by Psacharopoulos (1994) in his comprehensive review of rates of return estimates to general and vocational secondary education in 24 developing countries. Psacharopoulos concludes that returns to the academic track are higher than the vocational track. Robinson (1997) provides similar evidence for Britain based on individuals highest qualification. He found that returns to academic qualifications are slightly higher than the returns to vocational qualifications at an equivalent NVQ level.

On balance, Dearden et al conclude that the additional returns associated with academic qualifications are higher than those associated with vocational qualifications. While the returns to academic qualifications do not differ between low and high ability individuals the returns to vocational qualifications does. Gender differences exist and returns are also influenced positively if individuals subsequently obtain a skilled rather than unskilled job. This view is confirmed by Feinstein (2002) who found that there are significant differences in the health benefit outcomes associated with academic and vocational learning in Britain. Whilst there are generally substantial significant associations between education and health, generally, greater gains are associated with academic learning. However, the effects are not so clear-cut since those who study academic qualifications are more likely to come from advantaged backgrounds.

4.3 Level of Learning

Sianesi and Van Reenen (2000) note another issue for consideration - the importance of stages of education and levels of education. They were left unable to answer two fundamental questions at the end of their work:

- Are there decreasing returns to additional years of schooling?
- Does the impact of expanding a stage of education depend on the initial levels of attainment in the previous stage?

Conlon (2001) agrees that it is not simply the level or the type of qualification that has a bearing on the earnings return achieved by the qualified over the unqualified, but the combination of qualifications achieved. Conlon also recognizes that the age at which someone undertakes learning has a significant bearing on any return they may receive. In his investigation into the incidence and outcomes associated with the late attainment of qualifications in the UK, Conlon concludes that late learning is important with approximately one in three of the hours of education and training received by working age individuals in the UK attributable to those above the age of twenty-five. However, the costs and benefits associated with late learning remain difficult to compute due to the data limitations.

In their investigation of evidence, issues and deficiencies in the literature, Harmon et al (2000) found that the methods of estimation used varied significantly. The most significant were the different measures used by UK and US researchers. In the US schooling is measured in terms of years of education since years of schooling is the measure recorded in the major datasets such as the Census. In addition schooling in the US does not follow a nationally based credential system but is one where grades generally follow years, so education is a fairly continuous at least up to high school graduation. In Europe there are alternative streams that may lead to the different outcomes. Here estimation is based on qualifications. Some argue that qualifications matter more than years of schooling. As a result the estimates of returns to education can vary widely. Sloane et al (2003) add that rates of return may be influenced by the quality of the qualification gained or institution from which it was obtained.

The academic or vocational level prior to any learning also has a significant bearing on the outcome. Feinstein (2002) found that in the case of vocational education the health associated gains are greatest for those people who progress from level 0 to level 1. This is particularly the case for women and for depression. However, for women the effects on depression for vocational learning are much smaller from level 1 to level 2 or above. The outcomes from vocational education are therefore not linear, i.e. the benefits do not increase at the same rate for each level of learning.

The findings of these studies highlight many of the difficulties that are inherent in any approach that tries to identify causal links or quantify the benefits of education. These studies reveal that both the type of learning, its length and the level of learning as well as prior experience are important factors in determining the return on education.

5 What are the social returns?

As with the human capital model, McMahon et al (1997) are able to show how education relates to wider economic and social effects. For example, when young people stay in high school and then obtain a job they are off the streets and crime costs to society are lower than they otherwise would be. Another example is that higher levels of education reduce fertility rates in females and eventual net population growth. This in turn is associated with less poverty and in poorer countries reduced water pollution and eventually better protection of the environment. McMahon sums up by explaining that human welfare depends partly on earnings but also on moderation of crime costs, slower population growth, less poverty, a cleaner environment and other non-monetary outcomes that all trace back to education in various ways.

Wolfe and Zuvekas (in McMahon et al 1997) identify a number of non-market effects of education in their US based research (see Appendix I for the full list). Some of these outcomes (or externalities or spillover effects) relate to individuals and their family while others relate to society. In particular Wolfe and Zuvekas note the apparent:

- Positive relationship between education and health status
- Positive association between schooling and health of ones family members
- Positive link between schooling and the schooling received by one's children
- Contribution made by schooling to the efficiency of choices made, such as consumer choices
- Influence schooling has on fertility choices, in particular it seems to influence the decision of unmarried teenage females concerning giving birth

Each of these outcomes is comprehensively explained below.

5.1 Health

Education is reported to have both direct and indirect effects on health. Wolfe and Zuvekas (1997) found that increased schooling appears to relate to better health and increased life expectancy. The reasons for this may be due to occupational choices (low hazard occupations), location choices (less polluted areas), more information or skills in acquiring health related information, better nutrition, fewer health reducing behaviours (smoking) or more appropriate medical care usage. A related benefit is the development of lifestyle habits that promote good health. Evidence for the UK reveals that mortality rates are lower for people in higher social class groups, as Figure 2 reveals. Furthermore, Leigh and Dhir (1997) suggest that the education and health correlation might differ across race. Hunt-McCool and Bishop (1998) looked at the health status of elderly people to investigate this correlation. They concluded that even after all other factors are taken into account self-assessed health status is indeed correlated with race.

Figure 2: Mortality rates per 100,000 men aged 20-64 by skill based occupational classification, England and Wales, 1991-93
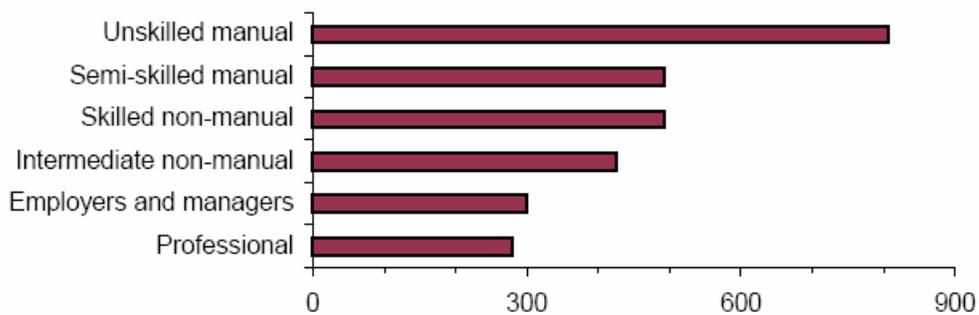
Source: Acheson et al (1998)

The associations between health and education are not always clear-cut and causalities are often hard to interpret. However, Feinstein (2002) suggests that there are three channels for effects of education on health:

1. Economic factors (income and employment)
2. Health related behaviours
3. Psychosocial factors

Economic factors include effects associated with income and employment effects. Higher levels of income encourage individuals to engage in healthy activities and eat more nutritious food. Employment factors suggest that higher levels of education allow individuals to work in less stressful jobs.

Health related behaviours include diet, smoking, patterns of alcohol consumption, medical compliance, taking regular exercise and the use of seatbelts and condoms. For instance Wolfe and Zuvekas (1997) suggest that people with more schooling are less likely to smoke and those who do, smoke less per day. The better educated are also less likely to be heavy drinkers and tend to engage in more exercise per week. Leigh (1998) found that in the US the incidence of smoking amongst college graduates has declined sharply since 1964 but only slightly among high school dropouts. Leigh proposes that the potential social benefits are large since smoking is responsible for up to 400,000 preventable deaths each year in the US. It is suggested that education may influence tastes by imparting values through reward, performance, conformity, cooperation and competition. Leigh suggests that the better educated have more health knowledge than the poorly educated and have more faith in science and government reports. Feinstein suggests that such effects are the result of increased levels of information awareness, psychosocial benefits (the understanding and sense of power over ones own life) and an understanding of the direct effects of patience (reduction in short term pleasures with long term costs) and risk aversion.

The direct psychosocial effects upon health increase individual's sense of power over their own lives, which may have a direct effect on stress levels and individual health. For example Rizzo and Zeckhauser (1992) found that doctors spent less time with better-educated individuals than for less educated individuals. The ability to make better choices extends into many other areas of life and affects all of the other spillover effects noted.

Health effects overlap and interact with each other considerably, with mental and psychological health effects reported to be greater than physical ones. Education is thought to aid both the protection of and recovery from mental health, Schuller (2002), by providing distraction from problems, providing a structure, building self-esteem, fun and enjoyment, developing a new sense of role and social identity, giving confidence in relation to others and helping people to feel part of the social world.

Feinstein also suggests that the health benefits of education are transferred on to children although how this happens is not entirely understood. Increased schooling of parents, particularly mothers, seems to lead to improved health among infants and children, Wolfe and Zuvekas (1997). This is measured in lower infant mortality rates and lower birth-weight babies among mothers with more schooling. Higher rates of vaccinations are also seen in better-educated parents. Wolfe and Haveman (2002) add that additional health benefits include the reduced spread of contagious disease to increased utility of friends and relatives whose well-being depends on one's own health. Almost all of the direct benefits of education to better health can be regarded as private benefits to the individuals concerned.

5.2 Fertility

Greenwood (1997) explains how additional education can have several affects that reduce fertility[1]. Education is likely to increase the efficiency of contraception as well as to increase the age of both marriage and first pregnancy. As a result it also increases the market wage rate of parents. Greenwood also suggests that more highly educated women tend to marry more highly educated men. The higher income of the male means the couple can afford to have more children. However, the higher levels of consumer spending and lifestyle changes for parents and each child result in a choice to limit the number of children born. The overall trend worldwide is that higher income families have fewer children but have higher expenditures per child. Becker et al (1977) add that better-educated people also tend to be more successful in having the precise number of offspring they desire.

On the other hand, less educated people are more likely to have children before forming any stable relationship. Blackwell and Bynner (2002) report that non-graduates are more likely than graduates to have a first birth before forming a partnership. They note a clear link between educational level and childbearing, commenting that postponed childbearing amongst women in Britain is linked to the expansion of higher education. In addition since the 1970's women's qualification rates have risen more rapidly than men's with more women pursuing professional careers. Furthermore, having higher-level qualifications affects the economic activity rates of mothers with young children. Only 11% of lone mothers with no qualifications were employed compared to 36% of those with at least one A level. Educationally disadvantaged women are more likely to have children at young ages and as a result become further disadvantaged in the labour market and are unable to meet the high costs of childcare to allow them to participate. At the extreme, teenage conceptions in England are four times the Western European average. Being in school and devoting time to school activities is a protective factor against early sexual activity, Whitbeck et al (1999).

5.3 Infant mortality

In poorer countries higher levels of educational attainment by girls is strongly associated with lower infant mortality and lower birth rates, Wolfe and Zuvekas (1997). Secondary education increases labour market participation that leaves less time available for raising children. It is also associated with greater use of birth control, delayed marriage and choosing to have fewer children. McMahon (2000) in his study of 78 of the OECD countries similarly shows how education has a direct bearing on infant mortality. In those OECD member states where female secondary education is lowest (Mexico, Turkey, Italy and Hungary) these states have the highest levels of infant mortality. In Portugal, where female enrolment rates have risen rapidly since 1990, infant mortality rates fell sharply thereafter.

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[1] The ratio of live births in an area to the population of that area

5.4 Population

According to McMahon (2000) the net effects of education on population growth follow directly from fertility and infant mortality effects. In the poorest OECD countries the positive effects of more female education are felt only after nine years of education. When environmental quality is investigated, a link to education can be found. For example high population growth rates may lead to faster cutting of forests for firewood, building houses and firewood. The World Bank uses deforestation and wildlife destruction as a proxy measure for a sustainable environment, also a key aspect of social wellbeing. Similarly air pollution is reduced as democracy expands and population growth rates slow. Improved health in the form of a 1% increase in life expectancy is estimated to lead to a 0.65% increase in population growth rates. Life expectancy is also partly affected by reductions in infant mortality rates. A 1% higher population growth rate in turn results in a 0.79% increase in inequality, a 0.96% reduction in forestlands and a 12.7% increase in water pollution. The first two are problems in OECD countries and Canada but very serious in Africa and South Asia where growth rates are higher.

5.5 Family life

Education has been found to influence family life in many ways. For example Wolfe and Haveman (2002) found that level of schooling seems to be connected to the probability that female offspring will give birth as unmarried teenagers. Children who live with mothers who have at least a high school education appear to be significantly less likely than other children to become unmarried teenage mothers. Wolf, Wilson and Haveman investigate the determinants of teenage pregnancy further in their 2001 study of US families. Their conclusions were that family characteristics are strongly related to the probability of teenage pregnancy. African-American girls, those whose mothers have little education, those who grow up in poor (low income, single parent or claiming welfare benefits) families, those who experience a large number of residential moves or those with lots of siblings are more likely to have a teenage pregnancy than girls who do not have these characteristics. Of particular interest was the fact that the rate of teenage non-marital childbirth is far higher amongst blacks than non-blacks.

Wolfe and Zuvekas (1997) also discovered generational effects within US families. They found that the educational level of the next generation is related to the education of the parents. Children of parents who graduated from high school are far more likely to graduate than children of less educated parents. Further education of parents increases this probability as well as increasing the cognitive development of children as well as increasing their probability of higher future earnings. More directly, Leibowitz (1974) showed that mothers education was positively and significantly related to IQ. The quantity of parental time allocated to children was positively related to parental education. Studies have established a pattern of the importance of a mother's educational achievement to her children that give results that are both monetary and non-monetary. Greenwood (1997) explains that parents with less education are likely to follow the habits of their parents or their neighbours. Those with more education are more likely to seek out new information regarding child development and health.

Haveman and Wolfe (2002) similarly explored intrafamily effects of family members on one another. They found that the education of one spouse had an effect on the earnings of the other spouse. This positive and significant effect suggests that the information, advice and assistance in skill acquisition and coping with challenges provided by a more educated spouse had a larger effect on the other spouse's earnings than the contributions made by a less educated spouse. Wolfe and Zuvekas (1997) note that education also has a positive influence on the choices individuals make involving the labour market, marriage and family size. They suggest that this may be because individuals are able to make better matches or spend less time in making their choices. Becker et al (1977) suggest that this is because schooling leads to better choices regarding marital partners. Blackwell and Bynner (2002) add that highly educated women have the greatest opportunity for economic independence and more opportunity to meet potential partners than women who only work in the home. In addition, the number of years spent in education is associated with higher post-divorce self-esteem and their educational attainments protect them against the economic hardships that follow divorce, Demo and Acock (1996).

Blackwell and Bynner (2002) suggest that the demands of modern employment for increased qualifications and skills put pressure on individuals to postpone marriage and parenthood. As a result, there has been an increase in single life style and cohabitation prior to marriage. Another effect is the expansion of the period of retirement as a result of an increased life span. Learning is seen as 'the essential antidote to stagnation and deterioration'. Whilst education itself is not the prime influence on such life course changes, it is a major mediator influencing family formation and dissolution. For example, women with few or no qualifications are more likely than their male counterparts to marry at a younger age. Such partnerships are more likely to breakdown and when this happens these women are least able to secure employment that pays enough to support them and their children, Berrington (2001). In turn these parents will be least likely to be able to support their children. However, more educated people are less likely to divorce.

5.6 Social Cohesion and Social Well-being

As early as 1962 Friedman argued for public subsidies on education on the grounds that a better-educated electorate makes better decisions over policy choices that affect the economy. Wolfe and Zuvekas (1997) suggest that there are many broad gains to society that may go unmeasured. For instance, there is evidence that the amount of time and money devoted to charity is positively associated with the amount of schooling even after controlling for income. Hodgkinson and Weitzman (1998) found that college graduates volunteered nearly twice as many hours and donated 50% more of their income than high school graduates. This public good aspect resulting from greater education may lead to social cohesion and may enable the use of new technologies. Wozniak (1987) in his research on farmers, found that an additional year of schooling is likely to result in that farmer having increased innovative ability.

Wolfe and Haveman (2002) found that people with increased years of schooling may contribute to the public good in other ways. For instance they make more informed choices when voting, may participate more fully in their communities or by being more trusting of others. This increased knowledge and ability to make better choices spills over into market transactions known as consumer efficiency. McMahon (2000) adds that increased levels of democratization, human rights and political stability are also the result of increased education. He estimates that a 1% improvement in democratization contributes to a 0.6% improvement in human rights and a 0.8% improvement in political stability. The attainment of a higher level of education is also associated with a lower probability of receiving benefits (either disability related or public assistance – US welfare) thereby enhancing the public good, Wolfe and Zuvekas (1997). Higher education of mothers reduces the probability that their daughters will receive welfare benefits even if they are eligible for them.

5.7 Crime

Crime is an increasing problem in many societies. For instance, in the US while federal spending on schools increased by around 2.4% between 1980 and 1990, spending on the justice system increased by 32% and the number of people imprisoned during this period more than doubled, Lochner (1999). Furthermore, in 1993 two out of three male prison inmates in the US had not graduated from high school. In the UK Feinstein (2002) reports that the Basic Skills Agency survey of inmates in 16 prisons reveals that the percentage of prisoners with poor basic skills was substantially higher than for other sections of the population. For these researchers the link between education and crime is clear. Feinstein (2002) further clarifies the effects of education by suggesting that there are five channels for effects in relation to crime:

1. The income effect
2. Direct effects on patience and/or risk aversion
3. Direct effects on the return to crime
4. Delinquency and the direct effects on the pleasure gained from crime
5. The inter-generational effect

The income effect
Lochner's (1999) argument is based on the idea that education raises skill levels and wage rates which then lowers crime. Generally, older, more intelligent, more educated individuals tend to commit less crime. Dropouts are much more likely to engage in crime than high school graduates and individuals attending college. This is because their skill levels are higher enabling them to earn higher wages - legitimate earnings are higher than any gains from crime. Encouragingly, non-graduates are less likely to commit crime as they get older. Whilst education is seen as an important factor in any attempt to reduce crime it is not the only factor. Lochner agrees that stricter punishments reduce criminal participation and suggests that incentives also have an impact. For instance lower taxes on wages increase the financial returns from employment whilst returns from crime remain the same. Crime then becomes less attractive. Skill levels and ability also affect the choices an individual makes. An individual with a lower criminal ability will invest

more in their skills and commit less crime while an individual with higher learning ability will invest more in market skills and commit less crime. Ability and high school graduation significantly reduce the participation of young men in crime and the probability of incarceration. Lochner's conclusion is that crime is particularly a problem among uneducated men and individuals with low skill levels are more likely to participate in criminal activities because the returns they can earn from work are lower than the returns from crime.

Direct effects on patience and/or risk aversion
Lochner and Moretti (2003) suggest that schooling may alter individual rates of time preference or risk aversion. Schooling may increase patience or risk aversion behaviours thereby reducing likelihood of committing crime. They suggest that more patient and more risk-averse individuals would place more weight on the possibility of future punishments. Schooling may also affect individual tastes for crime and individuals may become more patient in waiting for future returns.

Direct effects on the return to crime
Feinstein (2002) suggests that it is also possible that there is a positive association of education on white-collar crime and also possible that there is an effect of training and skills on property crime. In the US Levitt and Lochner (in Feinstein, 2002) found that males with higher maths scores commit fewer offences but those with higher scores on mechanical information tests had increased offence rates. They suggest that this is because mathematical ability finds returns only in the legitimate labour market, while mechanical knowledge also finds returns in crime.

Delinquency and the direct effects on the pleasure gained from crime
McMahon (2000) explains delinquency and the direct effects on the pleasure gained from crime. Whilst he agrees that education and crime are related he believes that academic achievement does not reduce crime directly, rather instead when young men remain under supervision either in school or in a job, they are not out on the street getting into trouble. Indeed, in the US, homicide rates are lower following higher secondary education enrolment rates and lower unemployment rates. Poverty crime rates[2] rise with economic growth but are lower with larger percentages of the relevant population in secondary school, with lower inequality and with lower poverty rates. McMahon is then able to further correlate education with other externalities. For instance an expansion of access to secondary education by 1% is estimated to contribute to a 31% reduction in inequality in OECD countries. A 1% reduction in inequality is estimated to contribute to a 1.13% reduction in the murder rate and a 5% reduction in poverty crime. A 1% reduction in poverty is also estimated to be associated with a 0.78% reduction in poverty crime.

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[2] Crime rates are measured as homicide rates and as all other crime, which is loosely referred to as poverty crime, as measured by INTERPOL

The inter-generational effect
Farrington et al (1996) have established that offending is strongly concentrated in families so that, for example, in their Cambridge study, half of all convictions were accounted for by 6% of families and 61% of convicted mothers in the study were married to convicted fathers. Offending runs in families but the reasons for this are unknown.

The evidence presented here reveals a strong correlation between education and crime. Low levels of education are associated with higher crime rates that have significant social costs.   Evidence from US census data supports a general finding that states with higher rates of high school participation and tougher penalties have the lowest index for property crime. It is estimated that a 1% increase in a state's high school graduation rate reduces robbery by 4.3%, burglary by 2.4% and larceny-theft by 1.4%, Lochner (1999). Lochner and Moretti (2003) suggest that a 1% increase in the high school completion rate of all working age men would save the US around $1.4 billion per year in reduced costs from crime incurred by victims and society. In the UK similar claims are made. Machin and Meghir (2000) suggest that taking 1% of the working age population from no qualifications or low qualifications to the achievement of 1 O Level would reduce the costs of property crime by between £10 million and £320 million per year. If those same people were taken to A Level or equivalent, the saving would be between £80 million and £500 million. The correlation between crime and education would then seem to be a strong one.

5.8 Poverty
Rising income inequality continues to be a major problem in some OECD countries. According to McMahon (2000) this is the result of higher earnings premiums being paid to the better educated. In some countries there are issues about who gets the education and the quality of that education. For example, in Brazil, rural areas do not have equal access to education. As a result enormous inequality exists. In his study of health and poverty in Bangladesh, Sen (1997) found that policies geared towards education specifically for the poor have positive effects on poverty reduction and also on better health.

6 Lifelong learning

So far most of the returns to education noted above relate to compulsory formal schooling. In most cases these studies relate to young people up to the age of around 23 (UK and US data). Or put another way, all of the studies relate to existing programmes of education. Lifelong learning has been less well researched but efforts are being made to fill this gap. The concept for the purpose of this report is education that includes all extensions to the existing provisions for education (OECD).

McMahon (1998) has identified an extensive list of externalities of lifelong learning. Many of the effects noted have already been explored in detail as externalities to existing programmes of education, mainly compulsory schooling. Lifelong learning is strongly correlated with prior formal education. McMahon suggests that lifelong learning, generally gives the same returns to education with the exception of higher divorce rates, later retirement, more work after retirement and knowledge dissemination. The growth in the divorce rate is due to a number of factors such as imperfect information or the greater independence of women, Becker (1981). This conclusion is the opposite to the conclusion of Berrington (2001) noted above who suggests that higher divorce rates are more prevalent amongst the less qualified. This contradiction might be due to methodological differences, specifically that Berrington is commenting on compulsory and mainstream schooling while McMahon's focus is on adult learning that occurs at later ages. McMahon suggests that the later retirement age is the result of corporate and military policies along with lifelong learning encouraging later retirement. Part time work after retirement is also possible after retirement with a reduction on social security fund costs which are a social benefit.

McMahon suggests that perhaps the single most important externality of lifelong learning is the knowledge that is disseminated and acquired through articles and books written by educated people. These are disseminated through radio, television, health and other encyclopaedia, computer software and through informal communication. The capacity to learn and adapt to new technologies are regarded by McMahon to be an enormous externality. Without this externality the cost to the public treasury in loss of production or failing to make the necessary transitions would be enormous. However, it is suggested by Schuller et al (2002) that the most fundamental benefit from learning is a growth in self-confidence. This conclusion was reached after interviewing over 140 people aged 16-70 in three areas of England who were engaged in a range of learning contexts. It could reasonably be concluded that McMahon's knowledge dissemination results in and is linked to Schuller's growth in self-confidence. The two are presented here as separately identified externalities that can be argued to be inextricably linked. It is through this growth in self-confidence that a range of other benefits are derived. These include the ability to challenge the views of others, to put oneself in unfamiliar situations, to communicate more effectively and to take on new roles and responsibilities in the family and community. These benefits range from individual benefits to community benefits.

It is because learning is often a group process involving collective tasks and group discussions that make it particularly effective in the promotion of psychological health, the formation of liberal attitudes and in developing communication and team working skills. These are noted by Schuller et al (2002) to be the wider benefits that contribute to active citizenship and social cohesion. Group discussions with fellow students of different backgrounds and having teachers who tell students not to stereotype people feed into the formation of non-discriminatory attitudes. Education also extends social networks and friendships.

6.1 Types of Adult Learning

Feinstein et al (2003) utilises the National Child Development Study (a longitudinal study of British people born in 1958) to estimate the effects of adult learning on a wide range of outcomes. Additional interviews were also undertaken. What makes this research different is that Feinstein and colleagues explore the effects of participation in four types of learning: academic, vocational, work-related and leisure courses. Their overall findings were that

- Statistically significant effects of the total number of courses taken during mid-adulthood are estimated to affect changes in exercise taken, life satisfaction, race tolerance, authoritarian attitudes, political interest, number of memberships, and voting behaviour.
- Taking one or two courses appears to have important impacts upon adults living in Britain in relation to changing levels of civic participation, health behaviours, and attitudes that contribute to social capital. Of lesser importance are the impacts of participation on wellbeing.
- For the whole range of variables examined here, the first and second course taken is associated with changes in outcomes that are greater in magnitude than those associated with taking additional courses.
- In relation to life satisfaction, race tolerance, political interest and civic participation, the more courses the better, albeit with diminishing returns.
- In relation to health behaviours and two of the four measures of change in social and political attitudes, it appears that there are no or even negative returns to taking high numbers of courses (over ten).
- Analyses of the determinants of participation in learning at age 42 indicate that changes in most outcomes (but not changes in exercise or life satisfaction) are involved in a process of progression. Participation leads to changes in health and social outcomes, and often these changes lead in turn to (or proxy for other factors leading to) further participation in more learning.

When the effects of learning for the four types of learning are analysed, the resultant effects are seen to vary quite considerably. These are summarised in Table 3.

Table 3: Interpretation of effect sizes for each course type

	Outcome	All	Acad. accred.	Vocatnl. accred.	Work-related	Leisure	Reverse causality
	Health						
1	Gave up smoking	↑↑				↑↑↑	No
2	Change in units drunk			↓↓↓⬇⬇	↑↑↑⬆	↓↓↓⬇⬇	Yes
3	Increased exercise	↑	↑↑		↑	↑↑	No
4	Change in life satisfaction	↑↑	↑		↑↑		No
5	Became depressed					↑	No
6	Recovered depression						No
	Social capital						
7	Change race tolerance	↑↑↑⬆	↑↑↑⬆	↑↑↑	↑↑↑⬆	↑	Yes
8	Change in pol. cynicism		↓				No
9	Change in authoritarian	↓↓↓	↓↓↓⬇	↓↓↓	↓↓	↓↓	Yes
10	Change in pol. interest	↑↑	↑↑↑⬆				No
11	Increased memberships	↑↑↑⬆	↑↑		↑	↑↑↑⬆	Yes
12	Voting '97 abstained '87	↑↑	↓			↑↑	No

Source: Feinstein et al (2003)

- For **academic accredited** courses the effects on social and political attitudes are greater than for any other course type
- Taking **vocational accredited** courses has positive effects on race tolerance
- Taking **work related training** courses has positive effects on the whole range of health and social outcome measures
- **Leisure** courses have strong effects on the whole range of health and social capital outcomes but not wellbeing. Leisure courses are also associated with becoming depressed.
- Taking **work related training** and **academic** courses are associated with increases in life satisfaction for men but not for women. The reverse is true for vocational courses.

Feinstein and colleagues conclude that their research provides consistent evidence for positive effects of adult learning on health and social capital outcomes. Even small effects are important in relative terms since they are substantial relative to the stability of attitudes, behaviours and levels of well-being during mid-adulthood. Participation in adult learning is a significant factor in the positive processes of psychological and social development as benefits arise beyond the confines of the subject matter of courses.

7 Final remarks

Wolfe and Haveman (2002) suggest that the full social gains from additional schooling exceed the 7-9 percent private rate (found in US literature). This rate is estimated through a complex approach that involves looking at the willingness to pay for additional years of schooling. They conclude that this has important implications for public policy, which leave two central policy questions:

- What volume of the nation's resources should be allocated to the production of schooling services?
- Who should be paying for these schooling services?

They go on to suggest that the full rate of return to education could be as high as 14-18 percent when non-market and market returns are considered. McMahon (2000) estimates that externalities represent about 40% of market outcomes and therefore externalities are estimated to be about 57% of total market plus non-market education outcomes. It is suggested by Wolfe and Haveman that if returns are this high then a reallocation of resources from other users may be in order. Since the private non-market gains from education are substantial with a greater share of the gains going to students and their families, it is suggested that the case to increase tuition fees is valid.

However, the picture is not all positive. Wolfe and Zuvekas (1997) conclude that schooling does indeed have substantial benefits beyond the usual measures of labour market productivity and fringe benefits. They also point out that schooling may have substantial costs that are largely non-economic such as job related stress.

It is often the cost to society that determines how and even if additional schooling should be offered to certain groups or individuals. Greenwood (1997) highlights some of the issues facing those children who are deemed to be 'at risk'. These children may have suffered poor nutrition or not received appropriate care. They are generally defined as those who spend a significant proportion of their years below 150% of the poverty line, in single parent families and in high crime neighbourhoods. They have a much greater risk of dropping out of high school and are more costly to educate since they require special compensatory programmes. They are also more likely to utilise expensive programmes like foster care. Rates of return for these children tend to be lower because they cost society more for the results. So although these individuals might collect some return from any additional years of education, society and governments are unlikely to offer extended educational programmes because they deem the cost to be too high. As a result, these young people often do not reach their full educational potential and therefore their full potential in society and the labour market.

On the other hand, problems for other groups in society *are* tackled by governments. For example, Wolf et al (2001) conclude that the prevalence of teenage non-marital pregnancy has been identified as 'the nation's most serious social problem' because of the presumed adverse effects on human capital. These are viewed as a social and economic problem because they have an adverse effect on the future productivity of both teenage mothers and their children.

This issue is a somewhat political issue rather one of cost vs. benefit. Huber et al (1993) conclude that the economically dominant classes accept democracy only when it is in their interests. In relation to the debate in question about funding lifelong learning for less able groups of people, we might conclude that the arguments are that extended education does result in a number of benefits but that the dominant classes argue that the benefits are not sufficient to warrant the costs. Political scientists suggest that the real case is that the dominant classes do not see the benefit to *themselves*.

8 Conclusions

The social non-market returns to education are numerous, multifaceted and far-reaching. The relationship between externalities is complex with many of the outcomes forming the basis of inputs to other outcomes. The social non-market outcomes to education are summarised in Table 4 below.

Table 4: Summary of Non-market Returns to Education

Population and health effects	Lower fertility rates Lower net population growth rates Better public health
Democratization	Increased democratization Increased human rights Increased political stability More liberal attitudes (specific to Adult Learning)
Poverty reduction and crime	Poverty reduction Lower homicide rates Lower property crime rates
Environmental effects	Decreased deforestation Decreased water pollution Decreased air pollution
Family structure and retirement	Lower divorce rates Higher divorce rates (specific to Adult Learning) Later retirement More work after retirement
Community service effects	Increased time volunteered to community service Generous financial giving within income strata Knowledge dissemination Extended networks (specific to Adult Learning) Increased self-esteem/civil participation (specific to Adult Learning)

References

Acheson, D. (1998) Independent Inquiry into Inequalities in Health, London: The Stationery Office in Feinstein, L. (2002) Quantitative Estimates Of The Social Benefits Of Learning, 2: Health (Depression And Obesity), Wider Benefits of Learning Research Report 6, The Centre for Research on the Wider Benefits of Learning

Becker, G. S. (1981) A Treatise on the family, Cambridge, MA, Harvard University Press in McMahon, W. W. (1998) Conceptual framework for the analysis of the social benefits of lifelong learning, Education Economics, Vol 6, No 3, Carfax Publishing

Becker, G. S., Landes, E. M. and Michael, T. R. (1977) An economic analysis of marital instability, Journal of Political Economy, 85, 1141-1188 in McMahon, W. W., Carnoy, M., Wolfe, B., Zuvekas, S., Greenwood, D., Sullivan, D. H., Smeeding, T. M. and Eisner, R. (1997) Recent advances in measuring the social and individual benefits of education, University of Illinois, Pergamon

Becker, G.S. (1964) Human capital, Columbia University Press in Venniker, R. (2000) Social returns to education: a survey of recent literature on human capital externalities, CPB Report00/1

Berrington, A. (2001) Entry into parenthood and the outcome of cohabiting partnerships in Britain, Journal of Marriage and the Family, 63: 80-96 in Blackwell, L. and Bynner, J. (2002) Learning, family formation and dissolution, Wider Benefits of Learning Research Report 4, Centre for Research on the Wider Benefits of Learning

Blackwell, L. and Bynner, J. (2002) Learning, family formation and dissolution, Wider Benefits of Learning Research Report 4, Centre for Research on the Wider Benefits of Learning

Blundell, R., Dearden, L. and Sianesi, B. (2001) Estimating the Returns to Education: Models, Methods and Results, University College London and Institute for Fiscal Studies

Conlon, G. (2001) The incidence and outcomes associated with the late attainment of qualifications in the United Kingdom, London School of Economics and Political Science

Dearden, L., McIntosh, S., Myck, M. and Vignoles, A. (2000) The Returns to Academic and Vocational Qualifications in Britain

Demo, D. H. and Acock, A, C. (1996) Motherhood, marriage and remarriage: The effects of family structure and family relationships on mothers' well-being, Journal of Family Issues, 13: 328-337 in Blackwell, L. and Bynner, J. (2002) Learning, family formation and dissolution, Wider Benefits of Learning Research Report 4, Centre for Research on the Wider Benefits of Learning

Farrington, D.P.; Barnes, G.C. & Lambert, S. (1996) 'The concentration of offending in families', *Legal and Criminological Psychology,* 1: 47-63 in Feinstein, L. (2002) Quantitative Estimates Of The Social Benefits Of Learning, 1: Crime, Wider Benefits of Learning Research Report 6, The Centre for Research on the Wider Benefits of Learning

Feinstein, L. (2002) Quantitative Estimates Of The Social Benefits Of Learning, 1: Crime, Wider Benefits of Learning Research Report 6, The Centre for Research on the Wider Benefits of Learning

Feinstein, L. (2002) Quantitative Estimates Of The Social Benefits Of Learning, 2: Health (Depression And Obesity), Wider Benefits of Learning Research Report 6, The Centre for Research on the Wider Benefits of Learning

Feinstein, L., Hammond, C., Woods, L., Preston, J. and Bynner, J. (2003) The Contribution of Adult Learning To Health And Social Capital, Wider Benefits of Learning Research Report 8, The Centre for Research on the Wider Benefits of Learning

Friedman, M. (1962) Capitalism and Freedom, University of Chicago Press in Enrico Moretti, E. (2002) Estimating the social return to higher education: Evidence from longitudinal and repeated cross-sectional data, Working paper 9108, National Bureau of Economic Research

Harmon, C., Oosterbeek, H. and Walker, I. (2000) The Returns to Education: A Review of Evidence, Issues and Deficiencies in the Literature, London School of Economics and Political Science

Harmon, C., Oosterbeek, H. and Walker, I.(2000) The Returns to Education: A Review of Evidence, Issues and Deficiencies in the Literature, London School of Economics and Political Science

Haveman, R. and Wolfe, B. (1995) Succeeding Generations. On the Effects of Investments in Children, New York: Russell Sage Foundation in Mingat, A. and Tan, J. (1996) The Full Social Returns To Education: Estimates Based On Countries' Economic Growth Performance, Université de Bourgogne and The World Bank

Hodgkinson, V. and Weitzman, M. (1998) Giving and volunteering in the United States: Findings from a national survey, 1988 Edition, Washington, DC: Independent Sector in McMahon, W. W., Carnoy, M., Wolfe, B., Zuvekas, S., Greenwood, D., Sullivan, D. H., Smeeding, T. M. and Eisner, R. (1997) Recent advances in measuring the social and individual benefits of education, University of Illinois, Pergamon

Hunt-McCool, J. and Bishop, D. M. (1998) Health economics and the economics of education: Specialization and the division of labor, Economics of Education Review, Vol 17, No 3, pp. 237-244, Elsevier Science Ltd

Jandhyala, B. G. (2001). Education and development: Measuring the Social Benefits. International Journal of Education Development, National Institute of Educational Planning and Administration, India

Leibowitz, A. (1974) Home investments in children: Journal of Political Economy, 82, S111-S131 in McMahon, W. W., Carnoy, M., Wolfe, B., Zuvekas, S., Greenwood, D., Sullivan, D. H., Smeeding, T. M. and Eisner, R. (1997) Recent advances in measuring the social and individual benefits of education, University of Illinois, Pergamon

Leigh, J. (1998), 'The Social Benefits of Education: A Review Article', Economics of Education Review, 17(3), pp.363-368 in Harmon, C., Oosterbeek, H. and Walker, I. (2000) The Returns to Education: A Review of Evidence, Issues and Deficiencies in the Literature, London School of Economics and Political Science

Leigh, J. P. and Dhir, R. (1997) Schooling and frailty among seniors, Economics of Education Review, 16, (1), 45-57 in Leigh, P. J. (1998) Social benefits of education: A review, Economics of Education Review, Vol 17, No 3, pp 363-368, Elsevier Science Ltd

Leigh, P. J. (1998) Social benefits of education: A review, Economics of Education Review, Vol 17, No 3, pp 363-368, Elsevier Science Ltd

Lochner, L. & Moretti, E. (2001) 'The Effect of Education on Crime: Evidence from Prison Inmates, Arrests and Self-Reports', *National Bureau of Economic Research Working Paper,* 8605

Lochner, L. (1999) Education, Work, and Crime: Theory and Evidence, University of Rochester

Machin, S. & Meghir, C. (2000) 'Crime and Economic Incentives', *The Institute for Fiscal Studies, Working Paper,* 00/17 in Feinstein, L. (2002) Quantitative Estimates Of The Social Benefits Of Learning, 1: Crime, Wider Benefits of Learning Research Report 6, The Centre for Research on the Wider Benefits of Learning

McMahon, W. W. (1998) Conceptual framework for the analysis of the social benefits of lifelong learning, Education Economics, Vol 6, No 3, Carfax Publishing

McMahon, W. W. (2000) The Impact of Human Capital on Non-Market Outcomes and Feedbacks on Economic Development, OECD

McMahon, W. W., Carnoy, M., Wolfe, B., Zuvekas, S., Greenwood, D., Sullivan, D. H., Smeeding, T. M. and Eisner, R. (1997) Recent advances in measuring the social and individual benefits of education, University of Illinois, Pergamon

Mingat, A. and Tan, J. (1996) The Full Social Returns To Education: Estimates Based On Countries' Economic Growth Performance, Université de Bourgogne and The World Bank

OECD (2000) Estimating Economic and Social Returns to Learning: Session 3 Issues for Discussion, OECD

Psacharopoulos, G. (1994), 'Returns to Investment in Education: a Global Update', World Development, Vol. 22, No. 9, pp.1325–1343 in Dearden, L., McIntosh, S., Myck, M. and Vignoles, A. (2000) The Returns to Academic and Vocational Qualifications in Britain

Psacharopoulos, G. (2003), Education for development: measuring the social benefits, International Journal of Education Development 23, 356-7 University of Athens

Richard Blundell, R., Dearden, L., Goodman, A. and Reed, H. (1999) The Returns to Higher Education in Britain: Evidence from a British Cohort, University College London

Rizzo, J. and Zeckhauser, R. (1992) Advertising and the price, quantity and quality of primary care physician services, Journal of Human Resources, 27, 381-421 in McMahon, W. W., Carnoy, M., Wolfe, B., Zuvekas, S., Greenwood, D., Sullivan, D. H., Smeeding, T. M. and Eisner, R. (1997) Recent advances in measuring the social and individual benefits of education, University of Illinois, Pergamon

Robinson, P. (1997), 'The Myth of Parity of Esteem: Earnings and Qualifications', London School of Economics, Discussion Paper No. 354, Centre for Economic Performance, London School of Economics in Dearden, L., McIntosh, S., Myck, M. and Vignoles, A. (2000) The Returns to Academic and Vocational Qualifications in Britain

Schuller, T., Brassett-Grundy, A., Green, A., Hammond, C. and Preston, J. (2002), Learning, Continuity And Change In Adult Life, Wider Benefits of Learning Research Report 3, The Centre for Research on the Wider Benefits of Learning

Schultz, T.W. (1961) Investment in human capital, American Economic Review, 51 (1), pp.1-17 in Venniker, R. (2000) Social returns to education: a survey of recent literature on human capital externalities, CPB Report00/1

Sen, B. (1997) Health and poverty in Bangladesh, World Health, Sept-Oct 1997, v50 n5:pp. 28-32 in McMahon, W. W. (2000) The Impact of Human Capital on Non-Market Outcomes and Feedbacks on Economic Development, OECD

Sianesi, B. and Van Reenen, J. (2000) The Returns to Education: A Review of the Macro-Economic Literature, London School of Economics and Political Science

Sloane, P., O'Leary, N., Murphy, P. and Blackaby, D. (2003) Returns to Education: A Survey of Findings, University of Wales Swansea, Welsh Assembly Government

Venniker, R. (2000) Social returns to education: a survey of recent literature on human capital externalities, CPB Report00/1

Whitbeck, L., Yoder, K., Hoyt, D and Conger, R.(1999) Early adolescent sexual activity: A developmental study, Journal of Marriage and the Family, 61: 934-946 in Blackwell, L. and Bynner, J. (2002) Learning, family formation and dissolution, Wider Benefits of Learning Research Report 4, Centre for Research on the Wider Benefits of Learning

Wolfe, B. L. and Haveman, R. H. (2002) Social and non-market benefits from education in an advanced economy, Education in the 21st Century: Meeting the Challenges of a Changing World, Federal Reserve Bank of Boston

Wozniak, G. (1987) Human capital, information and the early adoption of new technology, Journal of Human Resources, 22, 101-112 in McMahon, W. W., Carnoy, M., Wolfe, B., Zuvekas, S., Greenwood, D., Sullivan, D. H., Smeeding, T. M. and Eisner, R. (1997) Recent advances in measuring the social and individual benefits of education, University of Illinois, Pergamon

Appendix I: Catalogue of Outcomes of Schooling

Table 3
Catalog of Outcomes of Schooling

Outcome Category	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; Mincer 1962; Hansen 1963; Becker 1964; Conlisk 1971) and of changes over time (Allen 2001). Debate over role of work while acquiring schooling (Light 2001). Analysis exploring approaches to eliminating ability bias and publication bias (Ashenfelter, Harmon, and Oosterbeek 2000).
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 1981; Smeeding 1983) and wage level (Vanness and Wolfe 2002).
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). Suggestion that relationship is stronger in entrepreneurial families (Wong 1986) and among those whose spouse is in a skilled position (Neuman and Ziderman 1990). Also, some evidence that own schooling influences spouse's health and decreases mortality (Auster, Leveson, and Sarachek 1969; Grossman 1975; Grossman and Jacobowitz 1981).
4. Child quality; level of education and cognitive development	Private; some external effects; market and nonmarket effects	Substantial evidence that a child's education level and cognitive development are positively related to the mother's and father's education (Wachtel 1975; Murnane 1981; Sandefur, McLanahan, and Wojtkiewicz 1989; Dawson 1991; Haveman, Wolfe, and Spaulding 1991; Ribar 1993; Haveman and Wolfe 1994; Duncan 1994; Angrist and Lavy 1996; Ermisch and Francesconi 1997; Smith, Brooks-Gunn, and Klebanov 1997; Lam and Duryea 1999; Duniform, Duncan, and Brooks-Gunn 2000). Extended to a child's self-esteem (Axinn, Duncan, and Thornton 1997). Some evidence that a child's education is positively related to the grandparents' schooling (Blau 1999). Some evidence that education of adults in the neighborhood increases probability of a child's graduating high school (Clark 1992; Duncan 1994; Ginther, Haveman, and Wolfe 2000). Some evidence that increased women's literacy leads to higher human capital of children in developing countries (Behrman et al. 1999).

Table 3 (continued)
Catalog of Outcomes of Schooling

Outcome Category	Economic Nature	Existing Research on Magnitude
5. Child quality: health	Private; some external effects	Substantial evidence that child health is positively related to parents' education (Edwards and Grossman 1979; Shakotko, Edwards, and Grossman 1981; Wolfe and Behrman 1982; Behrman and Wolfe 1987; Grossman and Joyce 1989; Strauss 1990; Thomas, Strauss, and Henriques 1991 King and Hill 1993; Glewwe 1999; Lam and Duryea 1999).
6. Child quality: fertility	Private; some external effects	Consistent evidence that a mother's education is related to a lower probability that daughters will give birth out of wedlock as teens (Antel 1988; Sandefur and McLanahan 1990; Hayward, Grady, and Billy 1992; An, Haveman, and Wolfe 1993; Lam and Duryea 1999; South and Baumer 2000; Haveman, Wolfe, and Wilson 2001).
7. Own health	Private; modest external effects (Note: Some of the own health benefits from education will be captured in increased earnings, and hence included in *category 1*)	Considerable evidence that one's own schooling positively affects one's health status (Leigh 1981, 1983; Kemna 1987; Berger and Leigh 1989; Grossman and Joyce 1989; Kenkel 1991; Strauss et al. 1993; Sander 1995); also increases life expectancy (Feldman et al. 1989; King and Hill 1993; Crimmins and Saito 2001); also lowers prevalence of severe mental illness (Robins 1984) including depression (Herzog et al. 1998) and improves ability to deal with stressful events (Thoits 1984) and anger (Schieman 2000). High school graduation lowers mortality rate (Muller 2002). Health advantage of more schooling increases with age (Ross and Wu 1988, 1995).
8. Consumer choice efficiency	Private; some external effects; nonmarket effects	Some evidence that schooling leads to more efficient consumer activities (Michael 1972; Benham and Benham 1975; Pauly 1980; Rizzo and Zeckhauser 1992; Morton, Zettelmeyer, and Silva-Risso 2001). Home-production schooling may have long-term impacts (Corman 1986). College graduates maintain computational skills over longer period (Pascarella and Terenzini 1991).
9. Labor market search efficiency	Private; nonmarket effects	Some evidence that costs of job search are reduced and regional mobility increased with more schooling (Metcalf 1973; Greenwood 1975; DaVanzo 1983). Job turnover lower for women with more schooling (Royalty 1998).
10. Marital choice efficiency	Private; nonmarket effects	Some limited evidence of improved sorting in marriage market (Becker, Landes, and Michael 1977).

Table 3 (continued)
Catalog of Outcomes of Schooling

Outcome Category	Economic Nature	Existing Research on Magnitude
11. Attainment of desired family size	Private	Evidence that contraceptive efficiency is related to schooling (Easterlin 1968; Ryder and Westoff 1971; Michael and Willis 1976; Rosenzweig and Schultz 1989). In developing countries, fertility declines (King and Hill 1993; Lam and Duryea 1999).
12. Charitable giving	Private and public; nonmarket effects	Some evidence that schooling increases donations of both time and money (Mueller 1978; Dye 1980; Hodgkinson and Weitzman 1988; Freeman 1997).
13. Savings	Private; some external effects	Controlling for income, some evidence that more schooling is associated with higher savings rates (Solomon 1975).
14. Technological change	Public	Some evidence that schooling is positively associated with research, development, and diffusion of technology (Nelson 1973; Marsfield 1982; Wozniak 1987; Foster and Rosenzweig 1996). Some evidence that technological change increases returns to those with more education (Bound and Johnson 1992; Autor, Katz, and Krueger 1998; Bartel and Sicherman 1999; Allen 2001).
15. Social cohesion	Public	Descriptive evidence to suggest that schooling is positively associated with voting (Gintis 1971; Campbell et al. 1976; Wolfinger and Rosenstone 1980; Hauser 2000); with reduced alienation and social inequalities (Comer 1988); with opposition to government repression and reduced support for use of violence in protests (Hall, Rodeghier, and Useem 1986). Suggestion that own education is associated with trust of others and membership in community organizations (Helliwell and Putnam 1999).
16. Self-reliance or economic independence	Private and public	More education associated with reduced dependence on transfers during prime working years (Antel 1988; Kiefer 1985; Rudd, McKenry, and Nah 1990; An, Haveman, and Wolfe 1993).
17. Crime reduction	Public	Some evidence that schooling is associated with reduced criminal activity (Yamada, Yamada, and Kang 1991; Ehrlich 1975; Freeman 1995; Lochner and Moretti 2001). Some evidence that education is associated with a reduction in recidivism (Sherman et al. 1998). Some suggestion that quality preschool is associated with a reduction in crime (Reynolds 2000).

Source: Updated and adapted from Haveman and Wolfe (1984) and Wolfe and Zuvekas (1997).