



Policies to foster human capital†

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Summary

This paper considers the sources of skill formation in a modern economy and emphasizes the importance of both cognitive and non-cognitive skills in producing economic and social success, and the importance of both formal academic institutions and families and firms as sources of learning. Skill formation is a dynamic process with strong synergistic components. Skill begets skill. Early investment promotes later investment. Non-cognitive skills and motivation are important determinants of success and these can be improved more successfully and at later ages than basic cognitive skills. Methods currently used to evaluate educational interventions ignore these non-cognitive skills and therefore substantially understate the benefits of early intervention programmes and mentoring and teenage motivation programmes. At current levels of investment, American society under-invests in the very young and over-invests in mature adults with low skills.

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In response to the new labour market for skills in which the real wages paid to high-skilled and highly educated workers have increased while the real wages paid to low-skilled and less-educated workers have decreased, there is renewed interest in

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policies designed to foster the formation of socially productive skills in economies around the globe. Politicians and social commentators routinely express concern about the political and social consequences of growing economic inequality. A consensus is emerging that increasing the skills of the unskilled will bring them into the modern economy and will alleviate inequality, and that increasing the supply of skilled workers will help to dampen the rising wage or employment gap between the skilled and the unskilled by making skilled workers less scarce and lifting the less skilled into skilled status.

Politicians of all parties in the U.S. agree that reforms in finance and in educational administration are required. Their counterparts in other countries are equally enthusiastic about policies to raise skill levels.

In this paper, I examine the foundations of current policies toward skill formation. I re-examine the conventional wisdom on these matters as articulated by our political leaders drawing on a body of recent scholarship that challenges many of the premises that govern popular policy discussions in many countries. This scholarship suggests that a broader view of the way skills are produced in a modern economy is more appropriate. Once this body of research becomes accepted into the mainstream, the public discourse on skill formation will be substantially altered.

Although I draw most of my lessons from American data and analyses of American institutions, my message applies more generally. Current policies regarding education and job training around the world are based on fundamental misconceptions about the way socially useful skills embodied in persons are produced. They focus on cognitive skills as measured by achievement or I.Q. tests to the exclusion of social skills, self-discipline and a variety of non-cognitive skills that are known to determine success in life. The preoccupation with cognition and academic “smarts” as measured by test scores to the exclusion of social adaptability and motivation causes a serious bias in the evaluation of human capital interventions.

The conventional wisdom espoused by most politicians, educated laypersons and even many academics places formal educational institutions in a central role as the main producers of the skills required by the modern economy. It neglects the crucial role of families and firms in fostering skill, and the variety of abilities required to succeed in the modern economy. Popular discussions of skill formation almost always focus on expenditures in schools or on educational reforms and neglect important non-institutional sources of skill formation, which are equally important, if not more important, producers of the varieties of skills that are useful in a modern economy.

The current emphasis in policy discussions on formal schooling to the exclusion of informal, non-institutional, sources of learning is a consequence of three blind spots in the vision of politicians and policy analysts. The first blind spot is factual in nature and arises from a failure to recognize that learning is a lifetime affair and that much learning takes place outside of schools. Learning starts in infancy long before formal education begins and continues throughout life. Recent research in psychology and cognition demonstrates the vital importance for skill formation of the early pre-school years when human ability and motivation are shaped by families and non-institutional environments. Success or failure at this stage feeds into success or failure in school which in turn leads to success or failure in post-school learning. Early learning begets later learning and early success breeds later success just as early failure breeds later failure. Formal or institutional education is only one aspect of the learning process, albeit an important one, and recent research indicates that it is not necessarily the most important one.

In addition, since the publication of the Coleman Report (1966), we have known that families and environments—not just, or even, schools—play the crucial role in motivating and producing educational success as measured by test scores. Failed families produce low-ability, poorly motivated students who do not succeed in school. Policies directed toward families may be a more effective means for improving the performance of schools than direct expenditure on teacher salaries or computer equipment. Policies that seek to remedy deficits incurred in early years are much more costly than early investments wisely made, and do not restore lost capacities even when large costs are incurred. The later in life we attempt to repair early deficits, the costlier the remediation becomes. (See the evidence in Ramey & Ramey, forthcoming.)

On the other side of the educational process, the work experience and skills acquired in the workplace in the form of job search, learning-by-doing and workplace education are often neglected in popular discussions because they are not well measured. Post-school learning is an important source of skill formation that accounts for as much as one third to one half of all skill formation in a modern economy. (This estimate is made in Heckman, Lochner & Taber, 1998*a*.) Because much of this learning takes place in informal settings outside of educational institutions, it gets neglected by the educational technocrats and the politicians who equate skill formation with classroom learning. Once we recognize the importance of informal sources of learning for skill formation, we think about policies to foster skill in a different way.

A second blind spot in the vision of most educational planners and policy makers is a preoccupation with achievement tests and measures of cognitive skill as indicators of success of an educational

intervention. It is certainly true that cognitive ability is important in life, and there is some evidence that the return to cognitive ability has increased over time. (See however, Cawley, Heckman & Vytlačil (2000) for a discussion of the fragility of this evidence.) However, this narrow focus on cognition ignores the full array of socially and economically valuable non-cognitive skills and motivation produced by schools, families and other institutions. This emphasis critically affects the way certain early intervention programmes have been evaluated, as I demonstrate in this paper. Enriched early intervention programmes do not substantially alter I.Q. However, they substantially raise the non-cognitive skills and social attachment of participants.

Another common error in the analysis of human capital policies is the assumption that abilities are fixed at very early ages. This static conception of ability is at odds with a large body of research in the child development literature. In the early years of life, basic abilities can be altered. Schooling produces ability; ability creates a demand for schooling. The early human capital literature, as summarized in Becker (1964), suggests a false contrast between human capital and innate ability as rival determinants of earnings.

A more correct view of ability (or rather abilities) is that they are created in a variety of learning situations and that ability in turn fosters further learning. More able people acquire more skills; more skilled people become more able. Dynamic complementarity characterizes skill and ability formation and our economic models have to be modified to account for this.

A third blind spot in the vision of most educational planners and policy makers is a fundamental mistrust of the wisdom of parents to choose wisely if offered choices about their children's education. There is mistrust of competition and incentives as means of improving the performance of schools.

There is also substantial mistrust of "unregulated" informal learning whether it is in the workplace or the home. Although the failure of social planning in eastern Europe and elsewhere is widely acknowledged, the social planning mentality is alive and well in the local monopoly that is American public education at the primary and secondary levels, and that characterizes the provision of public education in most countries. The available evidence suggests that most parents care dearly about the education of their children and eventually distinguish a good school from a bad one. When offered choices and the opportunity to experiment, most parents generally choose wisely, at least after they have gained some experience. They can distinguish the good teachers from the bad teachers, and the good schools from the bad schools.

Everything we know also points to the benefits of competition. Monopolists in all areas of economic and social life indulge their

own tastes, and ignore the well-being of their customers in a way that competitors cannot.

In this paper, I examine the merits of some of the recent policy proposals by examining the evidence—or lack of evidence—supporting them. For example, much educational policy regarding college attendance is premised on the myth that many bright but poor students are being denied a college education by the inadequate financial resources of their families. This belief is the cornerstone of commonly advocated educational policies, such as the recently enacted Hope Scholarship programme in the U.S.

The entire field of educational research is littered with myths like this that guide public policy. We are told that reducing class size or increasing per pupil expenditure in primary and secondary schools will produce substantial improvements in educational outcomes. Yet most of the evidence points to the contrary. We are told that education produces substantial externalities—benefits harvested by others beyond those captured by the people who are educated. The substantial level of subsidy to education in most countries is claimed to be too small because further unexploited externalities remain. These unexploited externalities are said to justify further subsidies to education. Yet a careful reading of the evidence finds little evidence of such unexploited externalities in Western economies (Heckman & Klenow, 1998).

In analysing the evidence for these and other claims and their relevance for educational policy, it is important to distinguish statements about a world in which there is no educational policy from the world in which we live. The relevant question for this paper is whether we should increase current subsidies—not whether there should be any subsidies at all. At a very low level of expenditure, increasing schooling quality definitely improves schooling outcomes. Increasing the level of schooling undoubtedly produces externalities when schooling is at a low level. The current subsidy of direct costs to students at major public universities in the U.S. is around 80%. The relevant policy question is whether that subsidy should be increased and not whether there should be any subsidy at all.

Myths abound about job training policy as well. Many economies around the world have large groups of unskilled workers made obsolete by a rapid shift in demand toward more skilled workers. A dangerous myth that motivates welfare reform and training policy in many countries is that it is relatively easy to adapt adult unskilled workers to the modern economy. Under this view, most of the low-skilled people can easily be trained to be skilled labourers. In this paper, I demonstrate how high these costs actually are. In an era of tight budgets, it is far from obvious that investments in low-skill workers made obsolete by changes in technology are justified on any but political grounds. The major cost of such

investment is the diversion of resources away from the young and the more trainable for whom a human capital investment strategy is likely to be more effective and for whom it is likely to produce favourable outcomes in the long run.

Also missing from current policy discussions of education and training policy is any consideration of priorities or recognition of the need to prioritize. In an era of tight government budgets, it is impractical to consider active investment programmes for all persons. The real question is how to use the available funds wisely. The best evidence supports the policy prescription: invest in the very young and improve basic learning and socialization skills; subsidize the old and the severely disadvantaged to attach them to the economy and the society at large.

Figure A summarizes the main theme of this paper. It conveys two very different ideas. The first is a theoretical proposition. For the same level of investment at each age, the return is higher in human capital when a dollar is spent on the young than when it is spent on the old. This is so because the old have a shorter time to recoup their investment due to the shorter time remaining to them (Becker, 1964). An even more important point not made by Becker is that human capital has fundamental dynamic complementarity features. Learning begets learning. Skills acquired early on make later learning easier. More able people find earning easier.[†]

The second interpretation of Figure A is as an empirical description of the current level of spending on human resources in the American economy and in many European economies as well. At current levels of investment, the returns to investment in the young are quite high; the returns to investment in the old and less able are quite low. A socially optimal investment strategy would equate returns across all investment levels. The central conclusion of this paper is that at current total investment levels, efficiency would be enhanced if human capital investment were reallocated to the young.

1. The new American labour market: A quantitative assessment

From the early 1980s until recently, the real wages of unskilled American males have declined. Skill differentials have widened around the world. The real wages of skilled workers have increased. Accompanying the decline in the wages of the unskilled is a decline in labour market activity, especially among the unskilled. A variety of labour force measures show increasing joblessness and longer

[†] Heckman, Lochner and Taber (1998a) develop a sequential model of human capital investment in which skill and ability beget skill.

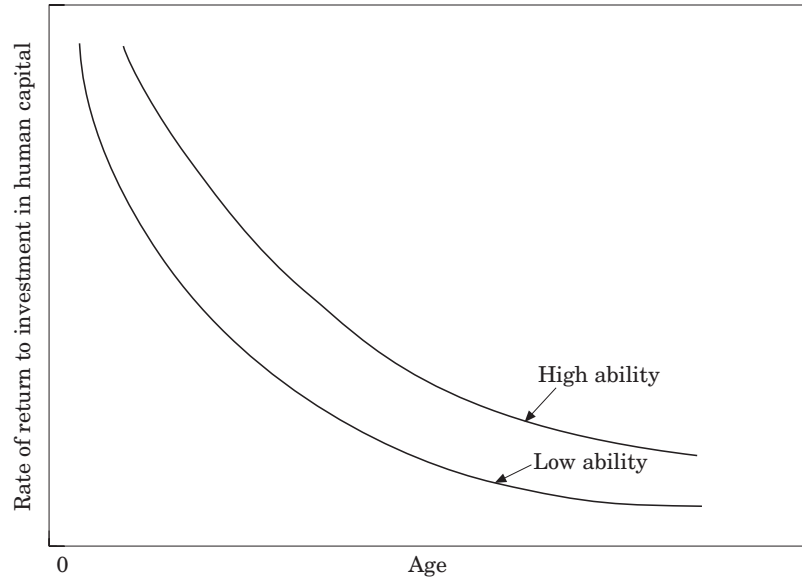


FIGURE A. Rate of return to investment in human capital.

unemployment spells for persons with low skills. This phenomenon is especially prominent in European countries with inflexible wages for low-skill workers.

1.1. MEASURING THE LOSS IN THE VALUE OF HUMAN CAPITAL AMONG THE LESS SKILLED

In order to gauge the magnitude of the capital losses imposed on the unskilled by the new labour market, I offer the following back-of-the-envelope calculation of the human capital losses experienced by unskilled workers in the new American labour market.[†] For human capital, a round, and roughly correct, average rate of return across all ability groups is 10%. Thus, for each \$10 invested in a person, the expected annual return is \$1. Later on in this paper, I will argue that based on the evidence, 10% is far too high a rate of return for low-skilled and older workers so the calculations I am about to give are biased downward in estimating the costs of investment to raise quantities of human capital to offset the price declines experienced in the U.S. economy and restore real earnings. At a 10% return, to add \$1000 in earnings per year to the average person it is necessary to make a one

[†] This calculation was first made in Heckman (1994, 1996), and Heckman, Roselius and Smith (1994).

time investment of \$10 000 in that person. Using a 10% rate, the investment needed to reduce any wage gap is 10 times the amount of the gap.

To put the magnitude of recent developments in the labour market in perspective, consider the answers to the following two questions:

- (1) How much would one have to invest in the American workforce in 1989 dollars to restore real earnings of male high school dropouts and graduates to their real 1979 levels?

This question is meaningful only for men because real weekly earnings for women have risen or remained roughly constant over the period 1979–1989. A second question is:

- (2) How much would one have to invest in the American workforce in 1989 dollars to restore 1979 earnings ratios between lower education groups and college graduates, without reducing the 1989 earnings of college graduates?

Using a 10% rate of return, it would require an investment of \$25 000 in each high school dropout or \$214 billion in 1989 dollars to restore male high school dropouts participating in the workforce to their 1979 real earnings level. To restore all high school graduates to their real 1979 levels would take an investment of \$10 000 per high school graduate, or more than \$212 billion in 1989 dollars, for a total of \$426 billion in 1989 dollars.

The answer to question (2) is even larger. Table 1 shows the amount needed to restore the 1979 earnings ratio between high school graduates or high school dropouts and college-educated full-time workers over age 25. To restore real earnings for both male and female workers over age 25 that are high school educated or less to their 1979 relative positions with respect to college graduates (holding the latter at 1989 real wage levels) would require an investment of more than 1.66 trillion dollars. These cost estimates are optimistic because they do not consider persons below age 25 or persons who do not participate in the workforce at the current wage levels. They are also optimistic for another reason: few—if any—government training programmes have returns anywhere near 10%, although some educational programmes realize such returns for most government programmes. Zero per cent is a much closer approximation to the true return. One might wish to qualify these calculations in many ways. One might want to adjust down the rate of return as more difficult-to-train persons receive training.

A more sophisticated calculation accounts for the fact that as persons have their skills upgraded, the real wages of the less-skilled

TABLE 1. *Investment in human capital required to restore earnings to 1979 levels and to restore 1979 relative wage ratios using a 10% rate of return (in billions of dollars)*

<i>To restore earnings to 1979 levels</i>	
<i>Males</i>	
Investment needed to restore average male high school dropout earnings in 1989 to average real earnings of male high school dropouts in 1979	\$214
Investment needed to restore average male high school graduate earnings in 1989 to average real earnings levels of male high school graduates in 1979	\$212
<i>Total</i>	\$426
<i>To restore 1979 earnings ratios</i>	
<i>Males</i>	
Investment needed to restore average male high school dropout earnings in 1989 to the level needed to achieve the 1979 high school dropout/college earnings ratio (holding 1989 college graduate wages fixed)	\$382
Investment needed to restore average male high school graduate earnings in 1989 to the level needed to achieve the 1979 high school graduate/college earnings ratio (holding 1989 college graduate wages fixed)	\$770
<i>Females</i>	
Investment needed to restore average female high school dropout earnings in 1989 to the level needed to achieve the 1979 high school dropout/college earnings ratio (holding 1989 college graduate wages fixed)	\$136
Investment needed to restore average female high school graduate earnings in 1989 to the level needed to achieve the 1979 high school graduate/college earnings ratio (holding 1989 college graduate wages fixed)	\$378
<i>Total</i>	\$1.66 Trillion

Source: Wages are from Blank (1994). We assume workers work 50 weeks a year. The figures on the educational breakdown for the labour force are from Table 616, *Statistical Abstract of the United States*, 1992. We delete all persons out of the labour force and those less than age 25. On these criteria, our estimated investment costs are downward-biased. Source: Heckman (1994) and Heckman, Roselius and Smith (1994).

workers are likely to increase as they become more scarce and the real wages of those with higher skills are likely to decrease as their supply increases. This calculation gives us another gauge of the magnitude of the investment required to offset the changes in the price of skills in the modern American labour market.

The 1979–1989 percentage change in relative wages of college graduates relative to high school graduates in the U.S. is roughly 14 percentage points. To reverse the 10-year trend by increasing the supply of skilled workers requires a once-and-for-all increase of approximately 20% in the number of high-skilled persons in the workforce. College equivalents are 40% of the workforce and high school equivalents are 60%. For a 1990 workforce of 120 million, about 5.4 million people would have to be transformed to college equivalents to reverse the decade-long erosion of real wages. To maintain this gain in relative wages against the secular trend operating against unskilled labour, about one million additional skilled persons need to be added to the workforce each year on top of the once-and-for-all change of 5.4 million.

As a benchmark, the annual supply of high-skill equivalents to the U.S. economy in the early 1990s is approximately 1.8 million persons. Maintenance of existing skill gaps alone would require that the percentage of persons acquiring post-secondary skills would have to rise by 55%. To phase in the additional 5.4 million people that are required to restore wage parities to their 1979 levels over a 10-year period would require a total annual expansion of the supply of high-skill persons of 70–80%. In order to engineer such an increase through a tuition policy, it is necessary to reduce tuition substantially. College tuition would have to be zero and people would have to be paid to attend school.† Comparable calculations for other economies reveal the same large scale of investment required to alleviate the problem of rising wage inequality.

Given the magnitude of the required investment to restore real earnings levels, and the stringency of current government budgets, it is necessary to use funds wisely. Factually based policy is far more likely to be efficient policy. I now examine the evidence on skill formation and claims made about market failures and family failures that impede skill formation.

2. The evidence on credit constraints and participation in schooling and training programmes

One of the most widely accepted arguments in policy and academic circles is that credit constraints prevent poor persons from participating in formal education. The empirical association between family income and college enrollment presented in Figure B has attracted an enormous amount of attention in academic and policy circles, especially in the U.S. The most common interpretation of this evidence is that short-term family

† These calculations were first presented in Heckman, Lochner and Taber (1998a).

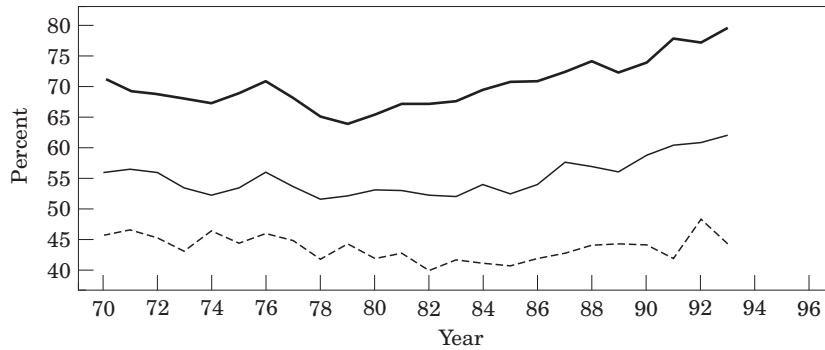


FIGURE B. College participation by 18 to 24 year-old high school graduates and equivalency degree holders. Family Income Quartile: — Top half, — third quartile, ---- bottom quartile.

Source: The 1971 to 1989 numbers were calculated from CPS P-20 school reports, and the 1990–1993 figures are authors' calculations from October CPS data files.

Note: High School completion includes equivalency degrees.

credit constraints prevent children from low income families from attending school. The Pell Grant programme and the recently enacted HOPE fellowship programme in the U.S. and many other governmental educational programmes are premised on this interpretation. It is the most popular explanation for the time series of the ethnic and racial gaps in college enrollment displayed in Figure C. Since minority families are concentrated in the lower end of the family income distribution, their failure to respond to the increase in the economic return to schooling that started in the late 1970s is widely viewed as a manifestation of the more general phenomenon of a market failure due to borrowing constraints that prevent poor people from taking advantage of the increase in the return to skills.

The common interpretation of Figure B, and the one that guides many recent policy proposals for higher education, notes that real tuition costs have increased in percentage terms over the past 16 years. At the same time, family incomes have declined among the bottom quartiles of the family income distribution. The real wages and employment of unskilled males have declined since the late 1970s. More families at the bottom of the family income distribution are headed by females with dependent children. Such families have lower earnings and income levels than families headed by males.

According to this interpretation, rising tuition costs and declining family resources have had a devastating impact on the college attendance decisions of children from low income families. Based on this interpretation, policies that further subsidize the already

substantial subsidies available to educate children from low income families have been advocated.

There is no doubt that real tuition costs have risen over the past 16 years both in the U.S. and in other countries. Between 1980 and 1997, average public posted “sticker price” tuition levels rose by 100% at public 4-year colleges and universities, and by 77% at public 2-year colleges (NCES, 1997). At the same time, it is important to recognize that government subsidies to higher education are already large. All told, individuals attending public institutions of higher education pay on average less than 20% of the total direct cost of attending college. (Direct cost does not include foregone earnings.) Moreover, a substantial fraction of the 20% of the total costs borne by individuals is actually paid by private foundations and charities that extend aid directly to students.†

The conventional wisdom is that borrowing constraints are binding for prospective college students from low income families and have become more stringent as the poor families have become poorer at precisely the same time that tuition costs have risen along with the rise in the return to education (Hauser, 1993). The conventional argument is that government policy has contributed to the rising inequity in schooling among different family income groups through expanding tuition costs, so it should also help to eliminate it. I now present reasons to doubt the received wisdom.

2.1. EXPLANATIONS FOR THE POSITIVE RELATIONSHIP BETWEEN FAMILY INCOME AND COLLEGE ENROLMENT

The argument that family credit constraints are the most plausible explanation for the relationship depicted in Figure B starts by correctly noting that human capital is different from physical capital. With the abolition of slavery and indentured servitude, there is no asset market for human capital. People cannot sell rights to their future labour earnings to lenders in order to secure financing for their human capital investments. Even if they could, there would be substantial problems in enforcing performance of contracts on future earnings given that persons control their own labour supply and the effort and quality of their work effort. The lack of collateral and the inability to monitor effort are widely cited reasons for current large-scale government interventions to finance education.

If people had to rely on their own resources to finance all of their schooling costs, there is no doubt that in the long-run the level of educational attainment in society would decline. To the extent

† Cameron and Heckman (1999) and Heckman and Klenow (1998) discuss the extent of subsidy in greater detail.

that subsidies do not cover the full costs of tuition, persons are forced to raise tuition through private loans, through work while in college or through foregone consumption. Children from families with higher income have access to resources that children from families with lower income do not have, although children from higher income families still depend on the goodwill of their parents to gain access to funds. Limited access to credit markets means that the costs of funds are higher for the children of the poor and this limits their enrolment in college.

Current tax law in the U.S. exacerbates these problems. Until recently, borrowing costs for education could not be written off against taxes. Even if they can be itemized, few poor families would find it profitable to itemize deductions. Until recently, the only exception to the non-deductibility of interest in the current tax law was mortgage interest. Under the new law enacted in 1997, deductions for student loans are available. These deductions benefit children from families that itemize and are unlikely to have much effect on college attendance for poor children. All families can itemize mortgage interest payments in declaring their taxes. However, poorer families are much less likely to own homes and hence fewer of them are eligible to use mortgages on homes to finance the schooling of their children.

The purchase of education is governed by the same principles that govern the purchase of other goods. There is, undoubtedly, a consumption component to education (see Lazear, 1977). Families with higher incomes buy more of the good for their children and buy higher quality education as well. This factor partly explains the relationships presented in Figure B.

An alternative and not necessarily mutually exclusive interpretation of the same evidence is that long-run family and environmental factors play a decisive role in shaping the ability and expectations of children. Families with higher levels of resources produce higher quality children who are better able to perform in school and take advantage of the new market for skills.

Children whose parents have higher income have access to better quality primary and secondary schools. Children's tastes for education and their expectations about their life chances are shaped by those of their parents. Educated parents are better able to develop scholastic aptitude in their children by assisting and directing their studies. The influences of family factors that are present from birth through adolescence accumulate over many years to produce ability and college readiness.

This alternative interpretation stresses the role of the family and the environment and does not necessarily rule out the importance of short-term borrowing constraints as a partial explanation for Figures B and C. However, if the finances of poor but motivated families hinder them from providing decent elementary and

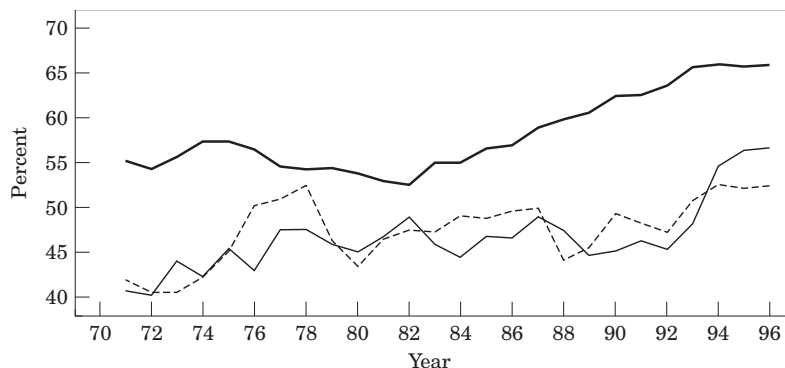


FIGURE C. College entry proportions of 21 to 24 year-olds who have graduated high school or obtained an equivalency degree. Race-ethnicity: — White, - - - Black, . . . Hispanic. These series are 3-year moving averages of the raw data. Racial-ethnic groups are defined mutually exclusively.

Source: Authors' calculations from 1971 to 1996 March CPS data files.

secondary schooling for their children, and produce a low level of college readiness, government policy aimed at reducing the short-term borrowing constraints for the college expenses of those children is unlikely to be effective. Policy that improves the environments that shape ability will be a more effective avenue for increasing college enrolment in the long-run. The issue can be settled empirically. Surprisingly little data have been brought to bear on this question.

The distinction between long-run family factors that promote college readiness and short-term borrowing constraints can be conceptualized by imagining an experiment in which a random sample of families is drawn and some of the families win a million dollar lottery at different points in the life cycle of their children. I assume that lotteries received at different ages are suitably discounted to a baseline level. Those who win as their children near high school completion have little opportunity to make cumulative long-run family investments that contribute to college-preparedness. There would be little effect of the newly-acquired wealth on the college attendance of their children if college readiness and ability are the decisive elements in producing enrolment in college.

For lottery winners with young children, a much larger response to the lottery would be expected in terms of the college attendance of their children if parents invest in better schools and more academic opportunities for their children over a longer horizon. If short-term credit market constraints are the significant factor governing college attendance, then we expect a large response in college enrollments by children of previously poor families, irrespective of the age of their children at the time the lottery was won.

If public policy aims to encourage college attendance, a focus on improving the environments of children and improving preparation for college will be more effective than grant or loan programmes to economically or cognitively disadvantaged children in their late teenage years. What is known about cognitive ability is that it is formed relatively early in life and becomes less malleable as children age. By age 14, basic academic ability seems to be fairly well set (see the evidence summarized in Heckman, 1995). Since scholastic ability promotes academic progress, early successful interventions in the life cycle of learning lead to higher overall achievement. By the time individuals finish high school and scholastic ability is determined, the scope of tuition policy for promoting college attendance is greatly diminished.

Only to the extent that the family income of able high school graduates falls below levels required to pay for college will short-term credit market constraints hinder college entry. Given the current college financial support arrangements that are available to low income and minority children in the U.S., the phenomenon of bright students being denied access to college because of credit constraints is an empirically unimportant phenomenon.

2.1.1. Tuition costs and college attendance

It is easy to exaggerate the contribution of tuition costs toward explaining the gap in the college attendance of children from rich and poor families. Substantial loan and aid programmes already exist that are targeted towards students from poorer families. At public 2- and 4-year institutions in the U.S. in 1996, average costs of tuition and fees were about \$2300. To offset these costs, both the Pell Grant and subsidized student loan programmes are available to children of low income families. Eligibility is determined by actual college costs and an estimated parental contribution that depends on travel expenses and allowances for miscellaneous expenses, the student's dependency status, family income and assets, and the number of other children the family has in college or post-secondary vocational training programmes. In 1997, a first-year dependent college student was eligible for a maximum of about \$8000 in Federal grants and subsidized loans. No minimum contribution toward estimated college costs was required from the student or the parents. In round figures, the \$8000 maximum benefit consists of \$2500 in Pell Grants, \$2500 in Stafford Loans, and \$3000 in Perkins Loans. The maximum rose to \$11 000 for third and fourth-year college students as subsidized loan limits rise. A host of other Federal programmes direct money to students in some form or another. In 1996, total institutional subsidies alone were approximately the size of the entire Pell Grant programme (College Board, 1997).

Discussions of college tuition policy focus too often on the elite public and private institutions and ignore the broad spectrum of community colleges and public 4-year colleges that are available to students. They often overlook the rapid growth of community colleges in the past 25 years. About half of all current college students are in community colleges. These colleges offer low tuitions (typically about \$1300 per year in 1997 dollars) and flexible schedules that allow students to work and attend college. There are many more community colleges (1036) than 4-year colleges (604) and most prospective students have one nearby so access to them is not a serious problem. Costs of room and board can be avoided by living with parents. Evidence reported by Kane and Rouse (1995) suggests that the economic return to a year at a community college is the same as the economic return at a 4-year college. Taken at face value, their evidence suggests that there is no compromise in generating earnings by attending a community college for the first 2 years of the college experience.

The growth in community colleges is an institutional response to the rigid schedules, high tuition costs and lack of access characteristic of 4-year schools. Many of the arguments currently made about the costs of attending college were more valid 25 years ago than they are now. In the current environment, with the institution of the community college in place, and with generous loan and grant programmes available, the arguments that tuition costs and commuting are major barriers to college attendance by the poor are implausible.

To strengthen this argument, note that the take-up rate on Pell Grants and Perkins Loans targeted towards students from low income families is low (see Orfield, 1992). Many more funds are available than are spent. Binding borrowing constraints are not a plausible explanation for the lack of utilization of these resources. It is more likely that many eligible persons perceive that even with a substantial tuition subsidy, the returns to college education for them are too low to pay for the foregone earnings required to attend school.

2.1.2. Some evidence on the unimportance of short-term credit constraints

I now pose and answer two questions: (1) which factors have the most influence on schooling attainment? and (2) is the estimated influence of family income on college attendance a consequence of long-run family effects or short-term borrowing constraints?

To answer these questions, I compare the estimated effects of family background and family on college attendance when scholastic ability (AFQT) is included as an explanatory variable in a statistical analysis and when it is not. Measured scholastic

ability is the outcome of long-term family and environmental factors produced in part from the long-term permanent income of families. To the extent that the influence of family income on college attendance is diminished by the inclusion of scholastic ability in an analysis of college-going, one would conclude that long-run family factors crystallized in AFQT scores are the driving force behind schooling attainment, and not short-term credit constraints.

Table 2 presents a summary of a recent study conducted with Stephen Cameron of Columbia University. Using a subsample of the NLSY data on youth with AFQT measured before high school graduation, we examine what portion of the gap in college attendance between minority youth and whites is due to family income, to tuition costs, and to family background. Not controlling for ability measured at an early age, about half (5 points) of the 11-point gap between Black and White college attendance rates is due to family income; more than half (4 points) of the 7-point difference between Hispanics and Whites is due to family income. When scholastic ability is accounted for, only one half of one point of the 11-point Black–White gap is explained by family income. For Hispanics, the gap actually *widens* when family income is included. Equalizing ability more than accounts for minority–majority college attendance gaps (see line 5). Similar

TABLE 2. *Change in minority college entry probabilities at age 24 conditional on high school completion (minorities vs. Whites)*

	<i>Without AFQT score</i>		<i>With AFQT score</i>	
	<i>Blacks</i> (1)	<i>Hispanics</i> (2)	<i>Blacks</i> (3)	<i>Hispanics</i> (4)
(1) Equating all family background components	0.10	0.11	0.08	0.05
Individual components				
(a) Number of siblings	0.03	0.03	0.02	0.01
(b) Highest grade of father	0.08	0.03	0.06	0.02
(c) Highest grade of mother	0.003	0.05	−0.005	0.02
(d) Broken home	−0.01	0.01	−0.002	0.01
(2) Equating family income	0.05	0.03	0.004	−0.02
(3) Equating local average wages	0.004	0.04	0.002	0.03
(4) Equating tuition and college proximity	−0.03	−0.05	−0.02	−0.05
(5) Equating AFQT scores	NA	NA	0.15	0.12
(6) Equating 1 and 2	0.14	0.13	0.08	0.03
(7) Equating 1, 2, 3 and 4	0.12	0.12	0.06	0.01
(8) Equating 1, 2, 3, 4, and 5	NA	NA	0.21	0.13
(9) Gap between Whites and minorities	0.11	0.07	0.11	0.07

Source: Cameron and Heckman (1999).

differences show up in high school graduation rates and overall college attendance rates that do not condition on high school graduation (see the evidence in Cameron & Heckman, 1999). Ability produced by families and environments accounts for pronounced minority–majority differences in schooling attainment, and not financial resources. The disincentive effects of college tuition on college attendance are dramatically weakened when ability is entered into the analysis of college attendance. This analysis suggests that it is long-run factors that shape ability, not short-term borrowing constraints, that explain the evidence in Figure B. Programmes that operate late in the life cycle are likely to be ineffective in promoting college attendance and wasteful of public funds. Cameron and Heckman (1999) report that when AFQT is introduced into college enrolment equations, the greater responsiveness of persons from low income families to tuition increases that has been reported in the empirical literature is eliminated.

Additional evidence in support of this point is provided by Brooks-Gunn and Duncan (1997) (see Table 3). They estimate the effect of family income on child schooling first, over the entire age span of the child (column 1 for ages 0–15, and then by age intervals as shown in the last three columns). They establish that family income received at an early age is a much more important determinant of completed schooling—not income received during high school or in the college-going years. This relationship holds up even when the same parental background factors as used by Cameron and Heckman are entered in an empirical analysis. This evidence is entirely consistent with the notion that it is college readiness—and not credit constraints—that explain the income–college-going relationship in Figure B. It is also consistent with the importance of early interventions in promoting skill formation which I discuss in section 5.

TABLE 3. *Income effects across the life span: Integration and interpretation effects of the ages over which parents' income is received on children's completed schooling*[†]

<i>Income measure</i> [‡]	<i>Parental income averaged over ages</i>			
	<i>0–15</i>	<i>0–5</i>	<i>6–10</i>	<i>11–15</i>
Average Income (\$10 000)	0.11 (0.02)	0.14 [§] (0.04)	–0.02 (0.03)	0.04 (0.02)
Adjusted r^2	0.164		0.169	

Source: Brooks-Gunn and Duncan (1997).

[†]Standard errors in parentheses. All regressions include controls for mother's schooling, family structure, race, sex, and the age of the mother at the birth of the child.

[‡]Income inflated to 1992 price levels using the Consumer Price Index (CPI-UX1).

[§]Coefficient is at least twice its standard error.

Cameron and Heckman (1998) analyse the determinants of grade-by-grade schooling attainment for cohorts of American males born between 1908 and 1964. Consistent with the idea that family income and family background factors reflect long-run and not short-term influences on schooling attainment, they find income and family background factors are powerful determinants of schooling completion from elementary school through to graduate school. An appeal to borrowing constraints operating in the college years is not required to explain the relationship between family income and college attendance decisions.

Cameron and Taber (1999) estimate the importance of borrowing constraints in a model that incorporates the insight that both schooling choices and returns to schooling will be influenced by borrowing constraints. Using a variety of methods, they find no evidence that borrowing constraints plays a role in the schooling decisions of recent cohorts of American youth. Additional evidence on this point is presented by Altonji and Dunn (1996), who find no evidence that returns to education vary systematically with family income. Stanley (1999) looks at the impact of the G.I. Bill on college-going decisions of Korean War Veterans. Consistent with my story, he finds that the take-up of college subsidies was concentrated almost exclusively among veterans from families in the top half of the socio-economic distribution.

3. Primary and secondary schools

State and local governments heavily subsidize primary and secondary education. Virtually all direct operating costs are completely subsidized through high school; only the opportunity cost of the students' time remains unsubsidized. Many have questioned whether the amounts spent are adequate. Should teachers be paid more? Should class sizes be reduced? Many read the latest evidence from the Tennessee Star experiment as suggesting that class size reductions promise big gains in test scores. Test scores are commonly used to guide the success or failure of educational reforms. Yet the link between test scores, especially those measured in the early years of schooling, to later outcomes is, at best, weak (Cawley, Heckman & Vytlačil, 1999). Fortunately, in recent years, a series of studies have appeared that link measures of schooling quality to measures of lifetime earnings and lifetime occupational achievement.

From this literature, there is a growing consensus indicating that within current ranges in most developed economies, measured inputs such as class size and spending per pupil have little, if any, effect on the future earnings of students (see Card & Krueger, 1996; Heckman, Layne-Farrar & Todd, 1996). The most optimistic estimates show a mere 1–2% rise in future earnings for every

TABLE 4. *School quality discounted net returns to raising spending per pupil by 10%*

<i>Education</i>	<i>Annual rate of return to earnings of schooling quality</i>			
	<i>1%</i>	<i>1.5%</i>	<i>2%</i>	<i>5%</i>
10 years	-3422	-2987	-2552	56
12 years	-3861	-3366	-2869	106
14 years	-4315	-3800	-3285	-196
16 years	-4523	-3898	-3273	476

Source: Heckman *et al.* (1997).

10% increase in per-pupil spending; however, even those estimates have been shown to depend crucially on *ad hoc* assumptions made by researchers. When those assumptions are relaxed, the effects of variation of per-pupil spending and class size around sample means are small and poorly determined (Heckman, Layne-Farrar & Todd, 1996).[†]

Even if we take the most favourable estimates from the literature and combine them with the best-case scenario for the costs of raising schooling quality at the secondary level, increasing spending per pupil is not a wise investment. Table 4 presents estimates of the discounted returns to schooling quality using the estimates of the quality–schooling relationship presented by Card and Krueger (1992). The evidence in the table indicates that the U.S. may be spending too much on students. Taking a high estimate (relative to the literature) of a 2% increase in future earnings for a 10% rise in per-pupil spending, yields a negative net return of such expenditure increases for all schooling levels. For high school graduates, the net loss is about \$3800, and for college graduates the net loss is over \$4400. Unless the same increase in spending raises future earnings by 5% or more per year, a number far higher than that produced by any study in the literature, the financial costs of school quality far outweigh the returns.[‡] In order to justify additional spending on primary and secondary schools, we would need to appeal to other social benefits that are not captured by earnings.

[†] Hanushek (1998) carefully examines the evidence from the widely celebrated STAR programme on the effect of reducing class size on test scores of primary school children and finds little evidence for a strong effect of the programme except on kindergarten children. The evidence on the STAR programme supports the case for early interventions that is discussed below and not the case for a wide scale expansion of class sizes at all ages. Krueger (pers. comm.) shows that the costs and benefits of STAR are about equal and there is little expected gain from the programme in terms of its likely effects on the earnings of participants.

[‡] This calculation was suggested to me by Sam Peltzman. Recall further that Heckman, Layne-Farrar and Todd (1996) demonstrate the fragility of the Card-Krueger estimates.

This evidence does not prove that school quality does not matter. Surely, it does. Increasing it from very low levels, it matters greatly. But, there is little evidence that marginal improvements from current levels of schooling quality are likely to be effective. Pouring more funds into schools to lower class sizes by one or two pupils, or to raise spending per pupil by a few hundred dollars will not solve the problems of the American primary and secondary school system. While the effects of quality vary across environments and additional funding for some schools may be justified, more fundamental changes are required if we hope to see a significant improvement in our educational system.

3.1. THE BENEFITS OF COMPETITION AND INCENTIVES

It is widely perceived that American primary and secondary schools are failing. The evidence for this failure is the dismal ranking of American high school students on standardized achievement tests compared to the performance of students from other nations. There is slow growth in achievement test scores, and in the recent past there have been periods of decline in scores in the face of rising real per-pupil expenditures (see Hanushek, 1998). As a nation, Americans are spending more and more on public schools and apparently getting little in return for all of this expenditure, at least using one widely used measure of schooling output.[†]

A sharp contrast is often made between the poor performance of public secondary schools and the high level of performance of the American college system. Students from around the world flock to the U.S. to study in our colleges and graduate schools yet our secondary schools appear to be second rate. How can we reconcile the apparently contradictory story that our high schools are mediocre and our colleges are first rate?

The answer lies in part in the way public schools are currently organized. Public school systems in the U.S. are local monopolies with few competitors. The American high school system is a creation of the 20th century and is a world unto itself. Within it, an artificial adolescent culture is left to flourish which often discourages academic achievement and the pursuit of knowledge even in the best schools in the best neighbourhoods (Coleman, 1961). The incentives of many principals and teachers to produce useful knowledge, or any knowledge at all, are weak although there are surely many dedicated professionals. They are often unresponsive to the changing demand for skills or to the

[†] Other relevant outputs of schooling such as motivation and self-discipline are not measured by these test scores. Casual empiricism suggests that discipline and self-motivation have declined among American high school students, but I know of no hard evidence on this question.

market realities that will confront their students when they leave schools. They are not accountable to anyone because it is not easy to monitor them. One valuable source of information—parental and student perception of the qualities of teachers and schools—is rarely used to punish poor teaching. Educational technocrats dismiss such evaluations as “subjective” and unreliable. The parents and students in these schools have limited ability to act on their valuable private information about bad teachers and bad schools. Poor families have only limited ability to choose alternative teachers and schools.

An emerging body of evidence indicates that competition and choice improves the quality of schools, as measured by test scores and by parental and student satisfaction with learning. Contrary to the view that competition siphons resources away from the public sector to its detriment, Caroline Hoxby (1999) has demonstrated that when public schools are subject to greater competition both from parochial and other private schools, the performance of all schools increases. Higher levels of achievement are produced at lower cost. See her evidence summarized in Table 5.

Derek Neal (1997) demonstrates that the higher achievement scores of Catholic school students, compared to public school

TABLE 5. *Effects of competition among public school districts*

Effect on per-pupil spending	17% decrease
Effect on student achievement as measured by test scores	3-percentile point improvement
Effect on student achievement as measured by wages	4% increase
Effect on student achievement as measured by educational attainment	0.4 additional years of education
Effect on parents' involvement in their student's school career	30% increase in parents' visits to schools
Effect on public schools' per-pupil spending	Approximately 0
Effect on achievement of public school students as measured by test scores	8-percentile point improvement
Effect on achievement of public school students as measured by wages	12% increase
Effect on achievement of public school students as measured by educational attainment	12% increase in probability of college graduation

Notes: (1) Consider an increase of 1 standard deviation in the number of school districts in a metropolitan area or a decrease of 1 standard deviation in the concentration of enrollment among school districts in a metropolitan area. (2) Note that smaller effects are found for metropolitan areas in which school districts do not have financial autonomy (most revenue is state-determined). (3) Consider an increase in exogenous tuition subsidies of \$1000 or an increase in exogenous private school enrollment of 10%. Source: Hoxby (1998).

students, demonstrated by Coleman, Kilgore and Hoffer (1982) and Coleman and Hoffer (1987), is largely a consequence of gains registered by inner-city students who choose Catholic schools over inferior inner-city public schools. In the suburbs, where districts are smaller and competition among school districts is more intense, the Catholic schools have little advantage over the public schools and the performance of both school systems is higher than in the centralized inner-city schools.

Everywhere it has been investigated, the effects of competition in education and training (and in virtually every other sector of life) are beneficial for the students and trainees. For example, the celebrated German Apprenticeship System has been recommended as a model for the U.S. and for many other countries. That system gives high school age students the choice of integrating work and learning as an alternative to strictly formal academic education. When stripped to its essentials, the German system differs from the U.S. public school system by: (1) breaking down the artificial separation between the world of work and the world of learning; (2) giving students and the firms that apprentice them choice among a variety of learning situations; and (3) motivating students to perform well in order to secure the most desirable apprenticeships and motivating many firms to provide valuable training opportunities. The high level of competition among firms offering apprenticeships and among students is a major source of its success (see Heckman, 1994; Heckman, Roselius & Smith, 1994).

Once it is recognized that public schools, especially inner-city public schools, are a virtual monopoly, while the U.S. university system is highly competitive, the mystery of the poor performance of the former, and the great success of the latter vanishes (see Hoxby, 1998). It is remarkable in a society as committed to consumer sovereignty and choice in most aspects of economic and social life as the American society, that there is so much resistance to permitting choice and instituting incentives in education. The conventional argument of the educational planners is that parents and students are not able to make wise choices. All the evidence points to precisely the opposite conclusion.

Recent research, to which I turn next, suggests that the early years of childhood prior to schooling are crucial for later success in schooling and life. If parents cannot make wise choices about the schooling of their children, how can we trust them to make the right choices for their children in the pre-school years? The logical extension of the paternalistic argument that denies parental sovereignty in schooling would suggest that the state should play a far more active role in the pre-school life of the child as well, a position few would be willing to accept.

I reject the paternalistic argument for most groups. However, for certain disadvantaged families paternalistic interventions may be appropriate. If we are to violate the principle of consumer sovereignty anywhere in the life cycle process of learning, the case for doing so is strongest at the pre-school stage for some groups and not at later stages of formal schooling where the argument for paternalism is most often made. Dysfunctional families and environments are a major source of social problems. Paternalistic interventions into the lives of severely deprived children in disadvantaged environments may be warranted. On what evidence do I base these remarks? What is the case for early intervention?

4. Early childhood investments

Recent studies of early childhood investments have shown remarkable success and indicate that interventions in the early years are important for promoting learning and can be enriched through external channels. Early childhood interventions of high quality have lasting effects on learning and motivation. Disadvantaged subnormal I.Q. children in Ypsilanti, Michigan were randomly assigned to the Perry Pre-school programme and administered intensive treatment at ages 4–5. Treatment was then discontinued and the persons were followed over their life cycle. These people are now about 35 years old. Evidence indicates that those enrolled in the programme have higher earnings and lower levels of criminal behaviour in their late 20s than do comparable children randomized out of the programme. Reported cost–benefit ratios for the programme are substantial. Measured through age 27, the programme returns \$5.70 for every dollar spent. When returns are projected for the remainder of the lives of programme participants, the return on the dollar rises to \$8.70. As with the Job Corps, a substantial fraction (65%) of the return to the programme has been attributed to reductions in crime (Schweinhart, Barnes & Weikart, 1993). The Syracuse Pre-school programme provided family development support for disadvantaged children from prenatal care through to age five. Reductions in problems with probation and criminal offences 10 years later were as large as 70% among children randomly assigned to the programme. Girls who participated in the programme also showed greater school achievement (Lally, Mangione & Honig, 1988). Studies of early intervention programmes have found short-term increases in test scores, less grade retention, and higher high school graduation rates among enrolled children. Of those studies that examine pre-delinquent or criminal behaviour, most have found lower rates of deviant behaviour among programme participants. See Table 6 for a summary of the

TABLE 6. *Effects of early intervention programmes*

<i>Programme / study</i>	<i>Costs[†]</i>	<i>Programme description</i>	<i>Test scores</i>	<i>Schooling</i>	<i>Pre-delinquency crime</i>
Abecedarian Project [‡]	—	Full-time year-round classes for children from infancy through pre-school	High scores at ages 1–4	34% less grade retention by 2nd grade; better reading and math proficiency	
Early Training [‡] (Gray, Ramey & Klaus, 1982)	—	Part-time classes for children in summer; weekly home visits during school year	Higher scores at ages 5–10	16% less grade retention; 21% higher HS graduation rates	
Harlem Study (Palmer, 1983)	—	Individual teacher–child sessions twice-weekly for young males	Higher scores at ages 3–5	21% less grade retention	
Houston PCDC [‡]	—	Home visits for parents for 2 years; child nursery care 4 days/week in year 2 (Mexican Americans)	Higher scores at age 3		Rated less aggressive and hostile by mothers (ages 8–11)
Milwaukee Project [‡] (Garber, 1988)	—	Full-time year-round classes for children through 1st grade; job training for mothers	Higher scores at ages 2–10	27% less grade retention	

(Continued overleaf)

TABLE 6. (Continued)

<i>Programme / study</i>	<i>Costs[†]</i>	<i>Programme description</i>	<i>Test scores</i>	<i>Schooling</i>	<i>Pre-delinquency crime</i>
Mother-Child Home Programme (Levenstein, O'Hara, & Madden, 1983)	—	Home visits with mothers and children twice weekly	Higher scores at ages 3–4	6% less grade retention	
Perry Pre-school Programme [‡] (Schweinhart, Barnes & Weikart, 1993)	\$13 400	Weekly home visits with parents; intensive, high quality preschool services for 1–2 years	Higher scores in all studied years (ages 5–27)	21% less grade retention or special services; 21% higher HS graduation rates	2.3 vs. 4.6 lifetime arrests by age 27 7% vs. 35% arrested 5 or more times
Rome Head Start (Monroe & McDonald, 1981)	\$5400 (2 years)	Part-time classes for children; parent involvement		12% less grade retention; 17% higher HS graduation rates	
Syracuse University Family Development (Lally <i>et al.</i> , 1988)	\$38 100	Weekly home visits for family; day care year round	Higher scores at ages 3–4		6% vs. 22% had probation files; offenses were less severe
Yale Experiment	\$23 300	Family support; home visits and day care as needed for 30 months	Better language development at 30 months	Better-school attendance & adjustment; fewer special adjustment; school services (age 12 1/2)	Rated less aggressive & pre-delinquent by teachers and parents (ages 12 1/2)

Note: All comparisons are for programme participants vs. non-participants.

[†] Costs valued in 1990 dollars.

[‡] Studies used a random assignment experiment design to determine programme impacts. Data from Donohue and Siegelman (1996), Schweinhart, Barnes and Weikart (1993) and Seitz (1990) for the impacts reported here.
Source: Heckman, Lochner and Taber (1997).

effects of selected early intervention programmes on student test scores, schooling, earnings, and delinquency, and Tables 7(i) and 7(ii) for a summary of the Perry Pre-school findings.

Evidence on the more universal Head Start programme is less clear, but the programme is quite heterogeneous and is much less well funded than the Perry Pre-school programme. Currie and Thomas (1995) found short-term gains in test scores for all participating children; however, most of those gains decayed quickly for African-American children. They conclude that either differences in local programme administration or in subsequent schooling quality are at the root of the differences between the outcomes for black and white children. Ramey *et al.* (1988) note that the schools attended by the Perry Pre-school children were of substantially higher quality than those attended by the typical Head Start child. Thus, the failure to maintain the initial positive stimulus of Head Start may account for the decline in its impact over time.

TABLE 7(i). *Pre-school effects related to economic benefits*[†]

<i>Outcome variable</i>	<i>Pre-school</i>	<i>(N)</i>	<i>No pre-school</i>	<i>(N)</i>
Education effects				
California achievement test at age 9	172.8	(54)	145.5	(55)
California achievement test at age 14	122.2	(49)	94.5	(46)
Classified mentally retarded [‡]	15%	(54)	35%	(58)
Graduated from High School	67%	(58)	49%	(63)
Employment effects				
Employed at age 19	50%	(58)	32%	(63)
Monthly earnings at age 28	\$1,129	(54)	\$766	(61)
Crime effects				
Arrested by age 19	31%	(58)	51%	(63)
5 or more arrests by age 28	7%	(58)	35%	(63)
Welfare effects				
Received welfare at age 19	18%	(58)	32%	(63)
Received welfare at age 28	59%	(58)	80%	(63)

Source: Schweinkart, Barnes and Weikart (1993).

[†]All group differences statistically significant at 0.05 level.

[‡]At least one year in a classroom for "educably mentally impaired" children.

TABLE 7(ii). *Present value of costs and benefits per child recipients of costs and benefits*

<i>Cost or benefit</i>	<i>Whole society</i>	<i>Pre-school participants</i>	<i>General public</i>
Pre-school Cost [†]	-\$12 356	\$0	-\$12 356
Measured benefits			
Child care	738	738	0
K-12 education	6872	0	0
College [‡]	-868	0	-868
Adult education	283	0	283
Employment [§]	14 498	10 269	4229
Crime	49 044	0	49 044
Welfare	219	-2193	2412
Benefit subtotal	\$70 876	\$8814	\$61 972
Projected benefits			
Earnings	15 833	11 215	4618
Crime	21 337	0	21 337
Welfare	46	-460	506
Total benefits	\$108 002	\$19 569	\$88 433
Net present value	\$95 646	\$19 569	\$76 077

Source: Schweinhart, Barnes and Weikart (1993).

[†]Costs and cost increases appear as negative numbers.

[‡]Some small portion of college costs are likely to have been borne by the participants, but these could not be estimated from the available information.

[§]The benefits reported include all costs paid by the employer to hire a participant. Allocation to participants and the general public assume that: (1) the marginal tax rate is 25%; (2) the value of fringe benefits received by the employee equals 10% of salary; and (3) the value of other fringes paid by the employer (e.g. the employer's share of social security) equals 10% of salary.

It is important to note, however, that similar declines in test scores were found for programmes like Perry Pre-school, but their long-term evaluations are quite favourable. The psychometric test score literature is not clear about the relationship between early test scores and success in school, graduation rates, socialization, and labour market outcomes. The fade-out effects in test scores found for this programme do not imply that long-term beneficial effects of Head Start are not present. Head Start may improve the lifetime prospects of its participants, despite yielding only short-term gains in test scores.

However, there is some evidence that Head Start may have smaller long-term impacts than more intensive programmes. Studies of Head Start's impact on special education placement and grade retention have produced less dramatic results than have been achieved from smaller demonstration projects like the Perry Pre-school programme (Haskins, 1989). This is not surprising

given the much lower spending per child and quality of service provided by the Head Start programme. Unfortunately, there are no reliable long-term evaluations of the Head Start programme that link interventions to conventional socio-economic outcome measures like occupational attainment and earnings.

The weaknesses of Head Start can be attributed to its shorter period of intervention, lower intensity, and less qualified staff than is typical of more enriched programmes (Zigler, 1994). With Head Start, as with most other things in life, you get what you pay for. For example, children enrolled in the Perry Pre-school programme received high-quality full-time pre-school services for 1–2 years (most received 2 years), and their parents benefited from weekly home visits by their children's teachers.

The intervention affected both children and parents. Parents improve their education and labour force activity and reduce their participation in welfare. The successful enriched programmes like Perry Pre-school foster long-term improvements in the home environment which carry over to the child long after the programme has terminated. Head Start offers a much lower quality (and lower paid) staff, part-time classes for children, and limited parental involvement. The programme terminates without any substantial intervention into or improvement in the home environments of the disadvantaged children. Improvements in Head Start, proponents argue, are likely to produce effects closer to those observed in more successful small-scale programmes. Given the potential for success (as exhibited by the Perry Pre-school experiment), more studies of the long-term impacts of various types of small-scale and broad-based early intervention programmes are certainly warranted.

Provocative calculations recently published by John Donohue and Peter Siegelman (1998) indicate that if enriched early intervention programmes were targeted toward high-risk disadvantaged minority male youth, the substantial costs of these enriched programmes evident in Table 6 would be more than repaid by the expected savings in incarceration costs alone.

An important lesson to draw from the Perry Pre-school programme, and, indeed the entire literature on successful early interventions, is that it is the social skills and motivation of the child that are more easily altered—not I.Q. These social and emotional skills affect performance in school and in the workplace. Academics have a bias toward believing that cognitive skills are of fundamental importance to success in life. Because of this, the relatively low malleability of I.Q.s after early ages has led many to proclaim a variety of interventions to be ineffective.

Yet the evidence from the Perry Pre-school programme and the evidence in Table 6 reveals that these programmes are highly effective in reducing criminal activity, promoting social skills and integrating disadvantaged people into mainstream society. The

greatest benefits of these programmes are on socialization and not I.Q. Social skills and motivation have large pay-offs in the labour market so these programmes have the potential for large pay-offs.

I next turn to the evidence on the effectiveness of interventions for older children.

5. Interventions in the adolescent years

How effective are interventions in the adolescent years? Is it possible to remedy the consequences of neglect in the early years? This question is relevant because cognitive abilities are fairly well determined or stable by age 8–9 in the sense that I.Q. is highly correlated at successive ages beyond that age range. Just as the early intervention programmes have a high pay-off primarily due to the social skills and motivation imparted to the child and the improved home environment, so do interventions that operate during the adolescent years, and for much the same reasons.

Table 8 summarizes evidence on the effects of adolescent interventions on education, earnings and crime rates. Both school-based and training-based programmes are compared. I briefly discuss what is known about school-based interventions during the adolescent years before I turn to a discussion of training programmes for youth and other persons in section 6.

A few recent studies of mentoring programmes, like the well-known Big Brothers/Big Sisters (BB/BS) and the Philadelphia Futures' Sponsor-A-Scholar (SAS) programmes, have shown broad positive social and academic impacts on participating school-age children and adolescents. BB/BS pairs unrelated adult volunteers with youths from single-parent households for the purpose of providing the youths with an adult friend and promotes private youth development. No specific attempts are made to ameliorate particular deficiencies or to reach specific educational goals; a broad, supportive role is envisioned for the mentor. In a random assignment study, Tierney and Grossman (1995) found that 18 months after being matched with a mentor, Little Brothers and Sisters (ages 10 to 16 at the time of the match) were less likely to have initiated drug or alcohol use, to hit someone, to skip class or a day of school, or to lie to their parents; they had higher average grades and were more likely to feel competent in their school work and report a better relationship with their parents (see Table 9).

The primary goal of SAS is to help students from Philadelphia public high schools make it to college. The programme provides long-term mentoring (throughout high school and for 1 year beyond), substantial academic support, help with college application and financial aid procedures, and financial support for college-related expenses. In many ways, individually matched

TABLE 8. *Effects of selected adolescent social programmes on schooling, earnings, and crime*

<i>Programme / study</i>	<i>Costs[†]</i>	<i>Programme description</i>	<i>Schooling</i>	<i>Earnings[†]</i>	<i>Crime[†]</i>
Job Corps (Long, Mallar and Thornton, 1981)	\$11 000	7 months of education and vocational training for 16–21 year olds (mostly male)	No effect	Discounted present value of increased earnings of \$10 000	Estimated reduction in crime valued at approximately \$4500
JTPA [‡] (Bloom <i>et al.</i> , 1993)	Males: \$1316 Females: \$1955	Job training and placement services for adolescents	No effect	No effect	
STEP (Walker & Viella-Velez, 1992)		Two summers of employment, academic remediation & life skills for 14 & 15 year olds	Short-run gains in test scores; no effect on school completion rates		
Quantum Opportunities Program [‡] (Taggart, 1995)	\$10 600	Counselling; education, communication, & development services; financial incentives for part. (4 years beginning in 9th grade)	34% higher HS graduation/GED rates (2 years post-programme)		4% vs. 16% convicted; 0.28 vs. 0.56 average number of arrests (2 years post-programme)

Note: All comparisons are for programme participants vs. non-participants.

[†] All dollar figures are in 1990 values.

[‡] Studies used a random assignment experimental design to determine programme impacts.
Source: Heckman *et al.* (1997).

TABLE 9. *Estimated benefits of mentoring programmes (treatment group reductions compared to control group)*

<i>Outcome Measure</i>	<i>Change</i>
Big/Brothers/Big Sisters	
Initiating drug use	−45.8%
Initiating alcohol use	−27.4%
Number of times hit someone	−31.7%
Number of times stole something	−19.2%
Grade Point Average (1–4 scale)	3.0%*
Skipped class	−36.7%***
Skipped day of school	−52.2%***
Trust in parent	2.7%**
Lying to parent	−36.6%**
Peer emotional support	2.3%*
Sponsor-A-Scholar [†]	
10th grade GPA (1–100 scale)	2.9
11th grade GPA (1–100 scale)	2.5
Percent attending college (1 year after H.S.)	32.8%
Percent attending college (2 years after H.S.)	28.1%

Source: Tierney and Grossman (1995) and Grossman and Johnson (1998).

*Statistically significant at 0.10 level.

**Statistically significant at 0.05 level.

***Statistically significant at 0.01 level.

[†]For the Sponsor-A-Scholar programme, only impacts that are statistically significant.

mentors serve as surrogate parents, providing a successful role model, monitoring student progress, and providing other social encouragement and support. SAS provides students with \$6000 in financial assistance throughout college for those choosing to enrol in an accredited 2- or 4-year post-secondary institution. The programme also provides a co-ordinator for groups of about 30 students to ensure a successful relationship is built between mentors and mentees. Using a matched sample of non-SAS students in Philadelphia high schools,[†] Johnson (1998) estimates statistically significant increases in GPA for 10th and 11th grades, as well as a 22% (16%) increase in college attendance 1 year (2 years) after graduation from high school (Table 9). Because the primary goal of SAS was to increase college enrolment, other social and psychological measures were not studied.

Much like SAS, the Quantum Opportunity Programme (QOP) offered disadvantaged minority students counselling and financial incentives (one dollar up front and one dollar put in a college fund)

[†] Comparison students were matched with participants on the basis of race, gender, school attended and 9th grade academic performance.

for every hour spent in activities aimed at improving social and market skills. Students who were randomly chosen to participate in the programme were provided with a mentor at the beginning of the 9th grade. All participants were kept in the programme for 4 years regardless of whether they dropped out of school or not. Over 4 years, the average participant logged 1286 hours of educational activities like studying with tutors or visiting museums. Two years after programme completion, about a third more participating students graduated from high school (or obtained their GED) than similar non-participants. Since many participants were enrolled in post-secondary schooling at the time of the follow-up study, it is difficult to determine the programme's effect on earnings. However, arrest rates for programme participants were one-half of those for non-participants. These benefits did not come without cost, however, as the average 4-year cost per participant was \$10 600. Still, a cost-benefit analysis estimated positive net social returns to QOP. See Taggart (1995) for a more detailed description of the programme and an evaluation of its impacts. Table 10 presents the evidence from a randomized trial evaluation of the Quantum Opportunity Programme. Again, the evidence is that these programmes can dramatically improve social skills and the adaptation of persons to society.

Two other studies provide additional evidence that creative programmes designed to keep adolescents in school can be effective. Ohio's Learning, Earning, and Parenting (LEAP) programme and the Teenage Parent Demonstration (TPD) provided financial incentives for teenage parents on welfare to stay in school or take GED classes (or, alternatively, imposed financial penalties for non-enrolment). LEAP showed increases in high school graduation or GED rates among randomly-assigned participants who were still enrolled in school when they entered the programme. TPD showed mixed results on education depending on the programme site. For young women who had already dropped out of school at the time of enrolment in the programme (and, to a lesser extent, those who were still attending school when they entered the programme), there is a cause for concern that participants may have substituted GED training for high school graduation as an easier means for meeting programme requirements.† Both of these programmes show positive post-programme effects on earnings and employment for students who were still in school when they entered the programme. The effects were often negative, however, for participants who had already dropped out of school before

† Cameron and Heckman (1993) have shown that a GED commands lower wages than a high school diploma in the labour market.

TABLE 10. *The quantum opportunity programme: Second post-programme year impacts*

	<i>QOP participants</i>	<i>Control group</i>	<i>Difference</i>
Completion			
Has high school diploma	63%	43%	+20%
Has GED certificate	25%	9%	+16%
Enrolment			
Currently in a 4-year college	23%	14%	+9%
Currently in a 2-year college	34%	11%	+23%
Currently in training	18%	2%	+16%
Currently in GED	4%	11%	-7%
Currently in college, training or GED	78%	38%	+40%
Employment			
Currently employed full-time	20%	7%	+13%
Currently employed part-time	16%	18%	-2%
Currently not in school training or work	14%	48%	-34%
Average yearly earnings all	\$1748	\$1591	+\$157
Percent with annual earnings >0	56%	28%	+28%
Child-bearing			
Average children ever parented	0.54	0.75	-0.21
Percent with child ever parented	39%	41%	-2%
Dependency			
Self receiving food stamps	22%	43%	-21%
Self receiving welfare	20%	42%	-22%
Criminality			
Percent ever arrested	19%	23%	-4%
Average number arrests in all	0.28	0.56	-0.28
Percent males ever arrested	27%	39%	-12%
Average number arrests (males)	0.46	1.05	-0.59
Percent ever incarcerated	13%	21%	-8%
Average number incarcerations all	0.21	0.49	-0.28
Percent males ever incarcerated	23%	50%	-27%
Average males ever incarcerated	0.38	0.94	-0.56
Graduated high school or GED			
Enrolled in a 4-year college	32%	17%	+15%
Enrolled in a 2-year college	28%	4%	+24%
Enrolled in job training	8%	8%	0%
Still in high school or GED	12%	4%	+8%
Employed, out of school	0%	0%	0%
Not in school or working	24%	62%	-38%
Plans to complete 4-year college	56%	17%	+39%
Plans to complete 2-year college	28%	13%	+15%
Plans to complete job training	12%	54%	+42%
No plans for college or training	4%	16%	-12%

Source: Taggart (1995).

TABLE 11. *Estimated impacts of new chance LEAP, and TPD (percentage, and TPD)*

<i>Programme</i>	<i>Ever received H.S. diploma or GED</i>	<i>Ever received H.S. diploma</i>	<i>Ever employed in previous year</i>	<i>Average monthly earnings in previous year</i>
New Chance	8.1***	-3.5***	2.8	-3
LEAP				
Not Enrolled	-3.4	-1.1	4.6*	8
Enrolled	7.0*	1.4	-2.6	-18
TPD				
Camden	2.0	4.4*		
Newark	-2.0	-5.2**		
Chicago	3.2	0.7		
Full Sample			-2.0	-18
Dropouts			-4.6	-56
Students			6.3**	79**
Graduates			-8.5**	-84**

Note: The follow-up periods for outcomes are approximately 42 months for New Chance, 36 months for LEAP, and 78 months for TPD.

Statistical significance levels are indicated as: *** = 0.01; ** = 0.05; * = 0.1.

Source: Granger and Cytron (1998).

entering the programme. A key finding from both of these studies is that they show more positive impacts for individuals still enrolled in school (when compared with dropouts).[†] It is still unknown whether that is because, on average, they are of a higher ability than those who have already dropped out, or because there is some advantage to intervening before adolescents leave school (see the evidence summarized in Table 11).

The three programmes just discussed demonstrate that financial incentives to stay in school and participate in learning activities for disadvantaged students can increase schooling and improve employment outcomes. It should be noted that while these programmes proved to positively influence employment and earnings (and, in the case of QOP, reduce crime), they do not perform miracles. Impacts are modest, but positive.

Two other programmes are worth discussing. The Summer Training and Employment Programme (STEP) provided remedial academic education and summer jobs to disadvantaged youths aged 14 and 15. Each summer, participants enrolled in 110 hours of classes and 90 hours of part-time work. While the programme achieved modest short-term gains in reading and mathematic

[†] See Granger and Cytron (1998) for a summary of both.

skills, those gains did not last. Two to three years after programme completion, there were no effects on high school graduation rates, grades, or employment. One criticism of the programme was that it did not attempt to follow-up on its summer programme with a school-year curriculum. Maryland's Tomorrow programme did just that. It combined an intensive summer programme with a school-year follow-up, offering participants summer jobs, academic instruction, career guidance, and counselling through adult mentors, peer support, or tutoring. While the programme did not reduce final dropout rates, it did seem to delay dropout (dropout rates were lower during the 9th grade but not by the end of the 12th grade). The programme also increased the pass rate for 12th grade students taking the Maryland Functional Tests, a basic skills test.

These programmes suggest that sustained interventions targeted at adolescents still enrolled in school can positively impact learning and subsequent employment and earnings.[†] These studies also suggest that interventions for dropouts are much less successful. Unfortunately, they do not explain why. We do not know whether there is some advantage to intervening before the dropout decision is already made, or if those who choose to drop out have less motivation and lower ability, making programmes less effective for them regardless of when the intervention takes place.

I next turn to the evidence on more traditional job training programmes. Can they convert unskilled adults into skilled workers efficiently?

6. The effectiveness of public sector training programmes

Due to a lack of data and a bias in favour of the funding of studies of government training, the returns to private sector training are less well understood than the returns to public sector training. Studies by Lillard and Tan (1986), Bartel (1992) and Bishop (1994); Lynch (1992, 1993) find sizable effects of private sector training. In comparison with studies of public sector training, most of these studies do not attempt to control for the bias that is produced because more able persons are more likely to take training, so the estimated rates of return would overstate the true returns to training by combining them with the return to ability. Thus, part of the measured return may be due to more motivated and able

[†] See the report entitled "What's working (and what's not)?" by Stanley (1995) for a more comprehensive survey of programmes aimed at increasing the skills and earnings of disadvantaged youth.

TABLE 12. *Rates of return on investments in private sector job training*

<i>Data Set</i>	
PSID, all males	23.5
EOPP, young new hires	8.7
NLS	16.0
NLS (Old NLS)	26.0

Source: Mincer (1993)

persons taking training. Estimated initial returns range from 10 to 20% (Mincer, 1993) (see Table 12).

An important feature of private sector training is that the more skilled do more investing even after they attain high skill levels. Different types of training and learning have strong complementarities with respect to each other. To the extent that effective training can be produced on the job, it is produced in the private sector and not in the public sector. The best hope of getting a reasonable return from job training is to encourage private sector investment. Firms are also more sensitive to changing market demands for skills than are government bureaucracies.

It is important to note, however, that private sector training typically excludes low-skilled persons. Firms can be exclusive in a way that government training programmes for disadvantaged workers are designed not to be. The lack of interest of private firms in training disadvantaged workers indicates the difficulty of the task and the likely low return of this activity. The best available evidence indicates that training programmes are an inefficient transfer mechanism and an inefficient investment policy for low-skill adult workers.

6.1. EVIDENCE ABOUT CONVENTIONAL PUBLIC TRAINING AND WORK-WELFARE PROGRAMMES

How ineffective are current programmes in moving people from welfare to work and in increasing their employment and earnings? Generally they are very ineffective. They cannot be expected to produce anywhere near the 10% rate of return that I used in my initial calculations in this lecture. Consider the evidence for various groups. Heckman, LaLonde and Smith (1999) present a much more comprehensive review of the evidence.

6.1.1. *Adult women*

Employment and training programmes increase the earnings of adult female AFDC recipients. Earnings gains are (1) modest;

TABLE 13. *Experimental estimates of the impact of employment and training programmes on the earnings of female welfare applicants and recipients*

<i>Services tested / demonstration</i>	<i>Net cost per participant</i>	<i>Annual earnings gain (loss)</i>	
		<i>After 1 year</i>	<i>After 3 years</i>
Job Search Assistance:			
Arkansas	140	220**	410**
Louisville (WIN-1)	170	350**	530**
Cook County, IL	190	10	NA
Louisville (WIN-2)	280	560**	NA
Job Search Assistance and Training Services:			
West Virginia	320	20	NA
Virginia	520	90	330*
Employment Services			
San Diego I (EPP/EWEP)	770	600**	NA
San Diego II (SWIM)	1120	430**	NA
Baltimore	1160	190	630**
New Jersey	960	720*	
Maine	2450	140	1140
Work Experience and Retraining:			
AFDC homemaker health care	11 550	460**	NA
National supported work	16 550	460**	810**

Source: Bell and Reesman (1987), Tables 3 and 4; Couch (1992), Table 1; Gueron and Pauly (1991), pp. 15–20.

Notes: **Statistically significant at the 0.5 level. N.A. = not applicable. All figures in the table are expressed in 1990 dollars.

(2) persist over several years; (3) arise from several different treatments; and (4) are sometimes quite cost effective. Table 13 displays evaluation results for a variety of programmes. For example, participation in an Arkansas job search programme was required for AFDC recipients with children over age three. Participants attended a group job search club for two weeks and then were asked to search as individuals for an additional two months. A programme in San Diego required all AFDC participants to take job search assistance and mandated work experience. The gains were high for participants in both programmes. The National Supported Work programme provided intensive training and job search assistance at a cost of about \$16 550 per recipient. The estimated rate of return to this programme was only 3.5%.

The results from the recent experiment evaluating the Job Training Partnership Act shown in Table 14 corroborate these

TABLE 14. *Impacts on total 18-month earnings and employment: JTPA assignees and enrollees, by target group*

Impact on:	Adults		Out-of-school youths	
	Women	Men	Female	Male
<i>Per assignee</i>				
Earnings				
In dollar	\$539***	\$550	\$-182	\$-854**
As a percentage	7.2%	4.5%	-2.9%	-7.9%
Percentage employed	2.1%**	2.8**	2.8	1.5
Sample size (assignees and control group combined)	6474	4419	2300	1748
<i>Per enrollee</i>				
Earnings				
In \$	\$873‡	\$935‡	\$-295‡	\$-1355‡
As a %	12.2%	6.8%	-4.6%	-11.6%
Percentage employed†	3.5‡	4.8‡	4.5‡	2.4‡

Source: Bloom *et al.* (1993). Enrollee estimates obtained using the procedure in Bloom (1984).

†At any time during the follow-up period.

‡Tests of statistical significance were not performed for impacts per enrollee.

*Statistically significant at the 0.10 level.

**Statistically at the 0.05 level.

***Statistically at the 0.01 level (two-tailed test).

findings. The largest impacts are for adult women, many of whom were collecting AFDC during their participation in JTPA. However, the impacts are not sufficiently large to move more than a tiny fraction of women out of poverty. As a general rule, conventional employment and training programmes are often cost effective for adult women (especially if the opportunity cost of trainee time is ignored or is sufficiently low), but do not produce dramatic changes in participant earnings or employment.

6.1.2. Adult men

The evidence for this group is consistent across programmes. Returns are low but usually positive. Job search assistance is an effective strategy but produces only modest increases in mean earnings levels. For these groups, training programmes will not make much of a difference in closing the wage gap between the skilled and the unskilled.

The only exception to this generally poor performance of publicly provided training is in classroom training. Heckman, Hohmann and Smith (2000) demonstrate that the return to classroom training provided by government training programmes

is comparable to that provided by the ordinary educational sector for average students.

6.1.3. *Youth*

Evidence from the recently concluded JTPA experiment indicates that this programme produces only low or negative impacts on earnings. For male youth, the estimated negative effect is unbelievably low. If taken seriously, participation in JTPA has a more negative impact on the earnings of male youth than participation in the Army, loss of work experience, or the cost of incarceration as measured by many studies.

The New Chance programme, operating in 10 different states, provides equally pessimistic results for teenage mothers. This programme was voluntary for young single mothers aged 16–22 who were on welfare, had dropped out of high school, and had not yet received a high school diploma or GED. New Chance offered a comprehensive set of services to these mothers and their children, including instruction in basic skills and in subjects related to the GED, occupational training, work experience, and job placement services. The programme increased the proportion of young mothers receiving a high school diploma or GED by 8.1%. However, that increase came entirely from an increase of 11.8% in GED recipients. In fact, programme participants were less likely to receive a high school diploma than non-participants! There were no long-term impacts on earnings or employment (Quint, Bos & Polit, 1997; Granger & Cytron, 1998). Two primary differences between this programme and those just described are immediate. First, participants had already dropped out of school by the time they entered the programme. The impacts for TPD and LEAP were much smaller (and mostly insignificant) for dropouts than for individuals still enrolled in school. Second, New Chance was a strictly voluntary programme which attempted to induce teenage mothers on welfare to enrol based on programme benefits, while QOP, TPD, and LEAP provided financial incentives to encourage academic activities.

Only the Job Corps has a demonstrated positive impact on earnings. It is an expensive programme, costing around \$20 000 per participant in direct costs, with an estimated return of roughly 8–9%. There is some basis for supporting expansion of this programme, but even for this programme the evidence is weak. Part of the high return comes from the very large value imputed to human life and the slightly smaller rate of committing murders found among persons who participate in the Job Corps. With lower values placed on lives saved, the estimated gains from Job Corps are much smaller (see Donohue & Siegelman, 1998).

Jobstart was designed to achieve similar impacts to the Job Corps, without the associated costs. It offers less intensive services in a non-residential setting, at a direct cost of about \$6000 per participant (substantially more than JTPA training, but less than half the cost of the Job Corps). Not surprisingly, the savings in costs are matched by a reduction in impacts. While estimates suggest small increases in earnings and education, and reductions in crime, those effects were typically not statistically significant for the overall sample of participants. Two particularly problematic subgroups showed large positive impacts on earnings: men arrested between age 16 and programme entry, and youths who had dropped out of school for educational reasons. Previous arrestees also showed some evidence of reduced crime and drug use as a result of the programme.

More surprising, however, is the sizeable impacts reported by one programme site—the Center for Employment and Training (CET) in San Jose, California. The CET provides 3–6 months of vocational training to disadvantaged youths and adults, most of whom are high school dropouts. At a cost of \$4200 per enrollee, the programme showed sustained earnings gains of over \$3000 per year (a 40% increase)! The success of this programme is not entirely understood, but it does have a few distinguishing features which are suggestive (Stanley, 1995). First, the programme has close ties to the local labour market. An industrial advisory board is set up to aid in skill selection; courses are taught by technicians from industry; and many area employers are on the advisory board. Second, CET emphasizes job skills training over learning basic skills. Basic skills are taught in the context of job training. Third, the CET curriculum is tailored specifically to the needs of each participant. Fourth, the CET has been active in San Jose for over 25 years and programme staff have extensive local knowledge and contacts. It has earned a positive reputation among employers, which is likely to help the placement of new graduates.

6.2. TRAINING PROGRAMMES FOR DISPLACED WORKERS

Displacement of older workers with substantial experience in the labour market has become an increasingly important phenomenon in recent years. In response to this trend, Congress passed Title III of the Job Training Partnership Act in 1982 and the Economic Dislocation and Worker Adjustment Assistance Act in 1988.

Leigh (1990, 1995) summarizes the evidence on a variety of these programmes. Results from some of these evaluations suggest small to moderate wages gains lasting only about a year. A more recent evaluation by Mathematica (see Corson *et al.*, 1993 and Decker & Corson, 1995) of training provided under the Trade Adjustment

Assistance Act to workers displaced as a result of foreign trade finds no evidence of any effect of this long-term training programme on the earnings and employment of recipients. Consistent with the other studies of government employment and training programmes already discussed, the overall pattern for programmes aimed at displaced workers is one of weak impacts for most groups. This is in sharp contrast to the high rates of return for private on-the-job training.

We cannot rely on Federal job training programmes to convert adult unskilled workers into the skilled workers demanded by the modern economy, either in the U.S. or in any other country where their track record is equally poor (see, Heckman, LaLonde & Smith, 1999, for a survey of impacts of job training programmes around the world).

6.3. SUMMARY OF TRAINING IMPACTS

A comparison of these programmes suggests a few important lessons. First, you get what you pay for. The JTPA programme generally costs very little and produces very little. The intensive residential nature of the Job Corps was not easily replaced by the less expensive Jobstart programme (with the exception of CET). Second, the effects of treatment may vary substantially among subgroups. This is not only evidenced by the difference in effects for the JTPA across age and sex classifications, but it is also observed for subgroups in the Jobstart evaluation. Third, these types of programmes also affect behaviours beyond schooling and work which should be considered. Both the Job Corps and Jobstart suggest that reductions in crime may be an important impact of programmes targeted at male youths. Fourth, programmes that are highly integrated with the local labour market and private sector are likely to be the most successful. This supports my claim that efforts should be made to shift training subsidies to the private sector. It also reinforces the point I made about the German Apprenticeship System. It is effective in part because it tightens the link between the workplace and the school room. The evidence summarized in Heckman, LaLonde and Smith (1999) indicates that the rate of return to most U.S. and European training programmes is far below the 10% figure I used in my initial calculations and is sometimes negative.

7. Tax policy

The final type of policy I consider is tax policy. The U.S. has a progressive income tax system and this retards skill formation. Aside from the progressivity of the current tax system, tax rules

in the United States tend to promote human over physical capital formation (Quigley & Smolensky, 1990). There is some evidence that tax laws are more favourable towards investment by more skilled and wealthier workers, although there are elements in the tax code that favour low-skill workers as well. Tax rules also tend to encourage investments made on-the-job over investments in formal schooling, especially schooling that requires substantial out-of-pocket or tuition costs. While many of the effects of the current tax system on human capital investment may be unintended, those effects can be substantial and favour certain workers as well as certain types of investment over others.

In order to understand how taxes influence human capital investment, it is helpful to understand the costs and returns of such investment. The costs of investment are foregone earnings net of taxes plus any additional tuition or out-of-pocket expenses. Higher proportional taxes reduce the costs of spending an hour in school by the amount they reduce the return of working an hour in the market.

The simplest case to consider is a regime with flat (proportional) taxes where the only investment cost is foregone income. In this case, changes in the level of the flat wage tax will have no effect on human capital accumulation. Increases in the tax rate reduce the return by the same proportion as they reduce the cost, so there is no change in the incentive to invest. The ratio of marginal returns to marginal costs remains unaffected. Hence, proportional taxes on labour income have no effect on investment in human capital. On the other hand, if there are tuition expenses which are not tax deductible, a higher tax rate discourages investment, because it lowers the returns to investment more than the costs. In the case of a 10% increase in the tax rate, the return to investment falls by 10%, the cost of foregone income declines by 10%, but the tuition cost remains unchanged if tuition cannot be deducted, as it cannot be in the U.S. tax system. Thus, the return declines by more than the costs, so human capital investment is discouraged.

The intuition behind the neutrality of flat labour income taxes on human capital investment arises from the fact that the cost of time inputs to investment are foregone earnings, which are tax deductible. If tax rates are 10% and you earn \$10 less, you pay \$1 less in taxes—the net loss is only \$9. The costs of other inputs to on-the-job training can typically be expensed by the worker's employer and can be financed through lower wages, thereby making them tax deductible as well. The only major cost of human capital investment that is not tax deductible is college tuition. While this cost is substantial for some, a majority of youths do not attend college, and a majority of those who do attend community colleges or state colleges where tuition costs are modest. Because most of the costs of investment are financed through foregone earnings

and are tax deductible, changes in the rate of a flat tax on wages will have little effect on human capital accumulation. (Estimated inter-temporal labour supply elasticities are small and welfare effects from labour supply adjustment are negligible.)

In a modern society, where human capital is a larger component of wealth than is land, a proportional tax on human capital is like a non-distorting Henry George tax, as long as labour supply responses are negligible. Taxes on human capital should be increased while taxes on capital should be decreased in order to promote wage growth and efficiency.

However, the current U.S. tax system is not flat. The progressivity in the tax schedule discourages human capital investment. For some individuals, the gain in earnings resulting from human capital investment causes them to move up tax brackets. In this case, the returns from investment are taxed at a higher rate, but the cost is expensed at a lower rate. This discourages human capital accumulation. Consider a progressive tax system where the only cost of investment is foregone earnings. Suppose an individual's current marginal tax rate is 10%. If he chooses to invest, his increased earnings will cause him to switch to a marginal tax rate of 20%. In this case the returns are taxed at the 20% level, but the costs are deducted at the 10% level, and progressive taxes discourage human capital investment when compared to a flat tax regime.

Taxes on physical capital are another important component of the tax system that can affect human capital investment decisions. The level of human capital investment declines when the after-tax interest rate increases, because the discounted returns to investment are lower. Changing the tax on interest income can have a beneficial effect on both capital accumulation and on real wages.

Heckman, Lochner and Taber (1998*b*, 2000) and Heckman (2000), estimate that for the U.S. economy a revenue neutral move to a flat tax on consumption in the steady state raises the wages of both skilled and unskilled workers, raises aggregate output by 5% (and aggregate consumption by 3.7%), while raising the wages of college graduates and high school graduates equally (7%). Such a move would barely affect overall inequality while promoting greater levels of both human capital and physical capital. (See Table 15 taken from Heckman, Lochner and Taber (2000) which also presents evidence on the effect of switching to a flat income tax.) However, the real effect of these reforms is on physical capital, and its feedback effects on wages. The effects on human capital accumulation of these reforms are small. Tilting the bias in the tax system toward capital and away from human capital will improve the earnings of both capital and labour in the long run.

TABLE 15. *Closed economy effects of alternative tax proposals general equilibrium (steady state) and partial equilibrium effects[†] percentage difference from base state progressive case[‡]*

	<i>Flat Tax[§]</i>		<i>Flat Cons. Tax[§]</i>	
	<i>PE</i>	<i>GE</i>	<i>PE</i>	<i>GE</i>
After tax interest rate	0.00	1.96	17.65	3.31
Skill price college HC	0.00	-1.31	0.00	3.38
Skill price HS HC	0.00	-0.01	0.00	4.65
Stock of physical capital	-15.07	-0.79	86.50	19.55
Stock of college HC	22.41	2.82	-15.77	1.85
Stock of HS HC	-9.94	0.90	1.88	0.08
Stock of college HC per college graduate	3.04	2.55	-4.08	1.72
Stock of HS HC per HS graduate	1.84	1.07	-5.23	0.16
Aggregate output	-0.09	1.15	15.76	4.98
Aggregate consumption	-0.08	0.16	7.60	3.66
Mean wage college	3.39	2.60	0.12	6.96
Mean wage HS	2.44	2.44	0.25	6.82
Standard deviation log wage	4.09	1.56	-1.94	0.69
College/HS wage premium at 10 Years Exp [¶]	1.92	-0.45	3.10	0.18
Fraction attending college	18.79	0.26	-12.18	-1.92
Type 1: Fraction attending college	50.29	-1.25	-42.57	2.14
Type 2: Fraction attending college	28.50	-5.89	-15.60	-7.88
Type 3: Fraction attending college	14.13	-6.93	-5.20	-9.56
Type 4: Fraction attending college	15.27	6.13	-11.77	7.50
Type 1: College HC gain first 10 years	5.81	3.12	-7.53	1.51
Type 2: College HC gain first 10 years	5.33	2.86	-6.84	1.38
Type 3: College HC gain first 10 years	5.60	3.10	-6.70	1.61
Type 4: College HC gain first 10 years	6.85	4.17	-6.41	2.56
Type 1: HS HC gain first 10 years	3.42	1.06	-7.79	-0.34
Type 2: HS HC gain first 10 years	4.49	1.97	-7.60	0.46
Type 3: HS HC gain first 10 years	5.36	2.67	-7.62	1.06
Type 4: HS HC gain first 10 years	5.29	2.55	-7.95	0.92

Source: Heckman, Lochner and Taber (2000).

Notes: Types refer to ability classes with 1 being the highest ability quartile and 4 being the lowest.

[†]General equilibrium (GE) effects allow skill prices to change, while partial equilibrium (PE) effects hold prices constant.

[‡]In the progressive case they allow for a progressive tax on labour earnings, but assume a flat tax on capital at 15%.

[§]In the flat tax regime they hold the tax on capital fixed to the same level as the progressive tax, but the tax on labour income is flat as is calculated to balance the budget in the new GE steady state. This yields a tax rate on labour income of 7.7%. In the consumption regime, we tax only consumption at a 10.0% rate, again balancing the budget in steady states.

[¶]The college-high school wage premium measures the differences in log mean earnings between college graduates and high school graduates with 10 years of experience.

^{||}These rows present changes in the ratio of human capital at 10 years of experience vs. human capital upon entering the labour force.

Such tax reforms are usually either ignored or misrepresented in popular discussions. Politicians see such a move as favouring capital and, hence, rich people. They ignore the crucial point that higher levels of capital stocks raise the wages of all workers in a roughly uniform way.

I next consider which individuals are encouraged to invest by the current tax system and what types of investment they are encouraged to undertake. Various features of the current tax code are biased toward more skilled workers with higher earnings. For individuals who are employed, investment costs are typically financed through foregone earnings. To the extent that formal educational expenses are not paid for this way, they can be deducted from gross earnings provided that they are itemized and that itemizations from all sources exceed 2% of adjusted gross income. This feature of the tax code tends to favour high-skill individuals who are more likely to itemize expenses.

Since 1986, individuals have been unable to deduct interest paid on educational loans from their taxable income. The disincentive effects of this exclusion can be substantial. While individuals must pay taxes on interest from savings, they cannot deduct the interest they pay on educational loans. However, mortgage interest is still deductible. It is possible for families with home equity to take out mortgages to finance their children's education, and there is some evidence that post-1986 families have done so. Again, it is the more skilled and wealthy who are most likely to own homes, so they and their children are hurt less by a policy that only allows mortgage interest to be deducted.

The tax system favours public schooling investment at the primary and secondary level over private schooling and any type of post-secondary schooling. Any student can attend public elementary and high school for free and the costs of those public schools are financed primarily through local and state taxes, which are fully deductible. However, both private school and college tuition is not deductible, so the current tax system is biased against college education and private education. Moreover, the level of tuition tends to increase with college quality, so the current tax system discourages students from attending higher quality universities. Since private school tuition is not tax deductible, but local taxes are, communities have incentives to set up good public schools rather than send their children to private schools.

The current tax system favours human capital accumulation on the job vs. full-time schooling. Human capital investments can be separated into those undertaken while working (or paid for by the employer) and those taken elsewhere (and paid for by the individual). Current tax laws favour the former over the latter, encouraging individuals to seek training on the job. Virtually all investments made through an employer can be expensed and

financed through foregone wages. The employee does not need to itemize deductions to realize this tax benefit.

Educational assistance programmes exempt tuition paid for by employers from personal income tax, provided the schooling is job-related. Portable vocational or employer-based training can be sold to employees by firms and paid for by lower wages. The foregone earnings are essentially written-off on personal income taxes. Individuals seeking training are, therefore, encouraged to look to their employer rather than formal schools. In addition, training and schooling expenditures that are not job-related can be immediately written-off by firms up to \$5250 per year for each worker. However, tuition support is restricted to undergraduate level education (U.S. Congress Joint Committee on Taxation, 1992). Again, this shifts schooling and training to the workplace environment.

Relative to physical capital, some types of human capital investment are favoured by the tax system, while others are not. To the extent that many human capital investments are immediately tax-deductible while physical capital investments must be amortized, the current tax system encourages human over physical capital investment. In cases where schooling or training costs cannot be deducted—primarily tuition costs for formal schooling—investment in physical capital is favoured. While it is ambiguous as to which groups current tax provisions benefit most—the most or the least skilled—employer provided training is certainly favoured over training undertaken away from the workplace. This asymmetry of tax treatment is often justified by the argument that there is a much larger consumption value of academic education than job-specific training and that this consumption value should be taxed.

8. The conflict between economic efficiency and the work ethic

To the extent that there are strong complementarities between different types of skill investments, there is a conflict between policies that seek to alleviate poverty by investing in low-skill workers and policies that raise the wealth of society at large. Taking the available evidence at face value, the most economically-justified strategy for improving the incomes of the poor, especially adult low-ability low-skill persons, is to invest more in the highly skilled, tax them, and then redistribute the tax revenues to the poor.

However, many people view the work ethic as a basic value and would argue that cultivating a large class of transfer recipients would breed a culture of poverty and helplessness. If value is placed on work as an act of individual dignity, because of general benefits to families, and especially the early environments of young

children, and because of benefits to communities and society as a whole, then society may be prepared to subsidize inefficient jobs. Higher subsidies induce people to switch out of criminal activities. The problem with giving such subsidies to adults is that they may discourage skill formation among the young. To partially alleviate these adverse incentive effects, wage subsidies might be given on a cohort-specific basis. There is evidence that the problem of rising wage inequality is cohort specific. Older cohorts were not prepared for the new economy while younger cohorts adjust to the new realities they face as they enter the labour market (Heckman, Lochner & Taber, 1998*a*, 2000; Heckman, 2000).

However, job subsidies are not the same as investment subsidies. The evidence points strongly to the inefficiency of subsidizing the investment of low-skill, disadvantaged workers. Investment may have some additional non-pecuniary returns. In this case, a purely economic evaluation of investment policies may be inappropriate. If, however, economically inefficient investments are to be made, the cost of reducing the skill gap grows beyond the already large sums presented in Table 1.

9. Conclusion: A life cycle perspective

In evaluating a human capital investment strategy, it is crucial to consider the entire policy portfolio of interventions together—training programmes, school-based policies, school reform, and early interventions—rather than focusing on one type of policy in isolation from the others.

The best evidence suggests that learning begets learning. Early investments in learning are effective. Much of the recent emphasis on lower tuition costs for college students is misplaced when the value of early pre-school interventions is carefully examined. In the long run, significant improvements in the skill levels of American workers, especially workers not attending college, are unlikely without substantial improvements in the arrangements that foster early learning. We cannot afford to postpone investing in children until they become adults, nor can we wait until they reach school age—a time when it may be too late to intervene. Learning is a dynamic process and is most effective when it begins at a young age and continues through to adulthood. The role of the family is crucial to the formation of learning skills, and government interventions at an early age that mend the harm done by dysfunctional families have proven to be highly effective.

The returns to human capital investments are greatest for the young for two reasons: (1) younger persons have a longer horizon over which to recoup the fruits of their investments; and (2) skill begets skill. Skill remediation programmes for adults with severe educational disadvantages are much less efficient compared to

early intervention programmes. So are training programmes for more mature displaced workers. The available evidence clearly suggests that adults past a certain age and below a certain skill level obtain poor returns to skill investment. A reallocation of funds from investment in the old and unskilled to the young and more trainable, for whom a human capital strategy is more effective, is likely to produce more favourable outcomes in the long run. Figure A succinctly states the argument. At current levels of investment, marginal returns are highest for the young.

Current training policies need to be re-considered. Private training programmes have two advantages that public training programmes do not: they can train workers who are likely to benefit most, and they can tailor their training programmes to market needs. While public training programmes sometimes yield increases in participant earnings, those increases fall far short of those estimated for private training programmes. To the extent that this is true, incentives to promote private sector training should be expanded and ineffective public sector training programmes should be re-evaluated and eliminated. Firms are likely to choose younger and more able workers to train, rather than expending resources on older and more difficult to train workers who will gain little from additional investments.

For older unskilled workers whose skills have been made obsolete by newer modes of production, wage subsidies targeted toward older cohorts of workers caught up in the transition to a new economy offer a more efficient alternative for raising their incomes (see the discussion in Phelps, 1997.) By encouraging work rather than unemployment and crime, wage subsidies may also provide social benefits that extend beyond individual increases in earnings.

All levels of government subsidize higher education, and those subsidies benefit both unskilled and skilled workers. The argument for increasing the current high level of subsidies, however, is not well documented. The evidence that borrowing constraints are important deterrents to college attendance is very weak. Students from low-income families tend to have much lower college attendance rates for reasons other than their inability to meet tuition and living expenses. Lower family income levels are associated with less productive family and neighbourhood environments, as well as lower motivation and ability by prospective students. These factors are not so easily remedied by student loans or fellowships. The available evidence does not suggest that additional loans or subsidies are necessary to alleviate credit constraints. There is no evidence that suggests that massive externalities to education exist at current levels of subsidy that require an expansion of existing levels of subsidy to education (Heckman & Klenow, 1998).

Public primary and secondary schools are fully subsidized by taxes. The available evidence suggests that additional spending on public school quality would be inefficient. Instead, reforms in the administrative structure of education and infusion of incentives and competition are far more likely to be effective.

Given the weak life cycle labour supply responses reported in the literature (see Browning, Hansen & Heckman, 1999), a proportional tax on human capital is like a Henry George tax with no distorting effects on human capital accumulation. Reforms to eliminate progressivity in the tax system will have only small effects on human capital accumulation (Heckman, Lochner & Taber, 1998b, 2000). Far more important for wage growth and economic efficiency are reforms in the taxation of capital. Promoting capital formation raises the real wages of skilled and unskilled workers with only slight effects on inequality in earnings.

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