

Human Capital Revisited¹

1. Introduction

A Ryerson lecturer is supposed to tell the audience what he or she has been doing to earn a living from the University. Therefore it is an appropriate occasion for me to review what is known about human capital, especially the progress during the quarter-century since I published a book with that title. What has been called the human capital "revolution" began about three decades ago. Its pioneers include Ted Schultz, Jacob Mincer, Milton Friedman, Sherwin Rosen, and several others associated with the University of Chicago.

To most of you, capital means a bank account, one hundred shares of IBM, assembly lines, or steel plants in the Chicago area (especially during a Ryerson lecture). These are all forms of capital in the sense that they yield income and other useful outputs over long periods of time.

But I am going to talk about a different kind of capital. Schooling, a computer training course, expenditures on medical care, and lectures on the virtues of punctuality and honesty are capital too in the sense that they improve health, raise earnings, or add to a person's appreciation of

¹ I appreciate the helpful comments of Guity Nashat, Sherwin Rosen, and George Stigler and the assistance of David Meltzer.

literature over much of his or her lifetime. Consequently, it is fully in keeping with the capital concept as traditionally defined to say that expenditures on education, training, medical care, etc., are investments in capital. However, these produce human, not physical or financial, capital because you cannot separate a person from his or her knowledge, skills, health, or values the way it is possible to move financial and physical assets while the owner stays put. This embodiment of human capital in people is depressingly illustrated by the reactions of Hong Kong residents to the takeover of Hong Kong in 1997 by China. Many local people are busy protecting against China's policies by selling off some of their local financial and physical assets in order to invest in safer foreign securities and property. At the same time, however, computer experts, top management, and other skilled personnel are leaving Hong Kong in droves to seek citizenship elsewhere. They cannot reduce the risk to their human capital from China by investing only part of the human capital abroad; they must go where their capital goes.

It may seem odd now, but I hesitated a while before deciding to call my book *Human Capital*—and even hedged the risk by using a long subtitle. In the early days, many people were criticizing this term and the underlying analysis because they believed it treated people like slaves or machines. My, how the world has changed! The name and analysis are now readily accepted by most people not only in all the social sciences, but even in the media. I was surprised when a few months ago *Business Week* magazine had a cover story titled "Human Capital." And more amazing still, this has been their most popular cover story in several decades.

However, I should add that the concept of human capital remains suspect within academic circles that organize their thinking about social problems around a belief in the exploitation of labor by capital. It is easy to appreciate the problems created for this view by the human capital concept. For if capital exploits labor, does human capital exploit labor too—in other words, do some workers exploit other workers? And are skilled workers and unskilled workers pitted against each other in the alleged class conflict between labor and capital? If governments are to expropriate all capital to end such conflict, should they also expropriate human capital, so that governments would take over ownership of workers as well?

You can see why an idea developed to understand the economic and social world has been thrust into ideological discussions. Yet the concept of human capital has been popular in Communist countries. My book and those by Schultz and others on human capital are extensively used in the Soviet Union, Eastern Europe, and China. Even before the recent

reforms, economists and planners there had no trouble with the concept of investing capital in people.

I will try to avoid technical analysis and jargon, and concentrate on showing how the analysis of investments in human capital helps in understanding a large and varied class of behavior not only in the Western world, but also in developing countries and countries with very different cultures. My discussion follows modern economics and assumes that these investments usually are rational responses to a calculus of expected costs and benefits.

2. Education and Training

Education and training are the most important investments in human capital. My book showed, and so have many other studies since then, that high school and college education in the United States greatly raise a person's income, even after netting out direct and indirect costs of schooling, and after adjusting for the better family backgrounds and greater abilities of more educated people. Similar evidence is now available for many points in time from over one hundred countries with different cultures and economic systems. The earnings of more educated people are almost always well above average, although the gains are generally larger in less-developed countries. Consider the differences in average earnings between college and high school graduates in the United States during the past fifty years. After being reasonably stable at between 40 and 50 percent until the early 1960s, they rose during that decade and then fell rather sharply. This fall during the 1970s led some economists and the media to worry about "overeducated Americans" (see Freeman, 1976). The concept of human capital itself fell into some disrepute.

But as Kevin Murphy and Finis Welch document in a recent study (1989), the monetary gains from a college education rose sharply during the 1980s to the highest level during these fifty years. The earnings advantage of high school graduates over high school dropouts also increased. Talk about overeducated Americans has vanished, and it has been replaced by concern once more about whether the United States provides adequate quality and quantity of education and other training. These concerns are stimulated by tough economic competition from a renewed Europe, Japan, Korea, and other Asian countries, by sluggish rates of productivity advance in the United States during the past fifteen years, by a large drop in SAT scores, and by the dismal performance of American high school students on international tests in mathematics.

For those who prefer a monetary bottom line, trends in the earnings of young persons in the United States provide good reason for concern about the preparation they are receiving. The trend has been disastrous for the 15 percent of all students and much larger percentage of inner-city blacks who fail to complete high school. Their real wage rates have fallen by more than 30 percent since the early 1970s. Whether because of school problems, family instability, or other forces, young people without a college education are not being adequately prepared for work in modern economies.

A Labor Department commission on labor quality, of which I am a member, is considering what can be done to improve the quality of workers in the United States. The concerns that led to the creation of this commission have stimulated renewed academic interest in the analysis of human capital, which illustrates how research in social sciences responds, sometimes excessively, to public policy issues.

The fraction of high school graduates who entered college fell during the middle of the seventies when benefits from a college education dropped, and it rose again in the eighties when the benefits greatly increased. This caused an unexpected boom in college enrollments during the past few years, despite the relatively few people who are reaching college age. So, alas, the large rise in applications to our College in recent years is not due solely to more widespread appreciation of the superb education it provides. Many educators expected enrollments in the eighties to decline not only for demographic reasons, but also because college tuition was rising rapidly. They were wrong because they failed to appreciate that benefits from college rose even faster than costs, and that high school graduates respond to changes in both benefits and costs.

One might believe that enrollments in college would be easy to predict since the number of persons graduating from high school can be predicted quite closely. But demographic-based college enrollment forecasts have been wide of the mark during the past twenty years, as Steve Stigler and I, especially Steve, showed in a subcommittee report a few years ago to the Baker Commission. Such forecasts ignored the changing incentives to women, blacks, and older persons to enroll in college.

That human capital investments tend to respond rationally to benefits and costs is clearly indicated by changes in the education of women. Prior to the 1960s in the United States, women were more likely than men to graduate from high school but less likely to continue on to college. Women shunned math, sciences, economics, and law, and gravitated toward teaching, home economics, foreign languages, and literature. Since relatively few married women continued to work for pay, they

rationality chose an education that helped in household production and no doubt also in the marriage market. All this has changed radically. The enormous increase in the participation of married women is the most important labor force change during the past twenty-five years. Many women now take little time off from their jobs even to have children. As a result, the value to women of market skills has increased enormously, and they are shunning traditional "women's fields" to enter accounting, law, medicine, engineering, and other subjects that pay well. Indeed, women now comprise one-third or so of enrollments in law, business, and medical schools, and many home economics departments have either shut down or are emphasizing the "new home economics," which is a true branch of economics.

The same trends in women's education are found in Great Britain, France, Scandinavia, Taiwan, Japan, Mexico, and other countries with large increases in the labor force participation of women, even when attitudes toward women differ greatly from those now prevalent in Europe and the United States. Whenever the labor force participation of married women has increased sharply, changes in the gains from work for pay have had a more powerful effect on the behavior of women than have traditional ideas about the proper role of women.

Job opportunities for women at first improved slowly as they started to move up in business and the professions during the past several decades. But the trend accelerated sharply after the late 1970s. The ratio of the earnings of full-time working women and men has increased more rapidly since 1979 than during any previous period in our history, and women are becoming much more prominent in many highly skilled jobs. Improvements in the economic position of black women have been especially rapid, and they now earn just about as much as white women.

Although the civil rights movement clearly contributed to greater job opportunities for women and other minorities, it is far from the whole story. This can be seen from the fact that women progressed most rapidly under the Reagan administration, which was opposed to affirmative action and did not have an active Civil Rights Commission. In my judgment, women advanced primarily because of their greater attachment to the labor force. This in turn was stimulated by a large decline in fertility, a rapid increase in divorce, and the growing importance of the service sector. Human capital analysis assumes that schooling raises earnings and productivity mainly by providing knowledge, skills, and a way of analyzing problems. An alternative view, however, denies that schooling does much to improve productivity, and instead it stresses "credentialism"—that degrees and education convey information about the underlying abilities, persistence, and other valuable traits of people.

According to extreme versions of this line of analysis, earnings of, for example, college graduates exceed those of high school graduates not because college education raises productivity, but because more productive students go on to college.

Credentialism obviously exists. But many kinds of evidence suggest that credentialism does not explain most of the positive association between earnings and schooling.

The main problem with credentialism is that companies do not want information on success at schoolwork, but on abilities and performance in the context of working life: the discipline imposed by factories, the need to please customers and get along with fellow employees, and so forth. Success in the flexible, individualistic, and rather undisciplined university atmosphere in most countries and in high schools in the United States does not convey much relevant information. I tell my classes that eccentricities and nuts can last much longer as students than as workers, and they respond that the same is true of professors.

A cheaper and more efficient way to provide information to employers is for teenagers to enter directly into the labor force, as they did prior to the industrial revolution. Far more would be learned about their work-related abilities and other characteristics after six years of work experience than after six additional years of schooling. High school and college education has spread extensively in modern economies because the additional knowledge and information acquired in school is so important in technologically advanced economies. I should add that advocates of the credentialism approach have become rather silent in recent years with the growing concerns about schools and labor quality in the United States.

Of course, learning and training also occur outside of schools, especially on jobs. Even college graduates are not well prepared for the labor market when they leave school, and they are fitted into their jobs through formal and informal training programs. The amount of on-the-job training ranges from an hour or so at simple jobs like dishwashing to several years at complicated tasks like engineering in an auto plant. The limited information available indicates that on-the-job training is an important source of the very large increase in earnings as workers gain greater experience at work. And recent bold estimates by Jacob Mincer suggest that the total investment in on-the-job training may be almost as large as the investment in education.

After a few years of frequent job changes, most workers settle down and remain with the same company for a long time. Workers and their employers get bonded together in large part because of the on-the-job learning and training. Therefore, it is not surprising that job changes

are common among unskilled workers and uncommon among skilled workers. It also appears that job changes are much less frequent in Japan than in the United States mainly because on-the-job investments in workers are greater in Japan. My friends in the humanities like Dick Stern may complain that so far I have only mentioned "money," or they might say "mere money." Is there any place in human capital theory for education to appreciate literature, culture and the good life? Fortunately, nothing in the concept of human capital implies that monetary incentives need be more important than cultural and nonmonetary ones.

Obviously, it is much easier to quantify the monetary side, but, nevertheless, progress has been made on other aspects. Many studies show that education promotes health, reduces smoking, raises the propensity to vote, improves birth control knowledge, and stimulates the appreciation of classical music, literature, and even tennis. In an ingenious study that relies heavily on economic theory, Bob Michael (1972) quantifies some non-monetary benefits of education. His results and those of others indicate that such benefits of schooling are quite large, although for most people they are apparently smaller than monetary benefits.

3. Human Capital and the Family

No discussion of human capital can omit the influence of families on the knowledge, skills, values, and habits of their children. Parents who severely beat their children cause lasting damage, while at the other end of the spectrum, sympathetic and firm parents help motivate their children.

Large differences among young children grow over time with age and schooling because children learn more easily when they are better prepared. Therefore, even small differences among children in the preparation provided by their families are frequently multiplied over time into large differences when they are teenagers. This is why the labor market cannot do much for school dropouts who can hardly read and never developed good work habits, and why it is so difficult to devise policies to help these groups.

Parents have a large influence on the education, marital stability, and many other dimensions of their children's lives. The term "underclass" describes families in which low education, welfare dependence, early pregnancy, and marital instability pass from parents to children. In light of this, it is rather surprising that although earnings of parents and children are positively related, the relation is not strong. For example, if parents' earnings in the United States are 20 percent above the mean of

their generation, the children's earnings tend to be less than 6 percent above the mean of their own generation. Earnings of parents and children appear to be a little more strongly related when parents are poorer.

It is easy to see why children's and parents' earnings may be closer in poorer families. Richer families can pay for the training of their children, including the earnings foregone when children spend time in training rather than at work. Many poorer parents would be willing to lend their children money to help them obtain further training if the parents could expect to get paid back later when they are old. But children may not carry out their part of the bargain, especially in highly mobile societies where children often live far from their parents.

One solution is for governments to lend money to students when their parents are unable or unwilling to finance the training. The federal government has developed an extensive loan program to help students finance college education. Unfortunately the program has serious flaws, including low caps on the maximum amounts that can be borrowed, misplaced and excessive subsidies, and shockingly high default rates. In addition to explicit loans, some direct subsidies to schools may, in effect, also be "loans" to students which they repay later with taxes that help finance support for the elderly. By combining publicly subsidized schooling with a social security system, countries may have found a very crude and indirect, but perhaps reasonably effective, way to provide loans to children that get repaid when the parents are old and collect retirement benefits (see Becker and Murphy, 1988).

Families divide their total spending on children between number of children and the amount spent per child. The number of children and spending per child tend to be negatively related. The reason is simple. An increased number of children raises the effective cost of adding to the spending on each child, because an additional dollar or hour of time spent on each child then means a larger total addition to spending. Similarly, an increase in the dollars or time spent on each child raises the cost of having an additional child. Consequently, even a modest tax on births can have a large negative effect on the number of children and a large positive effect on the amount spent on each child.

China imposed heavy, not modest, taxes and other penalties on large families during the past decade, especially in urban areas. It is revealing about the cross-cultural relevance of this analysis that sharp declines in urban fertility have been accompanied by discussions in the Chinese press of the "emperor child." This refers to only children who receive lavish toys and presents from their parents, and are pushed toward outstanding educational achievement.

This negative relation at the family level between number of children

and spending per child implies a close and also usually negative relation at the aggregate level between population growth and investments in human capital. Differences among ethnic groups in the United States are fascinating. Groups with small families generally spend a lot on each child's education and training, while those with big families spend much less. The Japanese, Chinese, Jews, and Cubans have small families and the children become well educated, while Mexicans, Puerto Ricans, and blacks have big families and the education of children suffers. (I should add that the Mormons are an interesting exception, for they have both very large families and high levels of achievement). It should come as no surprise that children from the ethnic groups with small families and large investments in human capital typically rise faster and further in the United States' income-occupation hierarchy than do children from other groups.

Malthus' famous prediction that people marry earlier and birth rates rise when incomes increase was decisively contradicted by the industrial revolution, whose effects became evident only shortly after publication of the second edition of his book on population. This is a common paradox: a great book gets contradicted by events not long after publication. The contradiction to Malthus' theory is that fertility fell sharply, rather than rose, as per capita incomes grew in Great Britain, the United States, France, Germany, Sweden, and other Western countries. Rapid advances in education and other training accompanied the sharp declines in fertility. Parents did spend more on children when their incomes rose—as Malthus predicted—but they spent a lot more on each child and had fewer children, as human capital theory predicts.

Similar changes occur in other cultures when they experience rapid economic growth. Taiwan's birth rate was cut in half from 1960 to 1975, while the fraction of high school graduates doubled after Taiwan took off in the 1960s toward its remarkable economic growth. Mexico's birth rate did not fall much during its rapid economic growth in the 1950s and 1960s. But since 1975 birth rates have fallen by more than one-third, and school enrollments have expanded rapidly.

4. Human Capital and Economic Development

Economic analysis has no trouble explaining why, throughout history, few countries have experienced very long periods of persistent growth in income per person. For if per capita income growth is caused by the growth of land and physical capital per worker, diminishing returns from additional capital and land eventually eliminate further growth.

The puzzle, therefore, is not the lack of growth, but the fact that the United States, Japan, and many European countries have had continuing growth in per capita income during the past one hundred years and longer.

Presumably, the answer lies in the expansion of scientific and technical knowledge that raises the productivity of labor and other inputs in production. The systematic application of scientific knowledge to production of goods has greatly increased the value of education, technical schooling, and on-the-job training as the growth of knowledge has become embodied in people—in scientists, scholars, technicians, managers, and other contributors to output.

It is clear that all countries which have managed persistent growth in income have also had large increases in the education and training of their labor forces. First, elementary school education becomes universal, then high school education spreads rapidly, and finally children from middle income and poorer families begin going to college. A skeptic might respond that the expansion in education as countries get richer no more implies that education causes growth than does a larger number of dishwashers in richer countries imply that dishwashers are an engine of growth.

However, even economists know the difference between correlation and causation, and have developed rather straightforward methods for determining how much of income growth is caused by a growth in human capital. In an excellent study for the United States, Edward Denison (1985) finds that the increase in schooling of the average worker between 1929 and 1982 explains about one-fourth of the rise in per capita income during this period. He is unable to explain much of the remaining growth. I like to believe that this is mainly because he cannot measure the effects on earnings of improvements over time in health, on-the-job training, and other kinds of human capital.

The outstanding economic records of Japan, Taiwan, and other Asian economies in recent decades dramatically illustrate the importance of human capital to growth. Lacking natural resources—e.g., they import practically all their sources of energy—and facing discrimination from the West, these so-called Asian tigers grew rapidly by relying on a well-trained, educated, hard-working, and conscientious labor force. It surely is no accident, for example, that Japan's system of lifetime employment at large companies originated after World War II when they began to upgrade their technology rapidly partly by investing heavily in the training of employees. The lifetime system is not explained just by the traditional Japanese culture that emphasizes loyalty toward groups, for job changes in Japan were frequent during the first half of this century (see Hashimoto and Raisian, 1985).

Compelling evidence of the link between human capital and technology comes from agriculture. Education is of little use in traditional agriculture because farming methods and knowledge are then readily passed on from parents to children. Farmers in countries with traditional economies are among the least educated members of the labor force. By contrast, modern farmers must deal with hybrids, breeding methods, fertilizers, complicated equipment, and intricate futures markets for commodities. Education is of great value since it helps farmers adapt more quickly to new hybrids and other new technologies (see Welch, 1970). Therefore, it is no surprise that farmers are about as well educated as industrial workers in modern economies.

Education and training is also helpful in coping with changing technologies and advancing productivity in the manufacturing and service sectors. Recent studies show that more rapidly progressing industries do attract better-educated workers and provide greater training on the job (see Mincer and Higuchi, 1988; Gill, 1989).

5. Conclusions

We have reached the end of my visit. Perhaps I have succeeded in conveying the enormous energy devoted to the analysis of human capital during the past quarter-century and the impressive advances of analytical techniques and the accumulation of empirical regularities. Much is now known for many countries about the effects of education on earnings, occupation, employment, and unemployment of both men and women and various races and ethnic groups. Much too is known about the link between birth rates and investments in education and training, how families influence the human capital of their children, and the relation between investments in human capital and economic progress.

I indicated earlier that human capital analysis has been motivated partly by a desire to evaluate proposals to improve the quality of the work force through schooling, training, medical services, and child care. But its main purpose as far as I am concerned is to remove a little of the mystery from the economic and social world that we live in.

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