U.S. ECONOMIC GROWTH BASED ON EDUCATION

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By
Hector Cruz-Echevarria

Atlantic International University
Honolulu, Hawaii

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ABSTRACT

The objective of this research is to discover advanced studies related with the U.S. economic growth based on education and knowledge with the purpose to determine a correlation between education and economic growth. The author explains how the educational system of the United Sates has been for decades a reflex in the nation's economy, and how this effect contributes positively to the nation's economic growth and its influences on the evolution process. The research demonstrates that knowledge is the most important determinant in a society, and helps to prevent socio-economics problems, impacting direct and positively the economic growth. Consequently, an increase in the U.S. educational systems, means that this factor will generate more jobs and experienced professionals in the industry, changing from a traditional economy-based to an educational economy-based.

INTRODUCTION

This study investigates the U.S. economic growth using as a base the educational system in correlation. The author uses statistical data to determine the behavior of the US economic growth. The main objective of this investigation is examining the activities of registered investment companies to determine how these implications affect the U.S. economic growth. The author uses the knowledge capital as a base in the US economic growth. He uses statistical data to determine correlation with GDP growth. The research demonstrates that the US economy totally depends of the society educational level. His statistical data further indicates that when the economy grows, more people would pursue graduate level degrees, and more Master's and Ph.D.

ACKNOWLEDGMENTS

It has been a great pleasure working with the faculty, staff, and students at the Atlantic International University, during my tenure as a doctoral student. This work would never have been possible if it were not for the freedom I was given to pursue my own research interests. First, I would like to thank God, because he was the one who give me support and show to believe in myself to achieve this project. Thanks in large part to the kindness and considerable mentoring provided and supporting advisory by Maria Salaman Bayron, marketing professor at University of Phoenix.

I would especially like to thank my advisor, Dr. Franklin Valcin, for his generous time and commitment. Throughout my doctoral work he encouraged me to develop independent studying and research skills.

Finally, this dissertation is dedicated to my greatest blessing, my daughter Pamela, the most innocent and loving person I've ever known. She and my others sons, Hector Jr., Luismi, and Fernanda, they impart me the commitment I have with the society and with the business Industry. They served as an instrument to achieve my goals and show me to keep my eyes on the right direction, focus in my career and my beliefs.

METHODS

Subjects: To conduct the investigation the author used three academic libraries, three public libraries, three business magazines, and three peer review articles.

Materials: A total of 24 online articles were used to conduct the research process. The investigation is based on electronics articles such as: journals, peer review articles, business magazines, and academic libraries. The materials used in the investigation were texts books, magazines, electronics resources, and a notebook computer with a high-speed Internet connection.

Procedure*:* The research was conducted to determine how the educational system impacts the U.S. economic growth. The author uses as a references online publications, and academic libraries. .

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CHAPTER 1

EDUCATION ANALYSIS

U.S. Education Analysis

The 1990s brought rising tuition and fees but also expanded and restructured financial aid programs to help students pay for college. At the federal level, the 1992 Reauthorization of the Higher Education Act broadened eligibility for need-based aid, raised loan limits, and made unsubsidized loans available to students regardless of need. States and institutions increased their grant aid and put more emphasis on merit as a criterion for awards. As a result, the overall picture of what and how students pay for college has changed substantially since the early 1990s.

This special analysis uses data from the 1989–90 and 1999–2000 administrations of the National Postsecondary Student Aid Study to describe some of these changes. It focuses on students who were enrolled full time and were considered financially dependent on their parents for financial aid purposes. All dollar amounts were adjusted for inflation.

Between 1990 and 2000, the average price of attending college (tuition and fees plus an allowance for living expenses) increased at public 2-year institutions (from $7,300 to $8,500), at public 4-year institutions (from $10,000 to $12,400), and at private not-for-profit 4-year institutions (from $19,400 to $24,400) (figure 4.1).

These higher prices, combined with reduced expected family contributions for low- and middle-income students and their families resulting from restructuring of the aid programs, meant that the average student was eligible for more need-based financial aid in 2000 than in 1990.

Reflecting this greater need, more students received aid in 2000 than in 1990 (71% vs. 54%), and the average aided student received more aid ($8,700 vs. $6,200). Financial aid increased for all income groups and at all types of institutions.

Grant aid partly offset the price increases, with the percentage of students receiving grants rising from 45 to 57 percent and the average amount received by students with grants increasing from $4,200 to $5,400. However, the average net price after taking rants into account (i.e., price minus grants) increased at each type of institution. In other words, the growth in grant aid was not enough to offset the price increases.

The average net price after taking grants into account increased for all income groups, except those in the lowest income quarter attending public 2-year or private for-profit less-than-4-year institutions. Reflecting greater need and expanded eligibility for the Stafford loan program, the percentage of students who borrowed increased from 30 to 45 percent. In 2000, about half of low-income students and 35 percent of high-income students borrowed to help pay for their education. In 1990, about 46 percent of low-income students and 13 percent of high-income students borrowed. Among those who took out loans, the average amount borrowed increased from $3,900 to $6,100.

After taking into account both grants and loans, the average net price of attending increased for full-time dependent undergraduates at public 2-year institutions, remained stable for those at public 4-year institutions, and declined for those at private for-profit less-than-4-year institutions. The apparent decline at private not-for-profit 4-year institutions was not statistically significant.

The average net price after grants and loans declined for low-income students, except at public 2-year institutions, and increased for high-income students at public 2- and 4-year institutions.

Participation in Education

As the U.S. population increases, so does its enrollment at all levels of education. At the elementary and secondary levels, growth is due largely to the increase in the size of the school-age population. At the postsecondary level, both population growth and increasing enrollment rates help explain rising enrollments. Adult education is also increasing due to demographic shifts in the age of the U.S. population and increasing rates of enrollment, as influenced by changing employer requirements for skills. As enrollments have risen, the cohorts of learners—of all ages—have become more diverse than ever before.

As enrollment of school-age children is compulsory, growth in elementary and secondary schooling is primarily the result of the increasing size of the population. At the postsecondary level, both population growth and increasing enrollment rates help explain rising enrollments. Between 1970 and 2002, for

example, the enrollment rate of 20- and 21-year-olds increased from 32 to 48 percent.

Thirty-five percent of public elementary schools had pre-kindergarten programs in 2000–01, serving over 800,000 children. Schools in the Southeast were more likely to have pre-kindergarten programs and full-day programs than schools in other regions of the country. Public schools with large enrollments (700 or more students) and schools in central cities were more likely than other schools to offer pre-kindergarten classes.

Enrollment among 4- to 6-year-olds in kindergarten increased from 3.2 million in 1977 to 4 million in 1992 before decreasing to 3.7 million in 2001. During this period, the proportion of students enrolled in full-day programs increased, and by 1995, it was larger than the proportion enrolled in half-day programs.

Rising immigration and a 25 percent increase in the number of annual births that began in the 1970s and peaked in the mid-1970s have boosted school enrollment. Public elementary and secondary enrollment reached an estimated 48.0 million in 2003 and is projected to increase to an all-time high of 49.7 million in 2013. The West will experience the largest increase in enrollment of all regions in the country.

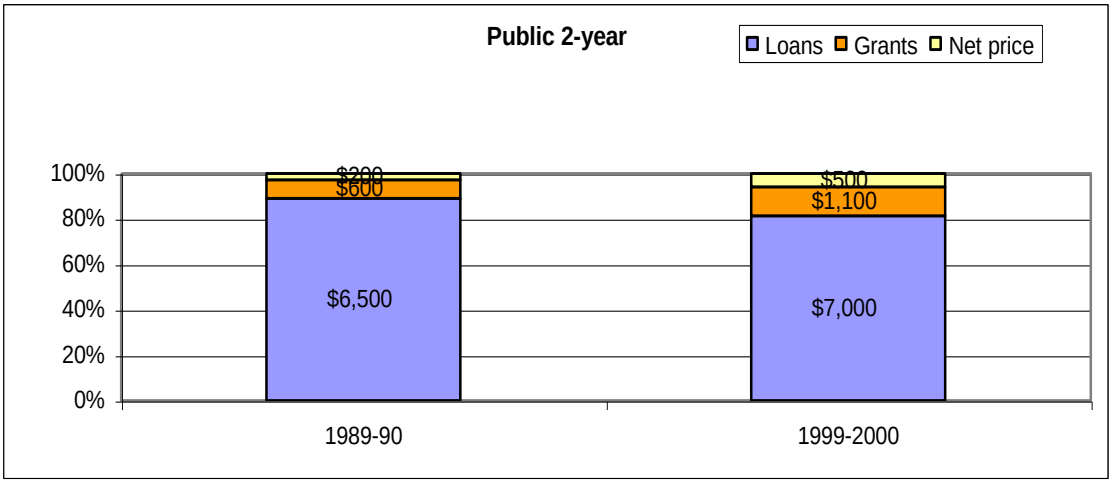
In 2003, Black and Hispanic 4th-graders were more likely than White 4th-graders to be in high-poverty schools (measured by the percentage of students eligible for a subsidized lunch) and less likely to be in low-poverty schools. The same is also true by school location: Black and Hispanic students were more

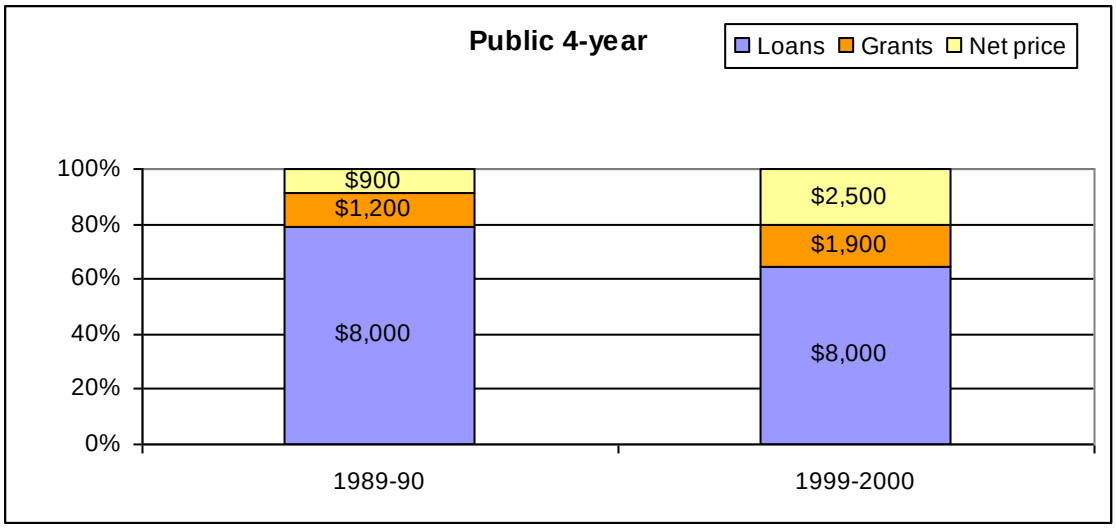
likely than White students to be concentrated in the highest poverty schools in central city, urban fringe, and rural areas in 2003.

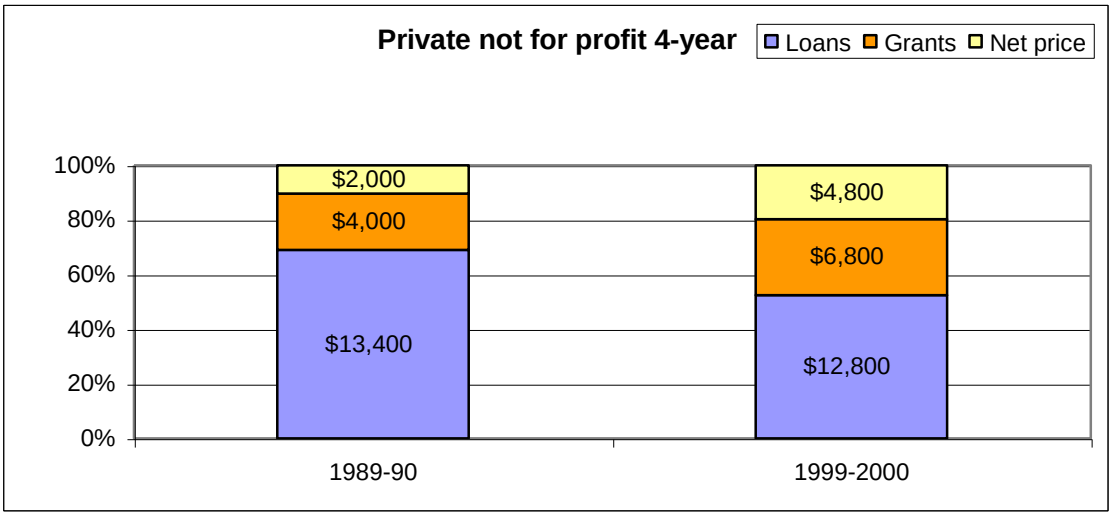
In the next 10 years, undergraduate enrollment is projected to increase. Enrollment in 4-year institutions is projected to increase at a faster rate than in 2-year institutions, and women's enrollment is expected to increase at a faster rate than men's. The number of part- and full-time students, those enrolled at 2- and 4-year institutions, and male and female undergraduates are projected to reach a new high each year from 2004 to 2013.

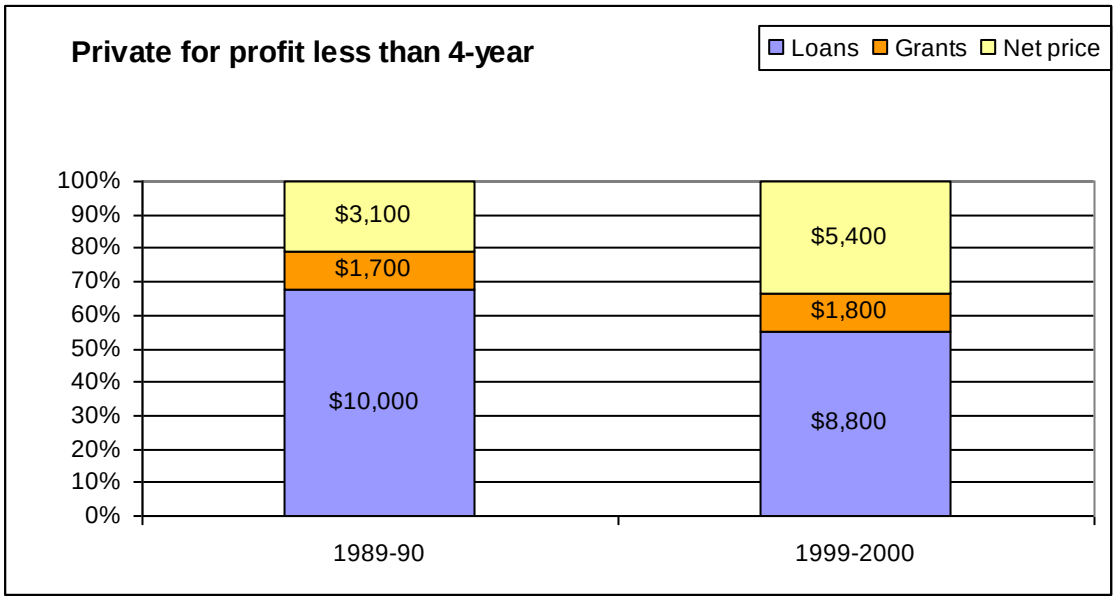
Forty percent of the population age 16 and above participated in some work-related adult education in 2002–03. The most common types of programs were formal work-related courses percent) and college or university degree programs for work-related reasons (9 percent). Educational attainment was positively associated with participating in adult education for work-related reasons.

Figure 4.1. Average net price, grants, loans, and total price (in 1999 constant dollars) for full-time, full-year dependent undergraduates, by type of institution: 1989–90 and 1999–2000




Public 4-year
Loans
Grants
Net price
100%
80%
60%
40%
20%
0%
$900
$1,200
$8,000
$2,500
$1,900
$8,000
1989-90
1999-2000


Private not for profit 4-year
Loans
Grants
Net price
100%
80%
60%
40%
20%
0%
$2,000
$4,000
$13,400
$4,800
$6,800
$12,800
1989-90
1999-2000



NOTE: Averages computed for all students, including those who did not receive financial aid. Detail may not sum to totals because of rounding.

SOURCE: Wei, C.C., Li, X., and Berkner, L. (2004). A Decade of Undergraduate Student Aid: 1989–90 to 1999–2000 (**NCES 2004–158**), tables A-1.2, A-2.2, A-3.2, A-4.2, A-1.6, A-2.6, A-3.6, A-4.6, A-1.10, A-2.10, A-3.10, A-4.10. Data from U.S. Department of Education, National Center for Education Statistics, 1989–90 and 1999–2000 National Postsecondary Student Aid Study (NPSAS:90 and NPSAS:2000). (Originally published as figure 10 on p. 24 of the complete report from which this article is excerpted.)

Learner Outcomes

How well does the American educational system—and its students—perform? Data from national and international assessments can help answer this question, as can data on adults' educational and work experiences, health, and earnings later in life. In some areas, such as reading, mathematics, and writing, the performance of elementary and secondary students has improved over the past decade, but not in all grades assessed and not equally for all students. Long-term effects of education, such as on the health and earnings of adults, help underscore the importance of education and the outcomes of different levels of educational attainment.

According to data from the Early Childhood Longitudinal Study, children without family risk factors, such as poverty, start kindergarten with higher performance and experience a larger gain in reading and mathematics scale scores through 3rd grade than students with 1 or more family risk factors. From the beginning of kindergarten in fall 1998 through the end of 3rd grade in spring 2002, children with no family risk factors had an average gain of 84 points in reading, compared with a 73-point gain among children with 2 or more family risk factors; the respective gains in mathematics were 65 and 57 points figure 4.5.

The average reading scale scores of 8th-graders assessed by the National Assessment of Educational Progress (NAEP) increased between 1992 and 2003, while no difference was detected for 4th-graders. The percentages of 4th- and 8th-graders performing at or above the *Proficient* level, defined as "solid academic performance for each grade assessed," were higher in 2003 than in 1992. Among 12th-graders, average scores were lower in 2002 than in 1992 and 1998. The average writing scale scores of 4th and 8th graders assessed by NAEP improved between 1998 and 2002 was increased. Twenty-eight percent of 4th-graders, 31 percent of 8th-graders, and 24 percent of 12th-graders performed at or above the *Proficient* level in 2002.

The average mathematics scale scores of 4th- and 8th-graders assessed by NAEP increased steadily from 1990 to 2003. For both grades, the average scale scores in 2003 were higher than in all previous assessments, and the percentages of students performing at or above the *Proficient* level and at the

Advanced level, defined as "superior performance," were higher in 2003 than in 1990. Thirty-two percent of 4th-graders and 29 percent of 8th-graders were at or above the *Proficient* level. In addition to indicators on students' academic achievement, there are also some indicators on the long-term outcomes of education.

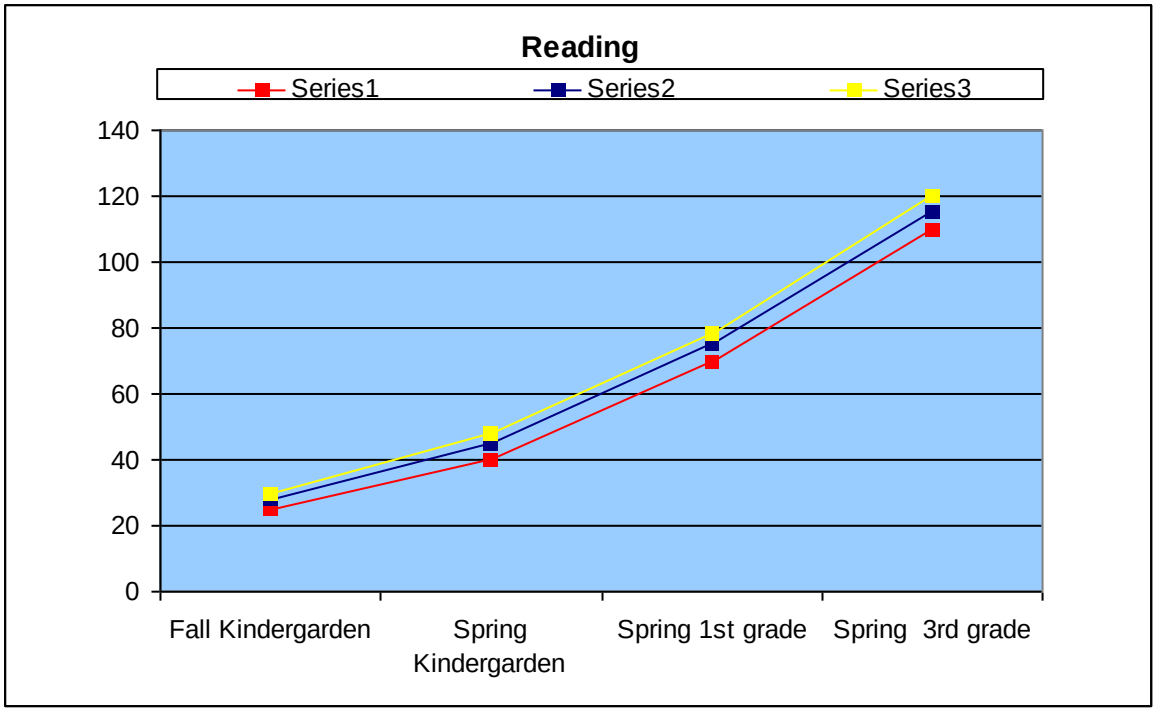
The better educated a person is, the more likely that person is to report being in "excellent" or "very good" health, regardless of income. Among adults age 25 and above, 78 percent of those with a bachelor's degree or higher reported being in excellent or very good health in 2001, compared with 66 percent of those with some education beyond high school, 56 percent of high school completers, and 39 percent of those with less than a high school education.

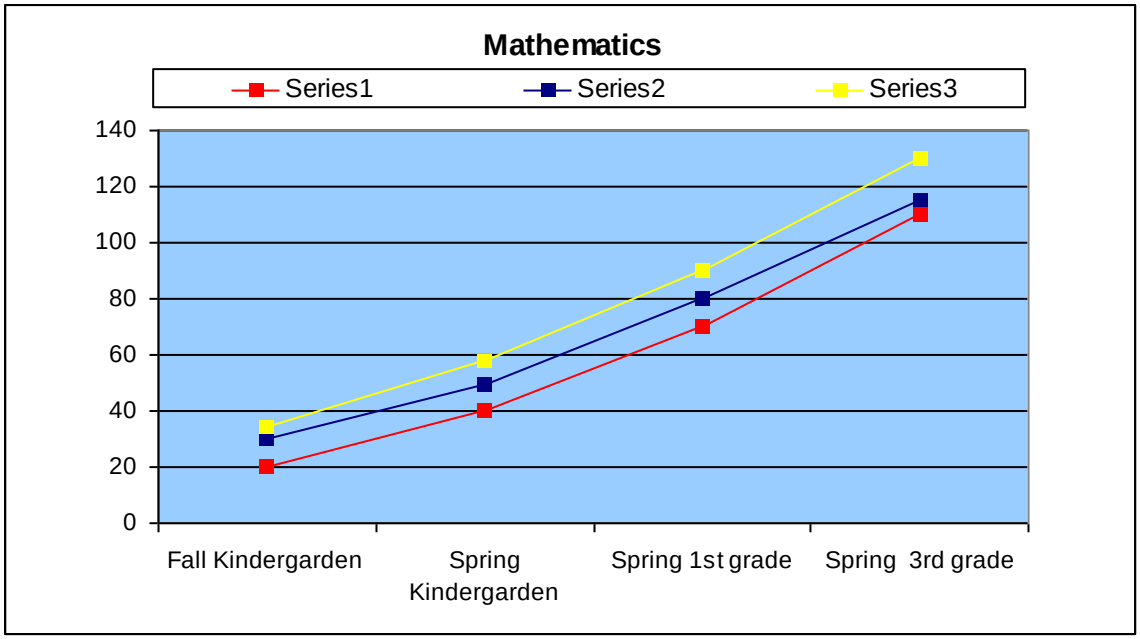
In 2003, 13 percent of all persons ages 16–24 were neither enrolled in school nor working, a decrease from 16 percent in 1986. The gap between the percentage of poor youth and others neither enrolled nor working decreased over the period. The percentages of White and Asian/Pacific Islander youth neither enrolled nor working in 2003 were lower than the percentages of Hispanic, Black, and American Indian youth. In addition, the percentage of Hispanic youth neither enrolled nor working was lower than the percentages of Black and American Indian youth.

The earnings of young adults with at least a bachelor's degree increased over the past 20 years relative to their counterparts with a high school diploma or General Educational Development (GED) certificate. Among men, the difference

in median earnings rose from 19 percent in 1980 to 65 percent in 2002, while among women, the difference increased from 34 percent to 71 percent.

Figure 4.5. Children's reading and mathematics scale scores for fall 1998 first-time kindergartners from kindergarten through 3rd grade, by family risk factors: Fall 1998, spring 1999, spring 2000, and spring 2002[1]





[1]Family risk factors include living below the poverty level, primary home language was non-English, mother's highest education was less than a high school diploma/GED, and living in a single-parent household, as measured in kindergarten.

NOTE: The findings are based on children who entered kindergarten for the first time in fall 1998 and were assessed in fall

1998, spring 1999, spring 2000, and spring 2002. Estimates reflect the sample of children assessed in English in all assessment years (approximately 19 percent of Asian children and approximately 30 percent of Hispanic children were not assessed). The Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K) was not administered in spring 2001, when most of the children were in 2nd grade. Although most of the sample was in 3rd grade in spring 2002, 10 percent were in 2nd grade and about 1 percent were enrolled in other grades.
SOURCE: Rathbun, A, and West, J. (2004). From Kindergarten Through Third Grade: Children's Beginning School Experiences (NCES 2004–007), tables A-4 and A-5. Data from U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Longitudinal Kindergarten–First Grade Public-Use data file and Third Grade Restricted-Use data file, fall 1998, spring 1999, spring 2000, and spring 2002. (Originally published as the Early Reading and Mathematics Performance figure on p. 48 of the complete report from which this article is excerpted.)

Student Effort and Educational Progress

Many factors are associated with school success, persistence, and progress toward high school graduation or a college degree. These include student motivation and effort, the expectations of students, encouragement from others, and learning opportunities, as well as various student characteristics, such as sex and family income. Monitoring these factors in relation to the progress of different groups of students through the educational system and tracking students' attainment are important for knowing how well we are doing as a nation in education. The proportion of 10th-graders who expected to complete a bachelor's as their highest degree nearly doubled between 1980 and 2002, and the proportion who intended to earn a graduate degree more than doubled. Rising aspirations were also notable among students from families with low socioeconomic status: about 13 percent of such students intended to earn a bachelor's degree in 1980, but this figure had tripled by 2002.

During the 1970s and 1980s, "event dropout rates," which measure the proportion of students who drop out of high school each year, declined. However, event dropout rates remained unchanged during the 1990s on average and for students from low-, middle-, and high-income families.

First-time entry rates into programs that lead to a bachelor's or higher degree increased from 1998 to 2001 in many countries that were members of the Organization for Economic Cooperation and Development (OECD). In 2001, the U.S. rate was lower than the OECD country average. Despite assistance offered through remediation, students enrolled in remediation are less likely to earn a postsecondary degree or certificate. The need for remedial reading appears to be the most serious barrier to degree completion: 12th-graders in 1992 who took remedial reading at the postsecondary level were about half as likely as those who took no remedial courses to have earned a degree or certificate by 2000.

While bachelor's degree completion rates have been steady over time, the likelihood of still being enrolled with no degree at the end of 5 years has increased. When comparing students who enrolled in a 4-year college or university for the first time in 1989–90 with those who began in 1995–96, 53 percent of both cohorts had completed a bachelor's degree within 5 years; however, the later cohort was more likely to have no degree but still be enrolled and also less likely to have left college without a degree.

Women have earned more than half of all bachelor's degrees every year since 1981–82. They still trail men in certain fields but have made substantial gains since 1970–71 at both the undergraduate (table 2.0) and graduate levels.

Table 2.0 Percentage of bachelor's degrees earned by women and change in the percentage earned by women from 1970–71 to 2001–02, by field of study: 1970–71, 1984–85, and 2001–02

Field of study	1970-71	1984-85	2001-02	Change in percentage points

				1970-71 1984-85	1984-85 2001-02	1970-71 2001-02
Total1	43.4	50.7	57.4	7.4	6.7	14.1
Health professions related sciences	77.1	84.9	85.5	7.8	0.6	8.4
Education	74.5	75.9	77.4	1.3	1.5	2.9
English language & literature/letters	65.6	65.9	68.6	0.3	2.7	3
Visual & performing arts	59.7	62.1	59.4	2.4	-2.7	-0.3
Psychology	44.4	68.2	77.5	23.7	9.3	33.1
Social sciences & history	36.8	44.1	51.7	7.3	7.6	14.9
Communications	35.3	59.1	63.5	23.8	4.4	28.2
Biological sciences/life sciences	29.1	47.8	60.8	18.7	13	31.7
Business	9.1	45.1	50	36	4.9	40.9
Mathematics	37.9	46.2	46.7	8.3	0.5	8.8
Physical sciences	13.8	28	42.2	14.2	14.2	28.4
Computer & information sciences	13.6	36.8	27.6	23.2	-9.2	14
Agriculture & natural resources	4.2	31.1	45.9	26.9	14.8	41.6
Engineering	0.8	13.1	20.7	12.3	7.6	19.9

[1]Includes others fields not shown separately

Contexts of Elementary and Secondary Education

The school environment is shaped by many factors, including the courses offered in the school and taken by students, the instructional methods used by teachers, students' opportunities to attend a "chosen" public school, the role of school staff in providing various support services to students, the extent to which teachers are teaching in their field, and the characteristics of school principals and their influence over school governance. Monitoring these and

[1] NOTE: Based on data from all degree-granting institutions.

SOURCE: U.S. Department of Education, National Center for Education Statistics. (2003). Digest of Education statistics 2002 (NCES 2003–060), tables 246, 276–297, and (forthcoming) Digest of Education Statistics 2003 (NCES 2004–024), tables 265, 268, and 271. Data from U.S. Department of Education, National Center for Education Statistics, 1969–86 Higher Education General Information Survey (HEGIS), "Degrees and Other Formal Awards Conferred" and 1987–2002 Integrated Postsecondary Education Data System, "Completions Survey" (IPEDS-C:87–02), fall 2002. (Originally published as the Bachelor's Degrees table on p. 65 of the complete report from which this article is excerpted.)

other factors provides a better understanding of the conditions in schools that influence education.

Since the early 1980s, the percentage of high school graduates completing advanced coursework in science and mathematics has increased. Between 1982 and 2000, the percentage that had completed advanced courses in science increased from 35 to 63 percent, and the percentage that had completed advanced courses in mathematics increased from 26 to 45 percent.

Among high school graduates in 2000, Asian/Pacific Islander and private school graduates completed advanced levels of science and mathematics coursework at higher rates than their peers. Females were more likely than males to have completed some advanced science coursework and to have completed level II advanced academic mathematics courses (i.e., pre-calculus or an introduction to analysis).

According to findings from the 1999 Third International Mathematics and Science Study (TIMSS) Video Study—which examined 8th-grade science lessons in Australia, the Czech Republic, Japan, the Netherlands, and the United States—46 percent of U.S. 8th-grade science lessons had students conduct experiments or other practical activities, while 31 percent had students collect and report data from those activities.

In 1999–2000, high school students in high-minority schools and high-poverty schools (measured by the percentage of students eligible for a subsidized lunch) were more often taught English, science, and mathematics by "out-of-field" teachers (i.e., teachers who have neither a major nor certification in the

subject they teach) than their peers in low-minority and low-poverty schools (figure 5.0).

The percentage of students in grades 1–12 whose parents enrolled them in a "chosen" public school (i.e., a public school other than their assigned public school) increased from 11 to 15 percent between 1993 and 2003. In the same period, the percentage of children attending private schools also increased (.9 percentage points for private, church-related schools and .8 percentage points for private, non-church-related schools). In addition, in 2003, parents of 24 percent of students reported that they moved to a neighborhood so that their children could attend a particular school.

Principals' perceptions of their own influence over a number of school governance functions vary by the control of the school. In 1999–2000, private elementary and secondary school principals were more likely than their public school counterparts to report a high degree of influence over establishing curriculum, setting disciplinary policies, and setting performance standards for students.

The goals that guidance programs in public high schools emphasize vary according to the size and location of the school. For example, in 2002, the smallest schools were more likely than larger schools to report that their primary emphasis was on helping students prepare for postsecondary schooling, while the largest schools were more likely to emphasize helping students with their high school academic achievement. Schools located in a

central city or an urban fringe area were more likely than rural schools to make helping students with their academic achievement the primary emphasis.

At the elementary and secondary school levels, most schools have staff that provides various support services directly to students (e.g., counselors, social workers, speech therapists, and instructional and non instructional aides). In 1999–2000, the most common student support staff in public elementary and secondary schools were school counselors, speech therapists, school nurses, and special education aides, each of which were found in 79 percent or more of schools.

Contexts of Postsecondary Education

The postsecondary education system encompasses various types of institutions, both public and private. Although issues of student access, persistence, and attainment have been predominant concerns in postsecondary education, the contexts in which postsecondary education takes place matter as well. The diversity of the undergraduate and graduate populations, the various educational missions and learning environments of colleges and universities, the courses that students take, the modes of learning that are employed, and the ways in which colleges and universities attract and use faculty and other resources all are important aspects of the contexts of postsecondary education.

Students age 24 and above represented 43 percent of all undergraduates in 1999–2000, and 82 percent of these students worked while enrolled. Many

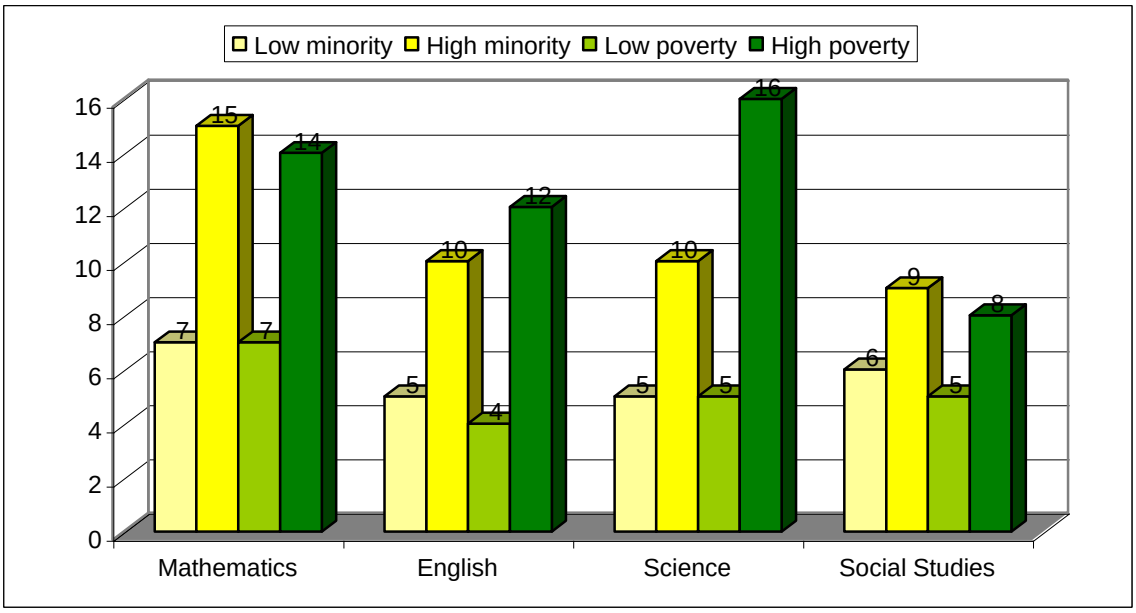
older undergraduates were employees first, focusing primarily on their jobs, and students second. Those whose primary focus was on their employment were less likely to complete their postsecondary programs than were older students who worked primarily to meet their educational expenses.

The list of the top 30 postsecondary courses, which reports the subjects that students study the most in college (and which is referred to as the "empirical core curriculum"), has remained relatively stable over the past three decades. Among bachelor's degree recipients who graduated from high school in 1972, 1982, and 1992, each cohort earned about one-third of its credits from the top 30 postsecondary courses for the cohort. For the 1992 cohort, the top 30 list for students attending highly selective institutions included a concentration of engineering and humanities courses and courses with an international theme, a pattern not present for students in selective and non-selective institutions.

Postsecondary institutions provided remedial coursework for 28 percent of entering freshmen in fall 2000 (22 percent undertook remediation in mathematics, 14 percent in writing, and 11 percent in reading). Public 2-year colleges provided such coursework for 42 percent of their entering students.

In 2000–01, 56 percent of all postsecondary institutions offered distance education courses, up from 34 percent 3 years earlier. The number of course enrollments in distance education also increased, nearly doubling between 1997–98 and 2000–01; by 2000–01, about half of these enrollments were at public 2-year institutions.

Figure 5.0 Percentage of public high school students taught selected subjects by teachers without certification or a major in the field they teach, by minority concentration and school poverty: 1999–2000



NOTE: "Major" refers to a teacher's primary fields of study for a bachelor's, master's, doctorate, first-professional, or education specialist degree. "Major field" can be an academic or education major. "High minority" refers to schools in which 75 percent or more of their enrollments are minority students; "low minority" refers to schools with a minority enrollment of less than 10 percent. "High poverty" refers to a school in which 75 percent or more of students are eligible to participate in the federal free or reduced-price lunch program, a common proxy measure of poverty; "low poverty" refers to schools in which less than 10 percent of students are eligible to participate in this program.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), 1999–2000, "Public School Survey" and "Public Charter School Survey." (Originally published as the Out-of-Field Teachers figure on p. 73 of the complete report from which this article is excerpted.)

Societal Support for Learning

Society and its members—families, individuals, employers, and governmental and private organizations—provide support for education in various ways. This support includes learning activities that take place outside schools and colleges as well as the financial support for learning inside schools and colleges. Parents contribute to the education of their children in the home through reading with young children, setting aside a time and place for schoolwork, and

seeing that assignments are completed. Communities impart learning and values through various modes, both formal and informal. Financial investments in education are made both by individuals in the form of income spent on their own education (or the education of their children) and by the public in the form of public appropriations for education. These investments in education are made at all levels of the education system. Other collective entities, such as employers and other kinds of organizations, also invest in various forms of education for their members.

- In 2001, 50 percent of children in kindergarten through 8th grade were enrolled in a variety of non-parental care arrangements after school, most commonly center- or school-based programs, relative care, and self-care. Black children were more likely than White and Hispanic children to participate in non-parental care.
- Thirty-eight percent of children in kindergarten through 8th grade participated in one or more organized activities after school in 2001. Children in 3rd through 5th grade and 6th through 8th grade were more likely to participate than children in kindergarten through 2nd grade. Parents of 19 percent of these children reported using activities to cover hours when adult supervision was needed for their children.
- Total expenditures per public elementary and secondary school student, adjusted for inflation, increased by 25 percent between 1991–92 and 2000–01. The largest increases occurred in midsize cities and rural areas.
- In 2000, expenditures per student for the OECD member countries averaged $5,162 at the combined elementary/secondary level and $9,509 at the post-secondary level. The United States and Switzerland, two of the world's wealthiest nations, ranked highest in expenditures per student at the elementary/secondary and postsecondary levels. Wealthy

countries such as the United States spent more on education, and a larger share of their gross domestic product (GDP) per capita on education, than less wealthy nations.

- The percentage of full-time undergraduates receiving institutional aid and the average amount awarded increased at 4-year institutions during the 1990s. In 1992–93, some 17 percent of full-time undergraduates at public institutions and 47 percent at private not-for-profit institutions received institutional aid; by 1999–2000, the respective proportions had increased to 23 and 58 percent. During this period, the average award increased from $2,200 to $2,700 at public institutions and from $5,900 to $7,000 at private not-for-profit institutions.
- Those who had received bachelor's degrees in 1999–2000 were more likely than their 1992–93 counterparts to have borrowed to pay for their undergraduate education (65 vs. 49 percent), and if they had done so, to have borrowed larger amounts, on average ($19,300 vs. $12,100 in constant 1999 dollars). However, the median "debt burden" (monthly payment as a percentage of monthly salary) a year later did not change.

Worker productivity is affected by many factors, including the education and skill level of the work force. Education and skills are important because they expand a worker's capacity to perform a task or to use productive technologies. More educated workers are also usually better able to adapt to new tasks or to changes in their old tasks. Furthermore, because education enhances workers' ability to communicate with and understand their co-workers, it may prepare people to work in teams more effectively.

Some observers fear that the American educational system has deteriorated in comparison with the educational systems in other countries, and that this

deterioration may soon cause the productivity of U.S. workers to lag behind that of workers in other countries. These observers have agreed that lagging productivity jeopardizes the nation's competitiveness in international markets and would eventually translate into a lower standard of living relative to other countries. But others argue that the relative economic performance and standards of living should not be the sole focus of studies of economic well being in the United States. Although economic trends outside the United States can be used as a benchmark for gauging U.S. progress, continued and substantial improvements in U.S. productivity and standard of living can be maintained regardless of our position compared with other countries. This point does not, however, discount the importance of education. If educational deterioration causes productivity to slow or even to decline, it would have a negative impact on our standard of living.

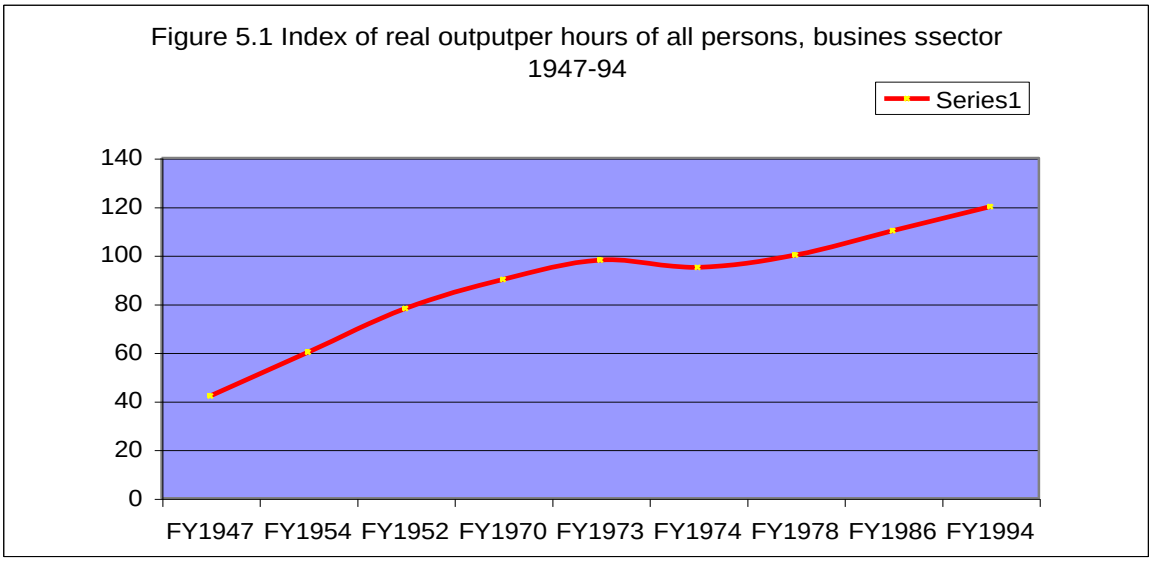
This chapter begins our investigation of education and worker productivity by examining recent trends in U.S. worker productivity. We extend this analysis of productivity by comparing it with the productivity in other industrialized countries and examining the extent to which American economic leadership is threatened by these other countries.

CHAPTER 2

WORKER PRODUCTIVITY AND EDUCATION

Trends in U.S. Worker Productivity

Research on the productivity of U.S. workers has focused on trends in the growth of productivity in the post-World War II period. Worker productivity is typically measured by dividing output by the number of workers or the number of hours worked. Figure 5.1 shows the postwar trend in worker productivity as measured by business sector output per hour worked. Output per hour has increased nearly continuously over the postwar period. Decreases were generally confined to single-year fluctuations. Output per hour in 1994 was about three times the output per hour in 1947. The average annual rate of productivity growth from 1947 through 1994 was 2.1 percent.



NOTE: Figures for years after 1988 were originally based on 1982=100. They were multiplied by a factor of 1.013 for use in the 1977=100 index. Hours of all persons include hours of employees, priorietors, and unpaid family workers. Output is the constant-dollar market value of final goods and services produced. For the business sector, the index relates to gross

domestic produce (GDP) less general government, output of nonprofit institutions, output of paid employees of private households, andrental value of owner-occupied dwellings. Business output was about 78 percent of GDP in 1992.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Handbook of Labor Statistics, Washington, DC: U.S. Government Printing Office, 1989; Monthly Labor Review 18 (8) (August 1995): 175.

Concern about the trend in U.S. productivity is based primarily on the lower rate of productivity growth since 1973 as compared with the period from 1947 through 1973. It is clear that the growth in output per hour worked since 1973 has lagged behind the 1947–73 trend, as shown in figure 5.1. From 1947 through 1973, output per hour worked increased by an average of nearly 3 percent per year, compared with slightly more than 1 percent per year from 1973 through 1994. In recent years, slow productivity growth has especially been a problem in non-manufacturing sector of the economy, which represents an increasing share of total U.S. employment.[1] Because of the slowdown in labor productivity, growth in worker compensation (earnings plus benefits) has slowed by a similar magnitude (Bosworth and Perry 1994). Given the strong connection between productivity and compensation, the productivity slow down has been described by Baily and Gordon (1988) as "America's greatest economic problem." Despite a vast amount of research on trends in productivity, economists remain perplexed about the nature of the post-1973 productivity slowdown. Various researchers attribute the slowdown to sectoral shifts in the labor force, inadequate accumulation of physical capital, inadequate work force training, or overemphasis on short-term goals in

[1] Baily and Gordon (1988) show that output per hour of work increased by 2.52 percent per year in anufacturing from 1973 through 1987, compared with an increase of only 0.25 percent per year in nonmanufacturing. However, measuring productivity in nonmanufacturing can be difficult because changes in the quality of goods and services can be difficult to track in this sector. Problems in measuring productivity are discussed in detail later in this chapter.

business management.[2] However, none of the studies has isolated the specific determinants of the post-1973 productivity slowdown. Bishop (1989) argues that declines in education achievement, as measured by test scores, play an important role in the slowdown of productivity growth since 1973. On the basis of estimated returns to test scores and the historical trends in test scores and economic productivity, Bishop claims that declines in test scores since 1967 reduced the contribution of education to productivity by 0.05 to 0.12 percentage points per year from 1973 through 1987.[3] Although this estimated impact appears to be small, Bishop argues that it translates into substantial social costs. He sets the social cost in terms of foregone national product at $86 billion in 1987, and he projects that it will double from 1987 through 2004. Although low academic achievement may inhibit the growth in productivity, it cannot account for the majority of the slowdown in U.S. productivity since 1973. First, the decline in productivity growth occurred all at once—too quickly to be attributed to slow-moving changes in work force quality. Second, the magnitude of the slowdown is much larger than the impact of dropping test scores cited by Bishop. Bishop's estimate would explain less than 10 percent of the overall productivity slowdown. Third, as is shown later in this chapter, productivity grew more slowly after 1973 in all industrialized

[2] Baily, Burtless, and Litan (1993) discuss each of these possibilities.

[3] Bishop (1989) estimates the impact of academic achievement on individual productivity by estimating the relationship between earnings as a proxy for productivity and test scores as a proxy for achievement. The achievement proxy is constructed based on the responses to the 13 questions from the Lorge-Thorndike intelligence test, part of the Panel Study of Income Dynamics survey. Bishop then measures trends in academic achievement over time on the basis of scores on the Iowa Test of Educational Development. These trends are translated into changes in labor quality and linked to productivity in a growth-accounting framework.

countries, not just in the United States. It would be difficult to believe that the quality of education declined simultaneously in all industrialized countries beginning in 1973. Finally, Bishop's argument applies exclusively to the cohort of students educated in the late 1960s and 1970s. As is shown in chapter 4, the levels of achievement of U.S. students in the late 1980s were restored to the levels of the early 1970s.

Another possible explanation for the productivity slowdown is that measurement errors have caused observers to overestimate the magnitude of the slowdown. Researchers have paid particular attention to the accuracy of the price indices that are used in the calculation of real output. In the U.S. economy, there is a general trend that shifts away from standardized commodities with easily definable characteristics that change little over time toward goods and services for which issues of quality are of primary importance. Some argue that the complexity in defining quality as it pertains to modern goods and services makes it extremely difficult to disentangle pure increases in the price paid for the same quality goods from price increases that reflect changes in quality. If the trend in prices is mis-measured, trends in output and productivity will also be mis-measured. While this argument is appealing, a detailed study (Baily and Gordon 1988) of the empirical evidence suggests that errors in measuring output fail to explain the majority of the observed post-1973 productivity slowdown.[4] A final possible explanation for the

[4] Baily and Gordon (1988) estimate that errors in measurement explain, at most, 0.5 percentage points of the 1.5 point slowdown in productivity growth between 1948 and 1973 and 1973 and 1987. The majority, 0.3 percentage points, of this errors-in-measurement estimate is attributed to declines in the quality of labor, such as the decline in test scores documented by Bishop (1989), rather than to previously overlooked or mismeasured increases in the quality of goods and

slowdown is that the lower rate of growth in productivity after 1973 may simply represent a return to the long-run trend in productivity, and that the high growth rate from 1947 through 1973 was a historical aberration (Baumol, Blackman, and Wolff 1989). The annual growth rate in output per hour for the entire period shown in figure 5.1, 1947–94, is approximately equal to the long-run productivity growth rate of 2 percent that has prevailed in the United States since 1870.[5] While these findings do not guarantee that the U.S. economy will return to and sustain 2 percent productivity growth in the future, they still do not conclusively show that productivity in the United States has already declined to a slower long-run growth rate. Rather, recent trends may be attributable to a short-run variation around an unchanged long-run trend.[6]

Productivity Trends in Industrialized Countries

Alarm about the recent slowdown in productivity in the United States is driven by the fear that other countries will surpass the United States in productivity, thereby achieving a higher standard of living at the expense of U.S. workers. While the available evidence is unclear as to whether the post-1973 U.S. productivity slowdown represents a long-term slowdown, it is clear that

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services. However, Baily and Gordon (1988) also present estimates from other studies, which suggest that the actual contribution of the decline in labor quality may be smaller than 0.3 percentage points.

[5] Maddison (1982) presents statistics showing that GDP per man-hour grew by an annual average compound rate of 2.3 percent from 1870 through 1979.

[6] Darby (1984) supports the argument that the statistics do not provide evidence of a long-run decline in productivity growth in the United States. Nordhaus (1982) points out that two similar periods of stagnancy in U.S. productivity occurred in this century. He presents statistics showing that U.S. productivity did not grow from 1901 through 1917 and grew slowly from 1924 through 1937.

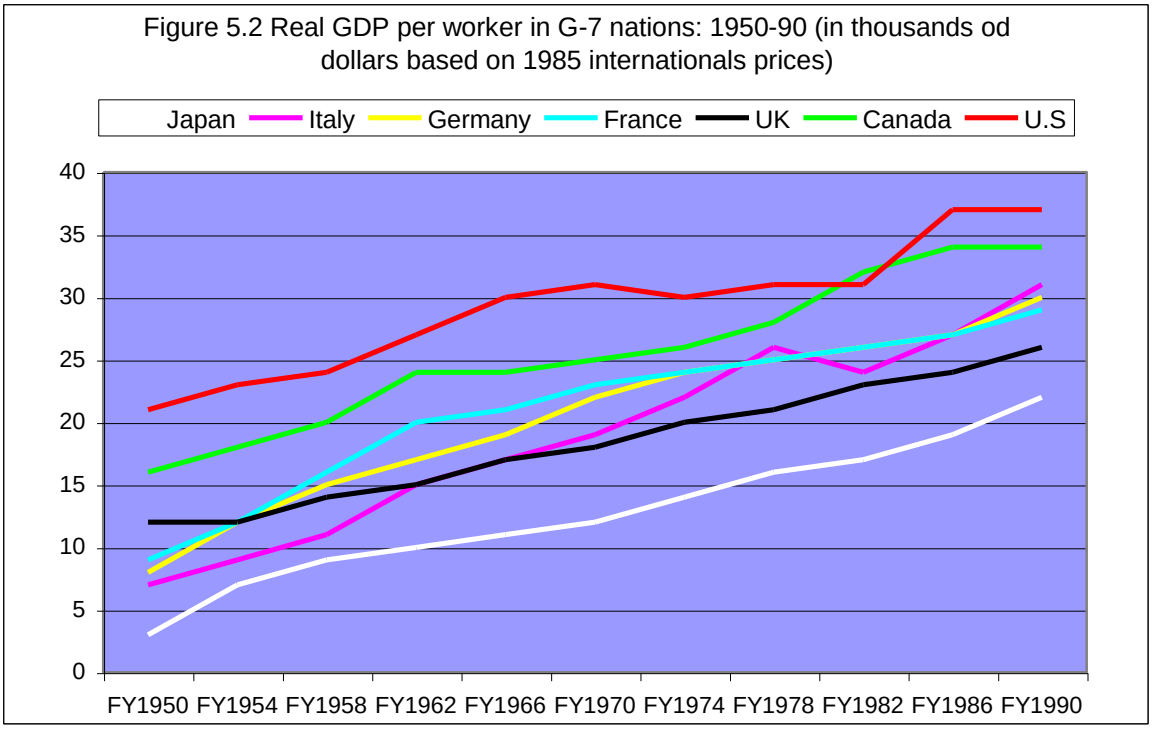
productivity in other countries is catching up to that of the United States. Figure 5.2 shows real gross domestic product (GDP) per worker for the "group of seven" (G–7) industrialized countries. The United States has clearly been the world leader in productivity for many years. During the postwar period, however, the other industrialized countries are catching up to the United States because they have increased productivity at a faster rate than the United States.

Despite the fact that other countries are gaining on the United States in productivity, the United States is still the world leader in productivity, and the trends do not necessarily signal a significant decline in U.S. economic capabilities. As of 1990, the United States was still the leader in productivity between the G–7countries. GDP per worker was slightly higher than in Canada and about 25 percent higher than in Italy (the country with the third highest GDP per worker) (figure 5.2). Furthermore,

other countries are not positioned to surpass the United States in the next few years; rather, they have been slowly catching up over many decades. Alternative data on productivity presented in table 5.1 show that this phenomenon, which is not new, actually began shortly after the end of World War II as other countries experienced higher growth rates than the United States from 1950 through 1973.[7]

[7] The data presented in table 5.1 and figure 5.2, are from different sources and are based on different productivity measures—productivity is measured as GDP per worker in figure 5.2 and GDP per hour worked in table 2.1.

Figure 5.2 Real GDP per worker in G-7 nations: 1950-90 (in thousands od dollars based on 1985 internationals prices)



SOURCE: Penn World Table (Mark 5.6), distributed by the National Bureau of Economic Research. For a description, see Robert Summers and Alan Heuston, "The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950–1988," Quarterly Journal of Economics (May 1991):327–368.

Worker Productivity and Education

Table 2.1 Growth in gross domestic product per hour worked (average annual growth rate)

	I 1913-1950	II 1950-1973	III 1973-1984	Acceleration from I to II	Slowdown from II to III
France	2	5.1	3.4	3.1	1.7
Germany	1	6	3	5	3
Japan	1.7	7.7	3.2	6	1.5
Netherlands	1.7	4.4	1.9	2.7	2.5
United Kingdom	1.6	3.2	2.4	1.6	0.8
United States	2.4	2.5	1	0.1	1.5

SOURCE: Angus Maddison, "Growth and Slowdown in Advanced Capitalist Economies: Techniques of Quantitative Assessment," Journal of Economic Literature (June 1987): 649–698

The data also indicate that the pattern of growth in productivity that occurred in the United States in the post-World War II period also occurred in the other

industrialized countries. As shown in table 2.1, productivity grew at an accelerated rate in these countries from 1950 through 1973, compared with the period from 1913 through 1950. The slowdown in the growth of productivity that occurred in the United States in the early 1970s appears also to have occurred in the other industrialized countries. The percentage-point magnitude of the decline was largest in Japan (4.5 percentage points) and smallest in the United Kingdom (0.8 percentage points). The decline in productivity in the United States (1.5 percentage points) was between these two extremes. The productivity trends in figure 5.2 and table 2.1 appear to be consistent with the economic hypothesis that productivity levels in countries with broadly similar labor resources will converge over time.[8] When the productivity of one country is superior to that of a number of other countries, largely as a result of differences in technical knowledge, the "follower" countries can catch up to the leader by acquiring new technical knowledge from the leader. Productivity converges because countries eventually learn these new productive techniques through trade, technology transfer, and their own research and development efforts. Figure 2.3, which shows that the coefficient of variation in productivity in the G–7 countries has declined steadily since 1950, demonstrates that productivity in these countries is, in fact, converging.[9]

[8] Baumol, Blackman, and Wolff (1989) provide a detailed description and analysis of this hypothesis.

[9] The coefficient of variation is equal to the standard deviation of productivity divided by the mean.

Contribution of Education to Economic Productivity

Economic research based on growth-accounting methods has shown that education has made a major contribution to growth in U.S. economic productivity.[10] Denison (1979) estimated that education contributed about 20 percent of the growth in national income per person from 1948 through 1973. Using similar methods and data for the same period, Jorgenson (1984) estimated that education accounted for 38 percent of the total labor contribution to U.S. output growth, or about 17 percent of growth overall. Recent estimates for the period from 1973 through 1984 (Sturm 1993) suggest that education accounted for about 15 percent of the growth in output per hour worked over this period. A more comprehensive study of productivity from 1948 through 1990 using growth accounting (U.S. Department of Labor 1993) showed that during this period, rising levels of educational attainment were responsible for about 14 percent of the growth in output per hour worked in the private sector.

The growth-accounting methods used in these studies have been frequently criticized. First, they use variation in earnings to represent variation in productivity, which cannot be observed directly. The relative productivity contributions of different levels of educational attainment are set according to earnings differentials among educational groups. If earnings are not closely correlated with productivity, this approach is inappropriate. The use of

[10] In growth accounting, researchers attribute growth in output to changes in factor inputs, such as capital and labor. The relative value of different levels of education attainment in the growth accounts is determined by the earnings of workers with different levels of attainment.

earnings differentials to measure the effect of educational attainment on productivity is discussed in chapter 3. Second, growth-accounting methods are used to "capture" the direct effect of different growth factors, but they do not account for interaction among the factors. Many researchers have discussed the importance of interaction, such as that between education and new technology. For example, a country's ability to exploit new technologies may depend on workers who have the education necessary to use the new technologies effectively. Third, growth-accounting methods focus exclusively on changes in years of formal education to measure the contribution of education. They do not control either for changes in the quality of education or for the contribution of informal education or training. Despite the weaknesses of growth-accounting methods, they have provided the best available estimates of the contribution of education to productivity growth. Although the exact magnitude of the contribution may be unclear, studies consistently show that education makes a substantial contribution to productivity growth. Recent attempts to generate estimates that are not subject to the traditional criticisms of growth accounting methods support this conclusion. Kim and Lau (1992) use a new methodology called the "meta-production function" approach to estimate the relationship between aggregate output and inputs.[11] They estimate that education accounted for 11 percent of the growth in aggregate real output from 1948 through 1985.

[11] The assumption of a meta-production function implies that the same production function can be used to characterize productivity in different countries. Kim and Lau use the meta-production function to perform an alternative growth accounting that dispenses with the traditional assumptions of constant returns to scale, neutrality of technical progress, and profit maximization. (Boskin and Lau (1990) describe the alternative growth-accounting procedure.)

International evidence suggests that education plays a similarly important role in influencing productivity in other countries as it does in the United States. Sturm (1993) demonstrates that among a select group of industrialized countries, the contribution of education to economic growth from 1973 through 1984 was the highest in France (22 percent) and the lowest in Germany (4 percent).[12] Using methods as well as a sample period different from those of Sturm (1993), Kim and Lau (1992) show that the contribution of education to growth in five industrialized countries from 1957 through 1985 was between 11 percent and 27 percent, depending on the country. The lowest impact was 11 percent in the United States and Japan, and the highest impact was 27 percent in West Germany.[13] Overall, the estimates suggest that the extent to which education has contributed to productivity growth in the United States is generally the same as in other industrialized countries. Therefore, the data provide no indication that the contribution of education to growth in the United States lags behind the contribution of education to growth in other countries. Evidence related to the convergence hypothesis also suggests that education plays an important role in productivity. Baumol, Blackman, and Wolff (1989) find that different groups of countries are converging to different productivity levels according to their educational levels. The industrialized countries with

[12] According to the estimates presented in Sturm (1993), the percentage of the growth rate explained by education is 15.5 percent in the United States, 22.0 percent in France, 20.9 percent in the Netherlands, 18.9 percent in the United Kingdom, and 10.8 percent in Japan.

[13] The impact of education on growth in the other two countries was 19 percent in France and 24 percent in the United Kingdom. The difference between the Kim and Lau (1992) estimate and the Sturm (1993) estimate for Germany is striking. Because the two studies use different data, different estimation methods, and different (though overlapping) time periods, it is difficult to determine what causes this difference.

the highest educational levels are converging to the highest productivity levels. Other countries are converging to lower levels—countries with roughly comparable educational levels are converging to a similar level, but they are not closing the gap with countries at higher educational levels.[14] Supporting evidence about the importance of education in productivity convergence is presented in Barro (1991), who shows that countries with low per capita GDP but relatively high levels of schooling tend to catch up to the GDP leaders.[15] These findings suggest that countries that lag in productivity must have some minimum level of education to be able to catch up to the leaders in productivity.[16] Regressions estimates presented in Baumol, Blackman, and Wolff (1989), which are based on a broad cross-section of countries, suggest that high school education is especially important in helping a country absorb and use new production technologies. Based on these estimates, Baumol, Blackman, and Wolff (1989) argue that primary education alone may not prepare the work force to adopt and implement new technologies. At the same time, findings on higher education appear to indicate that it may be less important than high school education in the productivity "catch-up" process for the broad cross-section of countries. However, higher education may still be a

[14] Baumol, Blackman, and Wolff (1989) estimate the impact of education on productivity using cross-section data from the Penn World Table (Summers and Heston 1991). Their findings show that enrollment rates for primary, secondary, and higher education have significant positive impacts on productivity growth. Controlling for enrollment rates, countries tend to converge on the productivity leader over time.

[15] Barro (1991) examines data on a cross-section of 98 countries from 1960 through 1985. Based on these data, Barro shows that the growth rate of real per capita GDP over the observation period is positively related to the school enrollment rates in 1960 and negatively related to the 1960 level of real per capita GDP.

[16] Kyriacou (1991) also presents findings that suggest productivity convergence occurs only if sufficient levels of schooling among the labor force have been accumulated.

critical determinant of the relative productivity levels among the most industrialized countries.

CHAPTER 3

ECONOMIC CONSEQUENCES OF EDUCATIONAL ATTAINMENT

While it is possible to link trends in worker productivity at the national level to changes in education at the national level, increases in worker productivity at the national level occur as conditions in the economy, including education, change to make individual workers more productive. In this chapter, we focus

on the economic consequences of education at the individual level in an attempt to measure the economic value of educational attainment and the incentive for individuals to invest in education. As discussed in the previous chapter, estimates of the contribution of educational attainment to worker productivity at the national level are based on the observed average earnings of workers at different education levels. Researchers characterize the differences in earnings by level of education as the return to the investment in human capital that is inherent in the acquisition of more education.[17] The returns as measured by earnings differences are used to represent the impact of education on worker productivity. This approach is based on economic theory, which states that in a competitive labor market, a worker's wage rate will be equal to his or her marginal productivity. Education may also improve a worker's long-term productivity because it increases his or her employment stability, thereby minimizing periods of unemployment in which the worker is not productive. In this chapter, we consider the trends in the economic returns to education as measured by differences in unemployment and earnings. We acknowledge the possibility that differences among workers in unemployment and earnings may not closely mirror differences in productivity.[18] But even if

[17] Alternative theories to human capital theory assert that additional education does not increase productivity, but rather that it is valuable for sorting out individuals with inherently low or high abilities or aptitudes. Even in this theory, additional education represents a potentially valuable investment from the worker's perspective because education is a signal that the worker has high ability and the potential to be highly productive.

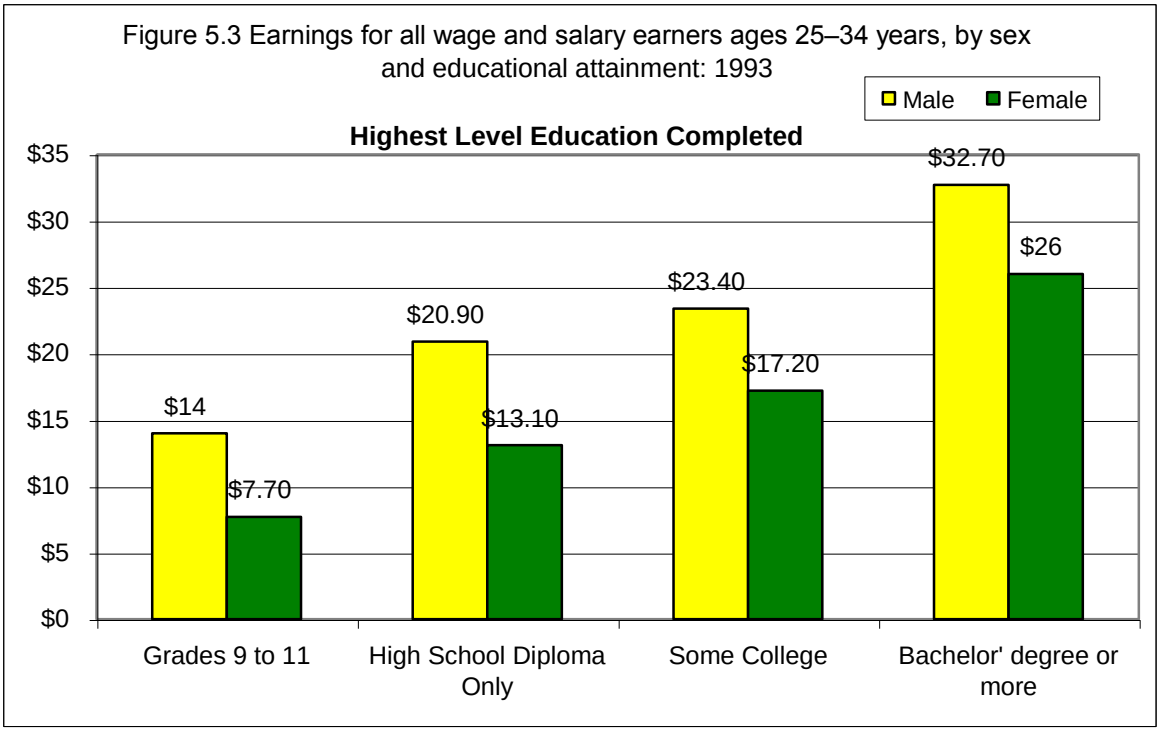
[18] Several theories of employment contracts have attempted to explain why workers or employers may prefer contracts that offer only modest adjustments of wages in response to differences in worker productivity. For example, employment contracts that limit wage adjustments may appeal to risk-averse workers who prefer a steady income. Use of such contracts implies that a worker's wage rate at a given point in time may not be equal to that worker's marginal productivity.

the estimated returns are not an accurate representation of the effects of education on productivity, the estimates still provide measures of the economic incentives for further education, and we can examine how these incentives have changed over time.

Education Attainment and Earnings

Most of the research on the effect of education on economic outcomes has focused on how education affects earnings. The effect of education on earnings represents the private economic return to the investment in education. Education probably also generates social benefits that are not reflected in earnings. For example, increased education may reduce crime rates or the use of government assistance programs, thereby benefiting other members of society. While these effects may be important, they do not relate directly to economic productivity and are beyond the scope of this chapter.

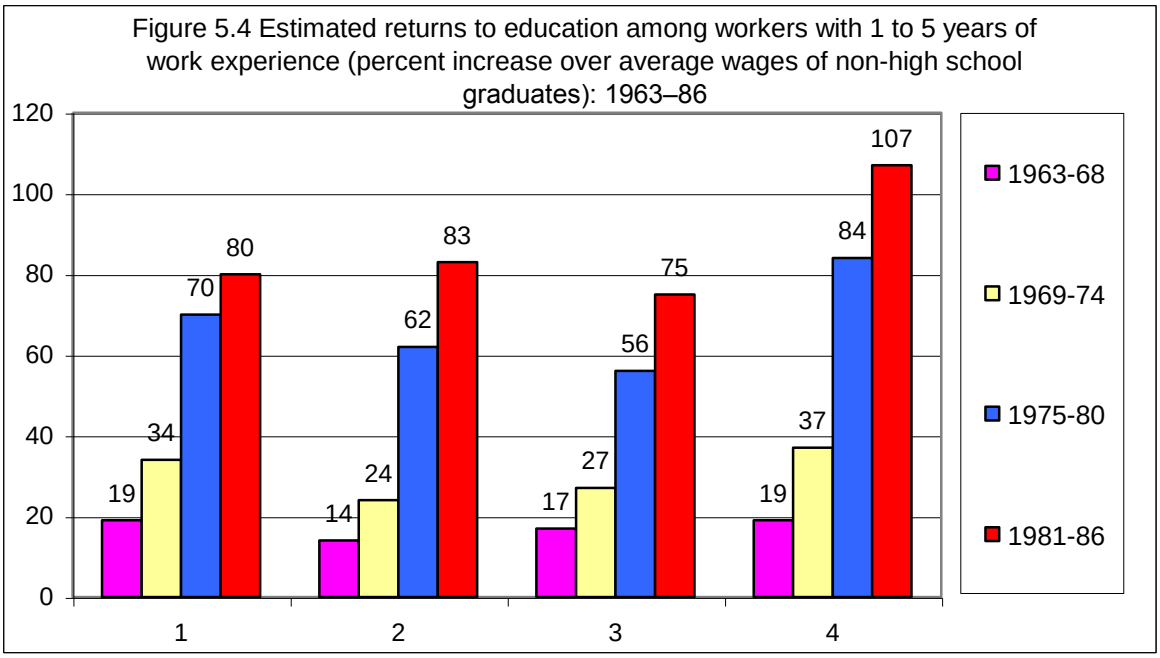
Data from the Current Population Survey demonstrate that median earnings increase with the level of schooling. Among males 25–34 years old in 1993, the median earnings of those with a college degree were approximately $33,000 per year, which was more than 50 percent greater than the median earnings of high school graduates and more than twice the earnings of high school dropouts (figure 5.3). A similar relationship between education and earnings held for females 25–34 years old, although for each educational category, the median earnings were lower for females than for males.



SOURCE: U.S. Department of Education, National Center for Education Statistics, The Condition of Education, 1995; U.S. Department of Commerce, Bureau of the Census, March Current Population Survey, 1994.

Estimates of the returns to education, holding other factors constant, also demonstrate the positive returns to education for young workers. According to these estimates, the returns to a college degree increased dramatically in the first half of the 1980s. Figure 5.4 shows that the earnings advantage for college graduates compared with that for high school dropouts increased from 56 percent from 1975 through 1980 to 84 percent from 1981 through 1986.[19] The returns to a high school diploma also increased during the 1980s, but more modestly than for a college degree. Other things being equal, high school graduates earned 19 percent more than dropouts from 1981 through 1986, compared with 17 percent more from 1975 through 1980.

[19] These comparisons, which are from Murphy and Welch (1989), control for differences in race, sex, and age.



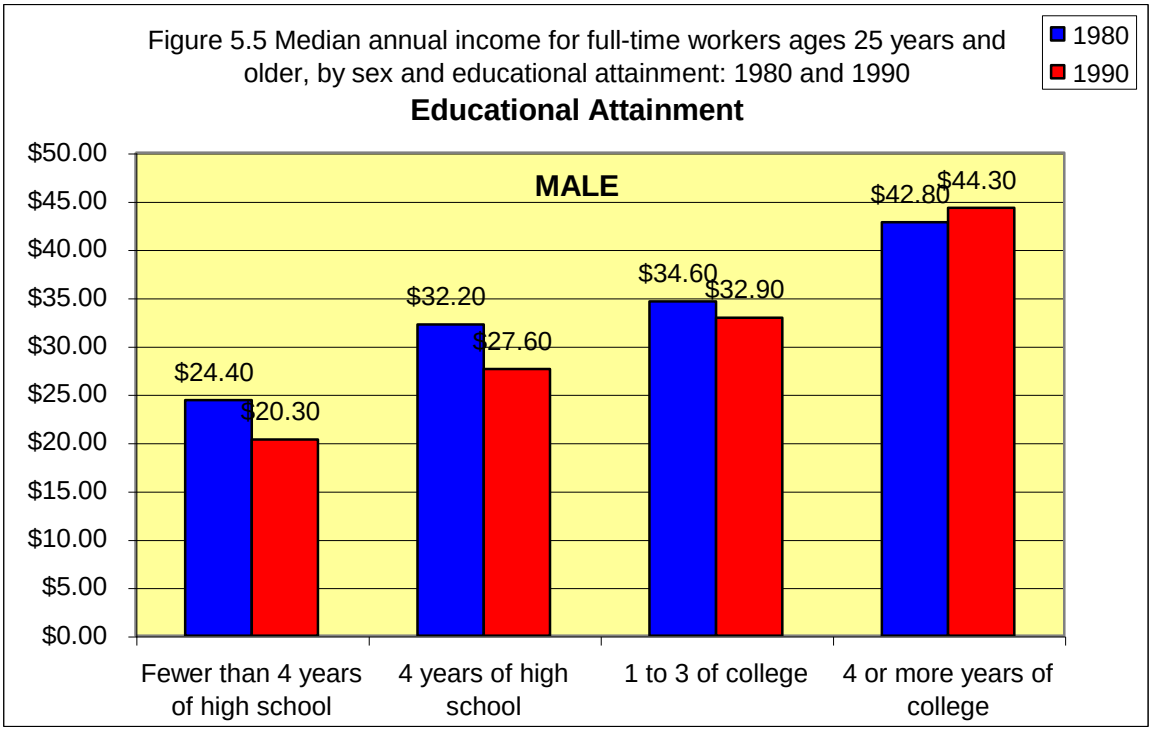
NOTE: Estimates of the returns to education control for differences between educational groups in race–ethnicity, age, and sex.

SOURCE: Kevin Murphy and Finis Welch, "Wage Premiums for College Graduates: Recent Growth and Possible Explanations," Educational Researcher (May 1989): 17–26; U.S. Department of Commerce, Bureau of the Census, March Current Population Surveys.

Increases in the returns to education were most dramatic at the highest levels of education. The increase in the returns to a high school diploma brought the rate of return back to the 19 percent that prevailed from 1963 through 1968, as shown in figure 5.4. But for higher levels of education, the rates of return in the 1980s exceeded those in earlier periods. The earnings advantage for each level of additional education compared with high school increased in the 1980s. For example, the returns shown in figure 5.4 for high school and college graduates imply that, compared with high school graduates, the earnings

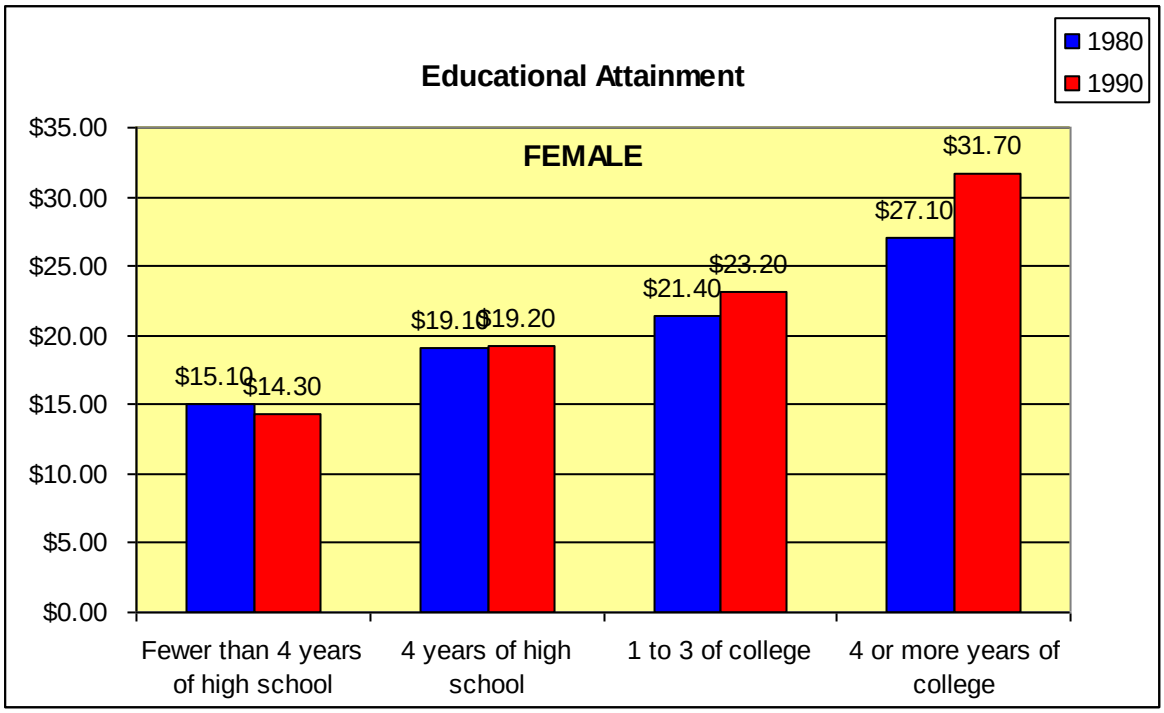
advantage for college graduates increased in the early 1980s, from 33 percent to 55 percent.[20]

The increase in returns to a college degree occurred as real wages increased among college graduates while real wages declined for high school graduates and dropouts.[21] Figure 5.5 shows that between 1980 and 1990 real income increased for men with four or more years of college and for women with one or more years of college. Real income decreased or remained approximately constant for groups with less education.



[20] These estimates are based on dividing one plus the return to college shown in figure 3.4 by one plus the return to high school.

[21] See Murphy and Welch (1989), Eck (1993), and Katz and Murphy (1992) for detailed discussions of the earnings trends by level of educational attainment.



SOURCE: Alan Eck, "Job-Related Education and Training: Their Impact on Earnings," Monthly Labor Review (October 1993): 21–38; U.S. Department of Commerce, Bureau of the Census, March Current Population Surveys.

Determinants of the Increasing Return to Education

Recent research has attempted to identify the factors that influence the increase in the returns to education. Several labor demand and supply factors have been cited as important. On the demand side, there appears to have been a rise in technological factors favoring more highly educated workers with greater problem-solving skills, driving up their relative wages (Katz and Murphy 1992).[22]Recent research (Berman, Bound, and Griliches 1994) attributes much of the change in the wage structure of manufacturing to increased demand for

[22] Using data from the Current Population Survey, Katz and Murphy (1992) show that the majority of the shift in relative demand for more highly educated workers occurred within industrial and occupational sectors. They conclude that these within-sector shifts are likely to reflect skill-biased technological changes.

high skilled labor.[23] The introduction of new production labor saving technology has also decreased the demand for lower-skilled workers in manufacturing, depriving them of traditionally high-paying jobs. An important factor in the increased demand for high-skilled labor may be the expansion of computer use. Estimates presented by Krueger (1993) suggest that between one-third and one half of the increase in the rate of return to education can be attributed to expanded computer use.[24]

A number of supply-side factors have also contributed to the increased returns to education. First, the educational attainment of new labor force entrants leveled off after a period of rapid growth. For males, there was even a slight drop in the proportion of labor force entrants with education beyond high school. This decrease in the rate of growth of college graduates, combined with the demand changes discussed above, put upward pressure on wages paid to those who did graduate. At the same time, the influx of new immigrants, both legal and illegal, increased the supply of less-educated workers. From 1975 through 1985, the percentage of high school dropouts who were immigrants increased from 17 to 31 percent (Borjas, Freeman, and Katz 1992). The impact of immigrants on average wages is further exacerbated if, as seems likely, the

[23] Berman, Bound, and Griliches (1994) use data for the period 1959 to 1989 from the Annual Survey of Manufactures, the Census of Manufactures, and the National Bureau of Economic Research trade data set. They base their conclusion about the importance of technological changes on three findings: (1) the shift in relative demand for more educated workers is due to increased use of non production workers within 450 manufacturing industries rather than to a reallocation of employment among the industries; (2) international trade generated only minor shifts in employment away from production-labor-intensive industries; and (3) within-industry increases in the use of non production workers are strongly correlated with investment in computers and research and development.

[24] Based on data from the Current Population Survey, Krueger (1993) estimates that workers who use a computer at their job earn 10 to 15 percent higher wages than other workers. Because of the high rate of computer use among highly educated workers and the expansion of computer use in the 1980s, the wage premium for computer use accounts for a substantial proportion of the increase in returns to education.

immigrants with less education face even greater barriers to employment than other Americans with a similar level of education. As a result of these barriers, immigrant workers are paid relatively low wages, which pulls down the average wage for the less educated group even before accounting for the supply effect of the immigrants on relative wages. Increased imports may also contribute to the effect of foreign labor supply because they create an indirect increase in the supply of less-educated labor from abroad. Economists disagree about the extent to which increased imports have affected wage differentials. Borjas, Freeman, and Katz (1992) estimate that growth in the U.S. trade deficit accounted for 15 to 25 percent of the rise in the college-high school wage differential from 1980 through 1985. Karoly and Klerman (1994) and Wood (1994) also argue that international trade has played a significant role in pushing down the relative wages of less-educated workers. In contrast, a recent detailed study of this effect (Lawrence and Slaughter 1993) argues that imports did not make an important contribution to changes in U.S. relative wages in the 1980s. They conclude, as have other researchers, that technological change rather than trade has been the primary factor driving down relative wages for production workers. Another potential supply factor that may contribute to increasing returns to education is a change in the skill of labor force entrants with a given level of educational attainment. Specifically, researchers have pointed to a decline in the quality of U.S. elementary and secondary education as a contributor to the increase in returns for college education. According to this argument, high school graduates are paid less, both in real terms and

compared with college graduates, because they are less skilled than high school graduates of previous years. There is evidence, however, to dispute this argument. Older high school graduates, who received their formal education before the alleged decline in U.S. education, suffered real wage declines similar to those of younger high school graduates (Blackburn, Bloom, and Freeman 1990). The rising returns to education are not simply the product of increased earnings for better-educated workers. Rather, the data imply that less-educated workers are at greater risk of having difficulty in the labor market now than in the past, and that the increase in returns to education is caused in part by the decrease in real earnings for those with less schooling. Nevertheless, it is difficult to evaluate changes in average wages for separate education groups. Part of the change in wages by level of education is caused by the changing composition of the groups. Hence, tracking the wages of an education group, like high school graduates, over time can be misleading because characteristics of high school graduates have changed over time. Part of the change in the composition of the educational groups occurs naturally as the educational attainment of the population increases. For example, the number of college graduates increases as students who in previous years would have entered the labor market directly now go on to college instead. These students, on average, are likely to be the most able of the students who in the past did not attend college, but they are also likely to be less able than the students who would have previously gone to college.[25] Consequently, the

[25] Baker and Smith (1994) report (based on data from the High School and Beyond Survey and the 1992 National

movement of this group between educational categories can cause a decrease in average wages in both categories. The wages of high school graduates will decrease as the best students from the group move into the college group. At the same time, these students bring down the average wage of the college group if they are less able, on average, than the traditional college group. Of course, average wages for the entire population will still increase if the new college attendees earn more than if they had not attended college. Trends in immigration have probably contributed to the compositional changes in the education groups. As immigrants become a larger proportion of the low education groups, they probably drag down the average wage for these groups because they face significant obstacles to employment, such as language barriers or unfamiliarity with the U.S. labor market, and are forced to accept lower-paying jobs. But this wage decrease is not evidence of a decline in the economic standing of a particular educational group. Rather, the groups themselves have changed in significant ways that affect the group-specific average wages. The increase in earnings inequality by education level has been accompanied by a general increase in income inequality in the United States. Income inequality may be harmful to the overall economy regardless of its source. Recent empirical research by Persson and Tabellini (1994) provides evidence that greater income inequality causes slower economic growth. Findings based on pooled historical data from a cross-section of nine developed

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Educational Longitudinal Study) that the percentage of high school seniors in the bottom quartile of academic performance who plan to go to college doubled from 1982 through 1992.

countries demonstrate that differences in income distribution explain about one-fifth of the variance in growth rates across countries and over time.[26] None of the other variables tested by Persson and Tabellini (1994) explains more than one-tenth of the variation.

The mechanism by which inequality slows economic growth is unclear. Persson and Tabellini (1994) argue that it is political. According to their theory, greater inequality leads to policies that increase tax rates on investment and other productive activities in order to redistribute income. As tax rates are increased, investment declines, which eventually causes productivity to slow down. Other researchers have argued that inequality slows growth through an economic mechanism. In this theory, increased income inequality makes it difficult for those at the bottom of the income distribution to acquire the skills necessary to succeed in the labor market. This may occur because poor families cannot borrow money to educate their children or because poor communities cannot effectively educate their children or provide them with role models. Employers, therefore, may face shortages of qualified workers, which can negatively affect production efficiency. Eventually, the overall economy is harmed by the lack of skills among the poor as companies become less productive and economic growth suffers.

[26] The growth measure used by Persson and Tabellini (1994) is annual average growth rate of gross domestic product per capita.

Using Education to Increase Earnings at the National Level

The strong link between education and earnings at the individual level implies that the education of the work force as a whole also plays a role in determining the productive capacity of the work force and the average earnings among all workers. As individuals increase their earnings by acquiring additional education, they also expand the productive capacity of the economy as a whole. This description of the link between education and productivity is consistent with the findings from the growth-accounting studies discussed in chapter 2, which estimated the statistical link between increases in education of the work force and increases in labor productivity. Productivity growth, therefore, can be supported by encouraging students to pursue additional schooling. For example, policies such as the provision of loans and educational grants that increase access to college can have a positive impact on productivity and on average earnings. The ability to increase the earnings of the work force in general through increased education is limited however, both because of market responses and because individuals vary in their capabilities. We cannot, for example, ensure that everyone will have a salary equal to the average salary for attorneys simply by putting everyone through college and law school. First, not all people are prepared to be attorneys, regardless of the training received, and most of the new entrants would probably be less capable than the average student who becomes an attorney on his or her own. In addition, flooding the market with attorneys would inevitably decrease the salaries for all attorneys (and the price of legal services) due to excess supply.

Hence, average pay in general and the earnings differentials between occupations and educational levels are sensitive to a dynamic labor market. The link between education and earnings of the work force is also somewhat tenuous because many other factors affect the productivity of workers and their earnings. For example, as discussed in chapter 2, the availability of capital is an important determinant of labor productivity. Labor productivity is also affected by changes in production technology and the ways in which work is organized. Some researchers have questioned the degree to which estimates of the impact of education on individual earnings levels are useful for evaluating the social benefit of increases in education. Levin and Kelley (1994), for example, argue that the estimated returns to education overstate the actual social benefits of education, claiming that changes in aggregate educational attainment do not bring about the increases in earnings that estimates of individual returns to education imply. As evidence, Levin and Kelley point out that the increases in education from 1968 through 1987 were accompanied by a decline in median earnings rather than an increase as implied by positive returns to education. But estimates of the returns to education are based on the assumption that other factors remain constant, and, as pointed out above, this is not the case in a dynamic market. The drop in earnings from 1968 through 1987 was not caused by the increase in education over the same period. Rather, it is likely to have been caused by factors beyond the changes in education, such as increased competition from foreign producers or

decreased power of labor unions. The increase in education may have kept median earnings from dropping even lower than it did.

CHAPTER 4

ECONOMIC CONCEQUENCES OF ADULT LITERACY

The previous chapter linked academic achievement of individuals as students to their eventual performance in the labor market. Alternative measures based on adult literacy can be used to evaluate adults once they are in the labor market. The term *literacy* in this context refers to the skills individuals need to use printed and written information, including quantitative information, to function successfully in their work and personal lives. Some observers are

concerned that there is a mismatch between the supply of and the demand for literacy skills in the labor force in the United States. Although not all skills required in the workplace can be characterized as literacy skills, they are likely to play an important role in the workplace. They may even be more important than academic achievement for the population at large because they are likely to be important in all types of tasks and settings. Information about adult literacy was provided recently by the 1992 National Adult Literacy Survey (NALS) sponsored by the National Center for Education Statistics. The survey was initiated to fill the need for accurate and detailed information on the English literacy skills of America's adults. For the purpose of the survey, a national panel of experts defined literacy as "using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential" (U.S. Department of Education 1993). To investigate and measure literacy, the survey contained a series of exercises that required respondents to read and interpret written material, compare and contrast findings, complete various forms, make arithmetic calculations, and write short letters. Respondents' proficiencies were measured on prose, document, and quantitative scales, ranging from 0 to 500. To capture the progression of information-processing skills, each scale was divided into five levels: level one (0 to 225), level two (226 to 275), level three (276 to 325), level four (326 to 375), and level five (376 to 500). A low score (level one) indicates that an individual has very limited skills in processing information from tables, charts, graphs, and maps, even those that are brief and uncomplicated. On the other

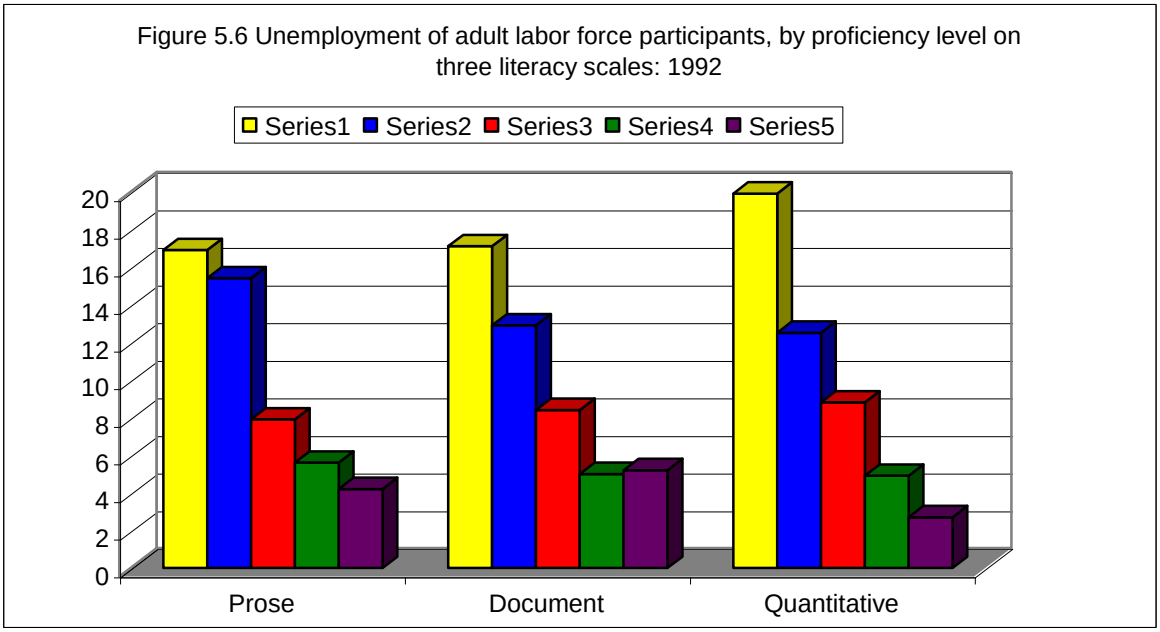
hand, a high score (level five) indicates advanced skills in performing a variety of tasks that involve the use of complex documents.[27]

In this chapter, we examine the relationship between literacy scores and labor market outcomes to identify the literacy skills that pay off in the labor market. The data necessary to examine the impact of literacy on worker productivity is unavailable. Therefore, in examining the link between literacy and productivity, unemployment and earnings are used as indicators of productivity.

Literacy and Unemployment

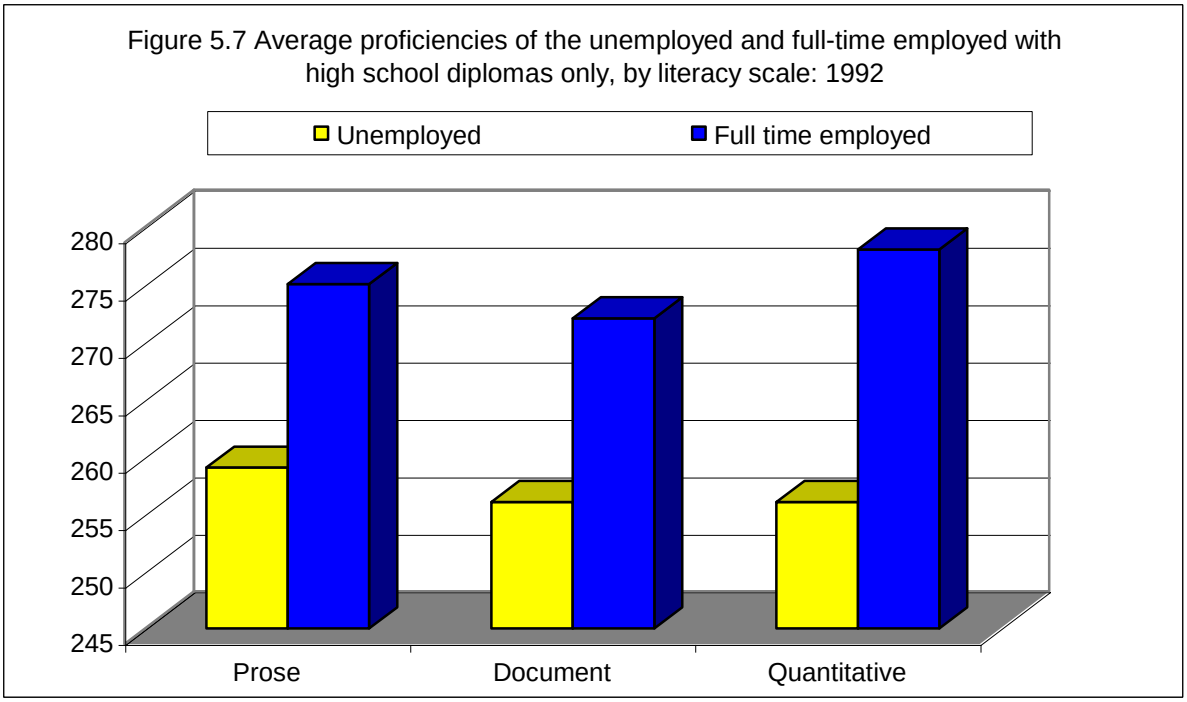
Unemployment tends to be correlated with low literacy. Figure 5.6 shows that the unemployment rate is generally higher for individuals with lower literacy levels on all three of the scales used in the NALS. Unemployment rates are especially high for workers in the two lowest literacy levels on each scale (levels one and two). For instance, the unemployment rate for these workers ranges from 12 percent for those with level two quantitative skills up to 20 percent for those with level one quantitative skills. The unemployment rate for workers in the top three literacy levels in each scale (levels three through five) is 9 percent or less.

[27] A detailed description of the prose, document, and quantitative literacy levels is contained in U.S. Department of Education (1993).



SOURCE: Andrew Sum, Literacy and the Labor Force: Results of the National Adult Literacy Survey, forthcoming; U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992.

Literacy affects unemployment even beyond the degree to which it is correlated with educational attainment. Within most categories of attainment, such as high school diploma only (figure 5.7), the average proficiency of the unemployed is less than that of the employed. Even after controlling for levels of educational attainment, workers with higher literacy levels are still less likely to be unemployed. This finding is supported by regression analysis of these literacy data in Sum (forthcoming), which shows that a 60-point increase in prose, document, or quantitative literacy reduces the probability of unemployment by about 2 percentage points.



SOURCE: Andrew Sum, Literacy and the Labor Force: Results of the National Adult Literacy Survey, forthcoming; U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992.

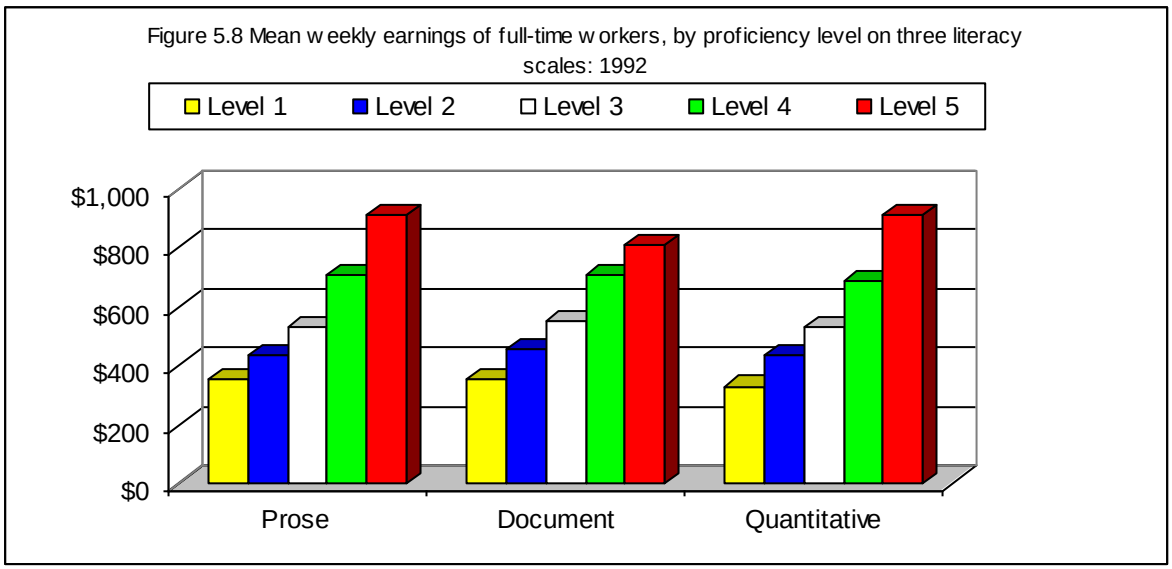
The connection between literacy and unemployment may exist for many reasons. First, if individuals with low literacy levels are less productive, they may be at greater risk of being laid off than workers with higher levels of literacy. This would translate into greater layoff frequency and more unemployment. Once unemployed, low-literacy workers may also have more trouble finding a new job than workers with higher literacy. Low-literacy workers who lose their jobs would therefore probably face longer unemployment spells than high-literacy workers who lose their jobs. This could happen either because low literacy tends to make workers less attractive to employers or because they cannot search for work as effectively as other job seekers. Finally, those with low literacy levels may make unwise labor market decisions that negatively affect their job stability. For example, low-literacy

workers may not be able to accurately evaluate alternative job prospects; therefore, they quit jobs on the basis of flawed evaluations of their prospects.

Literacy and Earnings

Overall, full-time workers with high literacy skills earn more, on average, than fulltime workers with low literacy skills. The earnings advantage for high-literacy workers is evident for each of the three literacy scales. On the prose scale, for example, full-time workers at level three earn a mean weekly wage that is 50 percent higher than the wage for their counterparts at level one, and those at level five earn a weekly wage that is 71 percent higher than the average wage of those at level three (figure 5.8).

Figure 5.8 Mean weekly earnings of full-time workers, by proficiency level on three literacy scales: 1992

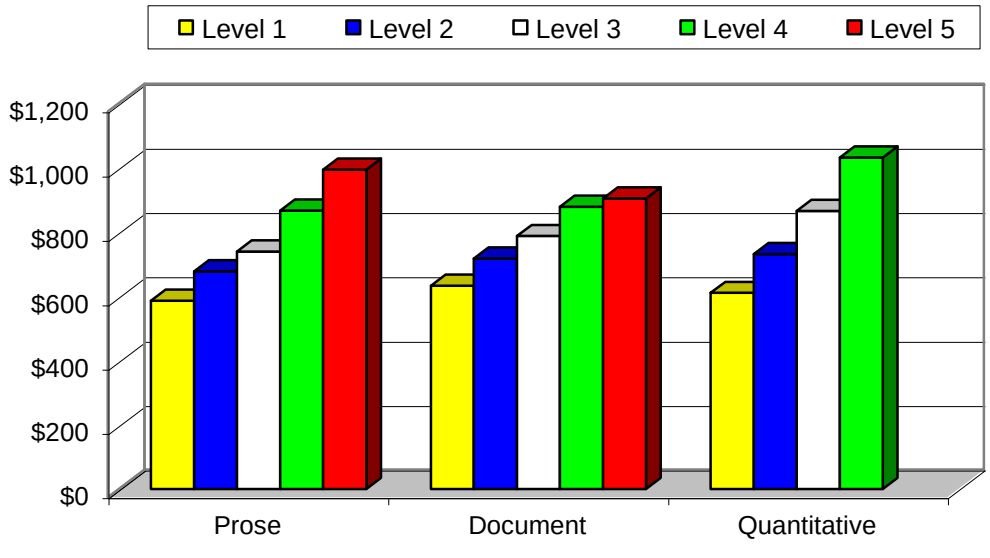


SOURCE: Andrew Sum, Literacy and the Labor Force: Results of the National Adult Literacy Survey, forthcoming; U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992.

The effect of literacy on earnings, however, is not simply the result of variations in education. Some differences in average earnings by literacy level exist even

within categories of educational attainment. For example, college graduates with a level five proficiency on any scale have greater earnings than college graduates with a level two proficiency on the same scale (figure 5.4). For the prose scale, college graduates in level five earn $993 per week compared with $677 per week for college graduates in level two—a difference of 47 percent. Sum (forthcoming) also conducted extensive regression analysis of the impact of literacy on employment and earnings outcomes. His findings demonstrate that literacy has both positive direct and positive indirect effects on employment and earnings. The indirect effect occurs because individuals with higher literacy tend to acquire higher education, which leads to more stable employment and higher earnings. But individuals with higher literacy also have more favorable employment and earnings outcomes even after controlling for their education level.

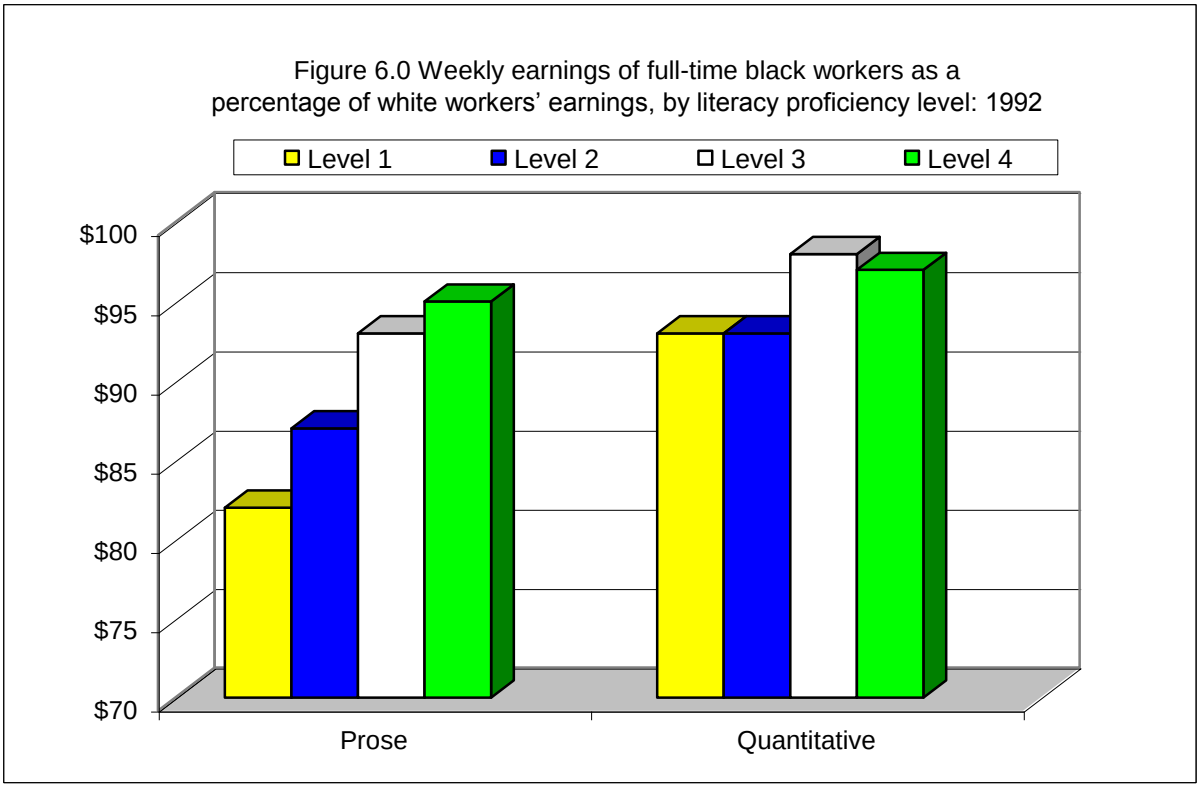
Figure 5.9 Mean weekly earnings of full-time employed college graduates, by proficiency level on three literacy scales: 1992



NOTE: No figure is available for quantitative literacy level 1 because there are too few college graduates in level 1 on the quantitative scale to generate reliable estimates.

SOURCE: Andrew Sum, Literacy and the Labor Force: Results of the National Adult Literacy Survey, forthcoming; U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992.

Enhanced prose and quantitative literacy could be an important ingredient in any prospective improvement in the economic condition of black workers compared with white workers. In the aggregate, black workers earn significantly less than white workers. Mean weekly earnings among black workers in the 1992 NALS sample were $425 or 73 percent of the $582 earned by white workers. But the differences in earnings were smaller among individuals at the same quantitative and prose proficiency levels. For instance, in terms of quantitative literacy, the mean weekly earnings of black workers ranged from 92 to 98 percent of those of whites, depending on the proficiency level (figure 6.0).



NOTE: No figures are available for literacy level 5 because there are too few cases to provide reliable estimates.
SOURCE: Andrew Sum, Literacy and the Labor Force: Results of the National Adult Literacy Survey, forthcoming; U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992.

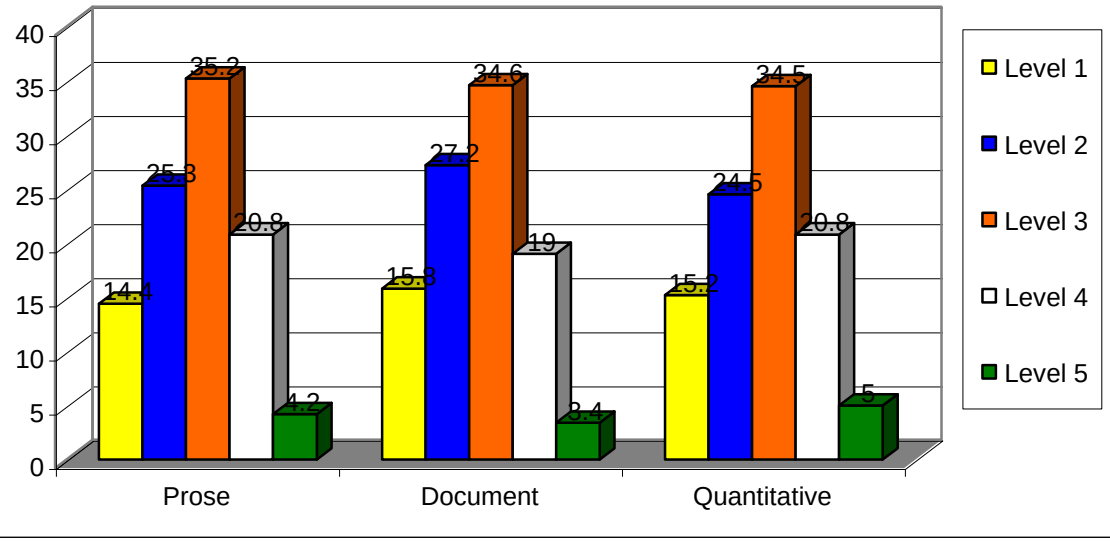
Literacy Levels of the Labor Force and New Job Entrants

Indicators 9 and 10 clearly demonstrate that literacy is strongly related to individual success in the labor market. Given this relationship, it is disappointing to find that the literacy proficiency of a substantial proportion of the U.S. labor force is limited. Approximately 40 percent or more of the adult labor force perform at the two lowest levels on each of the literacy scales (figure 6.1). For example, 43 percent of labor force participants perform at the two lowest document literacy levels—15.8 percent at level one and 27.2 percent at level two. This finding suggests that a substantial fraction of U.S. workers lack the skills needed to interpret, integrate, and compare or contrast information using

written materials common to the home or workplace. These workers appear to be unable to perform the types of tasks typical of certain occupations that demand high skills, such as professional, managerial, technical, high-level sales, skilled clerical, or craft and precision production occupations.

While a large proportion of the U.S. labor force has limited literacy skills, only a small proportion of the labor force performs at the highest literacy levels. For each literacy scale, 5 percent or fewer of labor force participants score in the highest proficiency level, demonstrating an ability to perform well on a wide array of literacy tasks.

Figure 6.1 Percentage of labor force in each proficiency level on the three literacy scales: 1992



SOURCE: Andrew Sum, Literacy and the Labor Force: Results of the National Adult Literacy Survey, forthcoming; U.S. Department of Education, National Center for Education Statistics, National Adult Literacy Survey, 1992.

Given the positive relationship between literacy and success in the labor market, increases in literacy should contribute to the productivity of U.S. workers. To examine recent trends in literacy among U.S. workers, we

compared the literacy scores of respondents in the 1992 NALS and the 1985 NAEP Young Adult Literacy Survey (YALS).

Findings from these studies suggest that the literacy levels of young adults from ages of 21–25 years may have declined in recent years. Adults in this age range, most of who are current or soon-to-be job entrants, performed less well in 1992 than the comparable group in 1985. In addition, the cohort of adults who were ages 21–25 years in 1985 appear to have had lower test scores in 1992, when they were ages 28–32 years, than they did in 1985.

The influx of new immigrants in the late 1980s may have contributed to these patterns. Recent immigrants have much lower average scores as measured on the literacy scales than either the native-born population or immigrants who have lived in the United States for more than 10 years. Among employed respondents to the 1992 NALS, the mean scores of recent immigrants were 25–30 points below the scores of other foreign-born respondents and 89–92 points below the scores of native-born respondents. The influx of immigrants from 1985 through 1992 is reflected in the increase in the proportion of the population that is Hispanic.

These findings on the apparent decline in literacy should be interpreted cautiously for at least two reasons. First, the data provide only two observation points. Further observation points are necessary to establish a trend in literacy. Second, the procedural differences in the application of the NALS and YALS may make comparisons difficult. NCES and the Educational Testing Service are currently conducting a reevaluation of the NALS and YALS data.

Preliminary estimates suggest that after controlling for procedural differences between the NALS and YALS, the estimated decline in literacy may be smaller than originally indicated and possibly insignificant.

CHAPTER 5

INTERNATIONAL TRENDS IN EDUCATION

According to the findings presented in chapter 2, worker productivity in other industrialized countries is increasing at a faster rate than in the United States, and these countries are therefore slowly catching up to the United States.

Furthermore, although factors other than education (for example, physical capital) are important to economic productivity, education appears to play a substantial role in determining productivity. In fact, throughout this report, we have shown a link between economic productivity and various measures of education, including attainment, achievement, literacy, and training. The next step in our examination of education and economic productivity is to explore how the United States compares with other countries in these specific measures of education.

This chapter presents four sets of indicators to compare education and skill training in the United States and other industrialized countries: measures of educational attainment in industrialized countries, the international distribution of educational achievement, adult literacy in industrialized countries, and training rates in industrialized countries.

Educational Attainment in Industrialized Countries

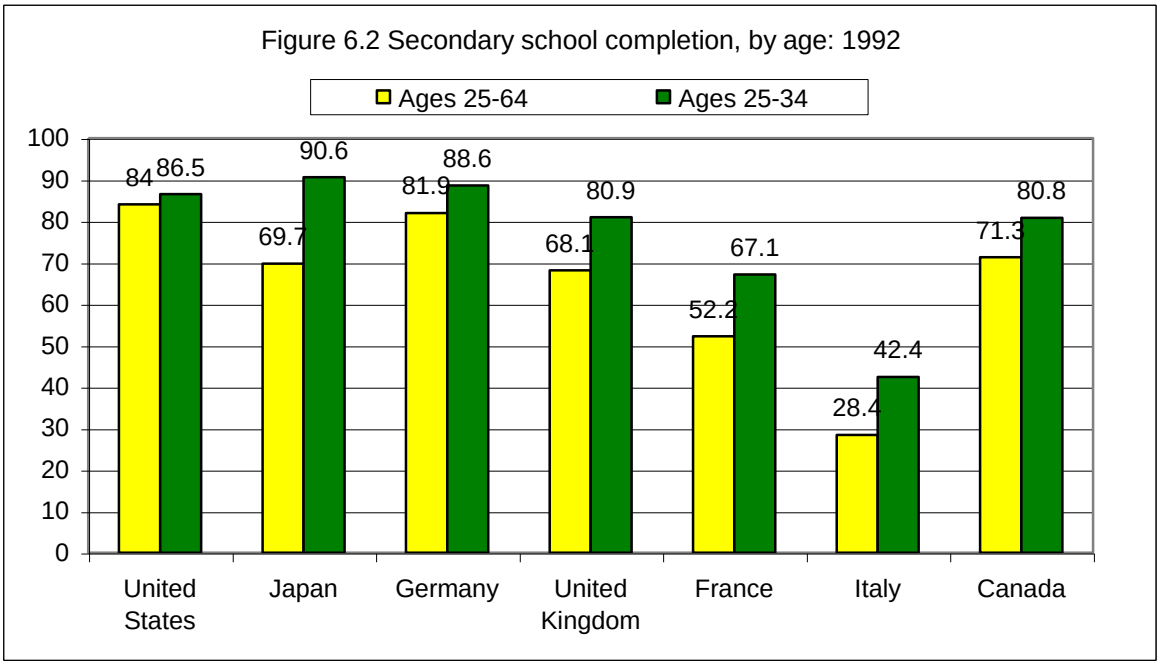
Evidence on productivity convergence brings to light two considerations central to an examination of the level of education in and between nations. First, it is necessary for countries to have a level of education that is roughly comparable to that in the leader country in order to benefit from the leader country's technical knowledge (see discussion in chapter 2). Second, analysis of productivity in a broad sample of countries suggests that a high rate of secondary education is especially important in enabling countries to be among the world leaders in worker productivity. A large proportion of the population in

countries with productivity converging on that of the United States has completed or is enrolled in secondary education (Barro 1991; Baumol, Blackman, and Wolff 1989). There is less evidence about the importance of college education for determining relative productivity among countries. However, substantial evidence of the connection between college education and productivity at the individual level (chapter 3) suggests that rates of college education may also be important determinants of cross-country differences in worker productivity. These considerations raise the issue of how levels of attainment among the industrialized countries known as the G–7 (United States, Japan, Germany, United Kingdom, France, Italy, and Canada) compare to one another.

Although the percentage of the adult population ages 25–64 years that has completed secondary school varies across countries, the evidence shows that nations are closing the gap with the United States at the secondary level. More than 80 percent of the adult population ages 25–64 years in both Germany and the United States have finished the equivalent of a high school education (figure 6.2). The trend among the youngest workers, however, is for the other countries to converge on—and in some cases overtake—the leader's level in secondary attainment.

Japan, Germany, the United States, the United Kingdom, and Canada all educate between 80 and 90 percent of their young adults ages 25–34 years through high school completion. Furthermore, in countries other than the United States, the attainment gap between the oldest and youngest age groups

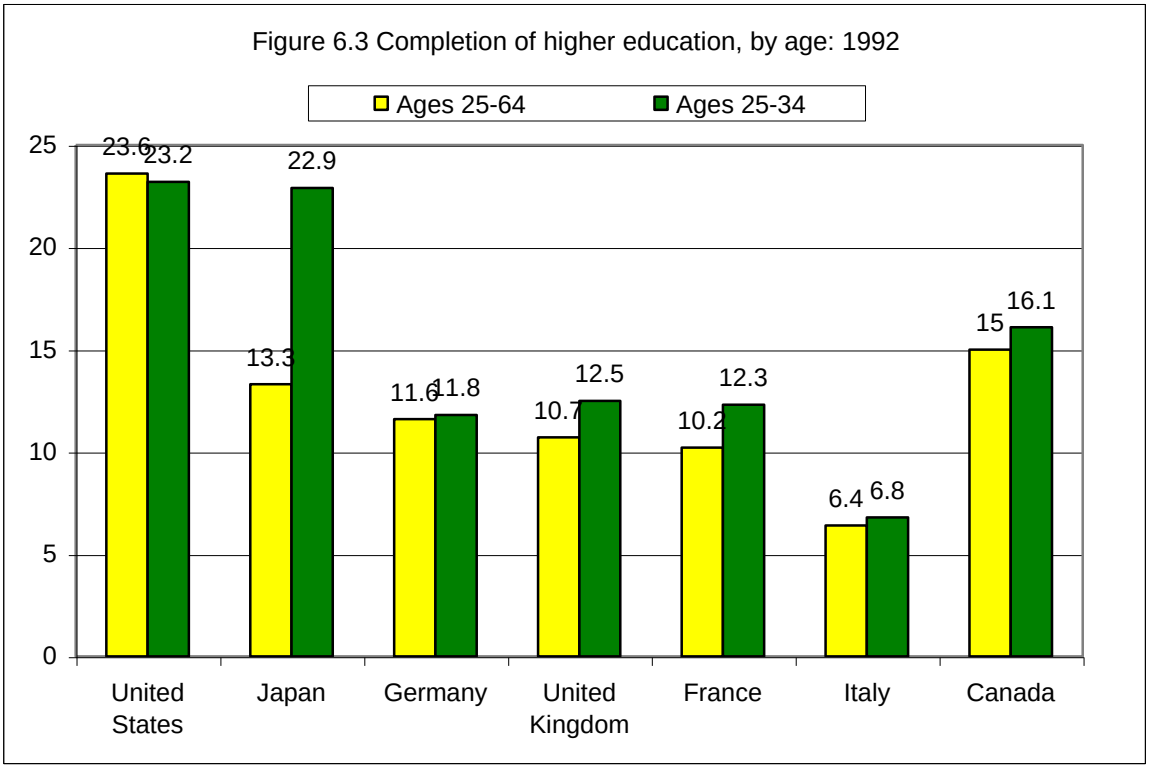
is larger than in the United States, indicating that attainment is increasing more rapidly in the other countries. This is due, in part, to the fact that older workers in most of these countries have a much lower level of attainment than older workers in the United States. The convergence of secondary education completion rates in G–7 countries are likely to be one of the factors contributing to the convergence of worker productivity in these countries.



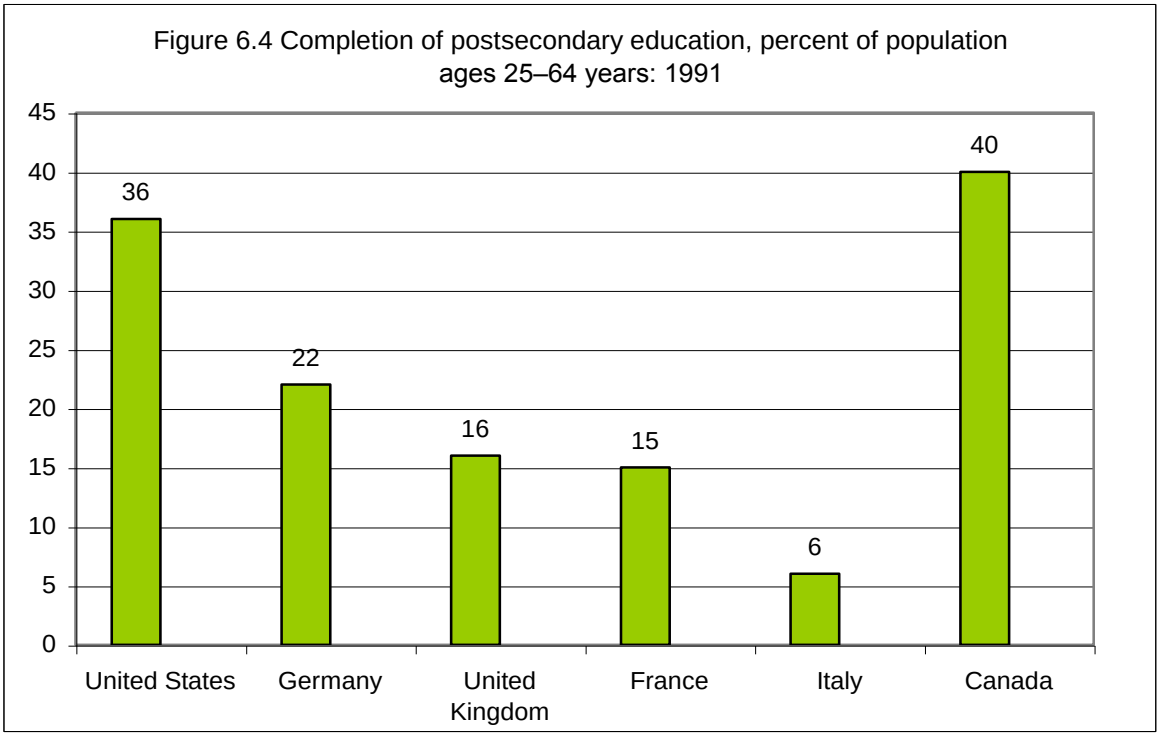
NOTE: In the United States, completing secondary school is defined as graduating from high school or earning a GED.
SOURCE: U.S. Department of Education, National Center for Education Statistics, The Condition of Education, 1995; Organization for Economic Cooperation and Development, Indicators of Education's Systems, Digest of International Education Statistics, forthcoming.

Most G–7 countries still lag well behind the United States in postsecondary attainment. The United States has by far the highest proportion of the population ages 25–64 years that has completed a college education, as shown

in figure 6.3. But the rate of college completion among young adults in the United States has risen very slowly over the past 20 years, and according to the data in figure 6.3, the rate of college completion among adult ages 25–34 years is slightly lower than for adult ages 25–64 years. The rate of college completion for the youngest cohort of adults in most of the other countries is only slightly higher than for all adult ages 25–64 years. The one exception is Japan, in which the rate of college completion among the adult population is rapidly increasing. By 1992, approximately 23 percent of Japanese adults ages 25–34 years had completed a college-level education, the same as U.S. adults in the same age range. These findings suggest that, to date, G–7 countries other than Japan have placed less emphasis on increasing the share of their population with this high level of education. This finding generally holds true even when college completions are combined with completions in non-university postsecondary programs (figure 6.4).



NOTE:
In the United States, completing higher education is defined as earning a bachelor's degree.
SOURCE: U.S. Department of Education, National Center for Education Statistics, The Condition of Education, 1995; Organization for Economic Cooperation and Development, Indicators of Education's Systems, Digest of International Education Statistics, forthcoming.



NOTE: Postsecondary education includes university and non-university education above the secondary level. Completion of postsecondary education is defined according to the International Standard Classification of Education, which is used as a means of compiling internationally comparable statistics on education. Postsecondary completion includes education at the postsecondary level which leads to an award or degree. The classification is described in detail in Annex 4 of Organization for Economic Cooperation and Development (1993). In the United States, completion of postsecondary education refers to high school graduates who complete programs at a technical or vocational institution, a two-year college, or a four-year college or university.
SOURCE: Organization for Economic Cooperation and Development, Education at a Glance, 1993.

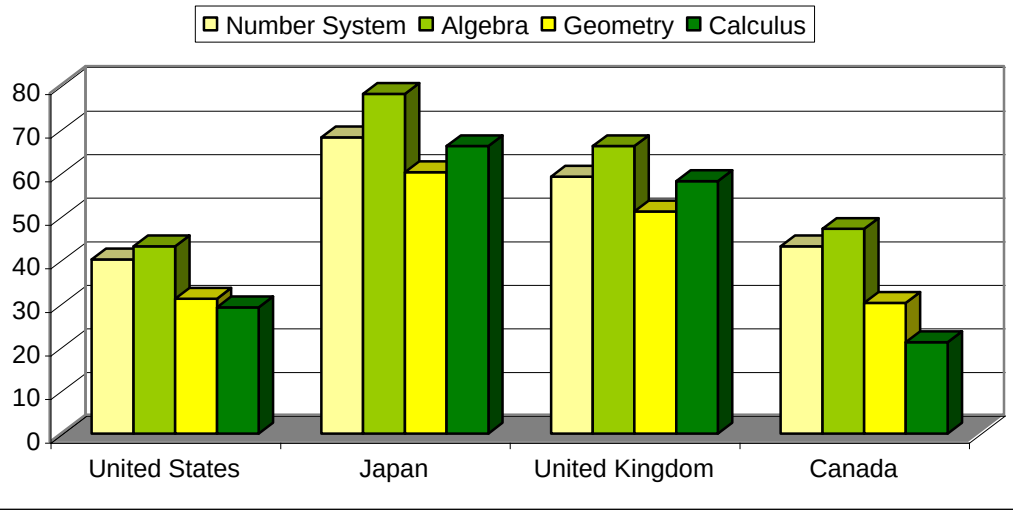
Educational Achievement in Industrialized Countries

Education attainment levels are merely an indication of the mix of skills and knowledge shared by populations in different countries. Consequently, many observers question whether the increase in the level of attainment in the United States over the past 30 to 40 years represents an increase in people with the skills and knowledge necessary to sustain economic productivity. Unfortunately, addressing this concern is difficult for a number of reasons. Among the most important is the dual problem of determining the kinds of skills and knowledge that lead a country to higher levels of productivity, and

obtaining agreement on the mix of skills that should be measured across similar populations in different countries. Furthermore, because of differences in the selective educational tracks in different nations, identifying comparable groups of students is also a challenge. This issue has created a tendency in international assessments of student performance to concentrate on younger populations that have not been subjected to selective educational practices. But skills at these younger ages are far from the point at which they would influence productivity in the workplace. In addition, most international studies compare students at a single point in time, and when the assessments are repeated over time, they tend to include a changing cast of countries. Consequently, it is problematic to make comparisons that indicate whether U.S. students have changed their performance relative to students in other countries over time. Despite these limitations, it is clear from the existing data that the United States is typically not the leader nation in average student achievement among G–7 countries in mathematics and science. In the early to mid-1980s, the average mathematics and science scores of U.S. students in their last year of secondary school were generally lower than those of students at a similar level of education in other G–7 countries (figures 6.5 and 6.6). The mean scores of students in Japan and the United Kingdom were consistently higher than those of U.S. students in the various mathematics and science areas presented in the figures. International reading achievement data for 14-year-old students, on the other hand, show that the mean scores of students in the United States are closer to the top of the international distribution. Among

the five G–7 countries presented in figure 6.3, the United States consistently trails only France in the three measures of reading achievement.[28]

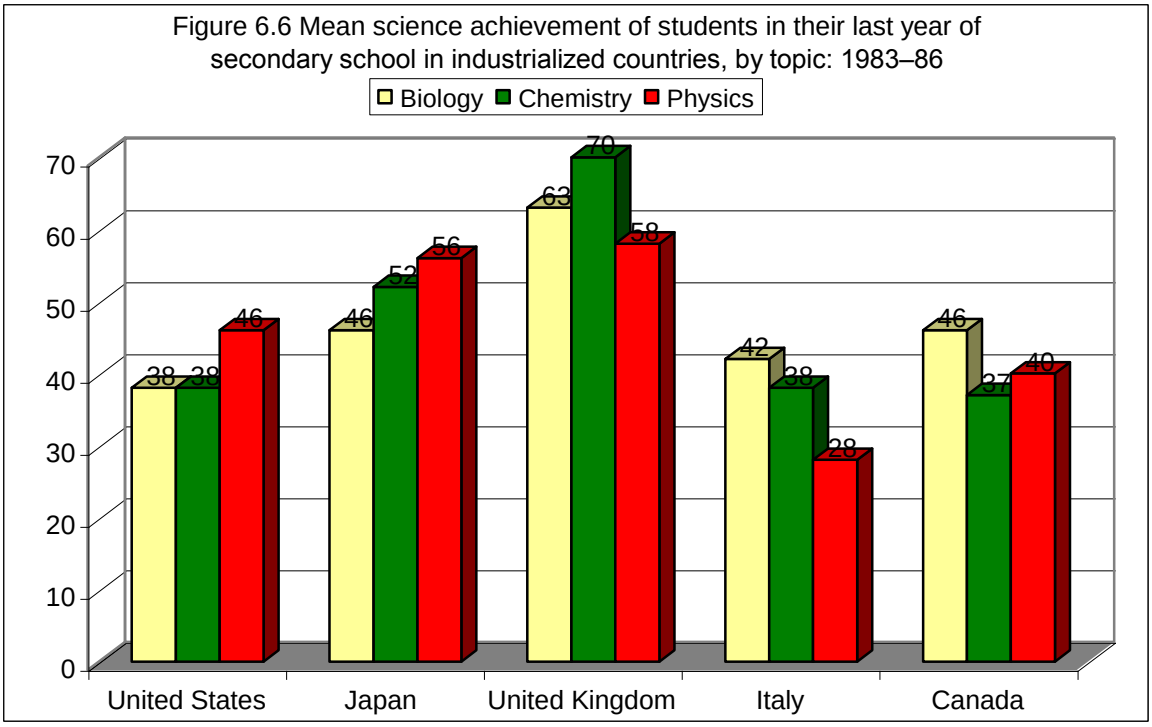
Figure 6.5 Mean mathematics achievement of students in their last year of secondary school in industrialized countries, by topic: 1980–82



SOURCE: U.S. Department of Education, National Center for Education Statistics, International Mathematics and Science Assessments: What Have We Learned?, 1992, based on data from the Second International Mathematics Study (SIMS).

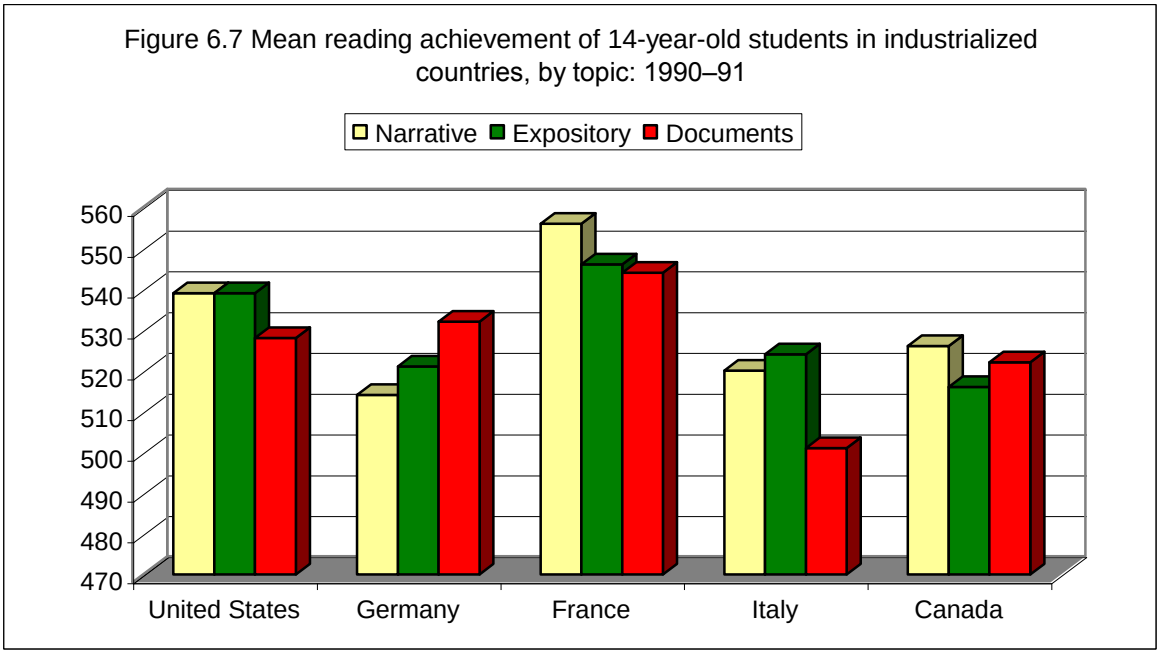
[28] The changing cast of countries included in figures 8.4 through 8.6 reflects the inconsistency with which nations participate in the various studies of international achievement.

Figure 6.6 Mean science achievement of students in their last year of secondary school in industrialized countries, by topic: 1983–86



SOURCE: U.S. Department of Education, National Center for Education Statistics, International Mathematics and Science Assessments: What Have We Learned?,1992, based on data from the Second International Science Study (SISS).

Figure 6.7 Mean reading achievement of 14-year-old students in industrialized countries, by topic: 1990–91



SOURCE: Warwick B. Elley, How in the World Do Students Read?, 1992, based on data from the International Association for the Evaluation of Educational Achievement Reading Literacy Study.

Data from the most recent international studies confirm the finding that the average mathematics and science performance of U.S. students is below that of students from other countries. On the mathematics test, the mean U.S. scores for both 9-year-olds and 13-year-olds were below those of most other countries. No country scored below the United States for 9-year-olds, and only Jordan scored below the United States for 13-year-olds. On the science test, U.S. 9-year-olds scored above their counterparts in two other countries and similar to their counterparts in the rest of the countries. But U.S. 13-year-olds trailed their counterparts in many of the other countries and surpassed only the 13-year-olds in Jordan.

The relative success of U.S. students on reading tests is also reflected in table 8.1. U.S. 9-year-olds scored higher than their counterparts in 20 of the other 22 countries included in the study. U.S. 14-year-olds also scored high in reading, equaling or surpassing their counterparts in most of the other countries. Only 14-year-olds in Finland had higher reading scores than 14-year-olds in the United States.

CONCLUSION

This research clearly demonstrate that the US educational system has a potentially effect in the economy growth. Research has found that higher education is associated with substantial earnings premiums in the job market. The rate of return on education, however, varies with such factors as family background.

Students of ability from economically disadvantaged backgrounds might decline to invest in higher education because of financial risk. The state should give such students grants and tuition subsidies.

During the next century, higher education will become increasingly important for landing high-paying jobs. But for the foreseeable future, many jobs will require no formal schooling beyond high school.

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CURRICULUM VITAE

Mr. Hector Cruz Echevarría
Address: 609 Tito Castro Ave. Suite #102
PMB- 362 Ponce, P.R. 00716
Phones: (787) 585-1000 (787) 585-1018
hcommunication@yahoo.com
pcrmarketing@hotmail.com

Career Profile:

Over ten (12) years experience working in the Marketing industry with strong interpersonal skills.

Strong Inter-Personal skills:

- Structured/ Analytical thinking,
- Systematic and informed (data based) problem solving

- Strong communication skills
- Leadership and ownership.

Academic Background

10/2004- in progress – North central University – On line Campus
Doctor of Business Administration (DBA)
Major: International Business

05/2001 to 07/2003 - University of Phoenix - Puerto Rico Campus
Master in Business Administration (MBA)
Major: Marketing

08/1997 to 12/2000 - Pontifical Catholic University of Puerto Rico - Ponce Campus
Bachelor of Science (BS)
Major: Liberal Studies

Job Experience

07/2003 PCR Marketing Consultants
CEO & Marketing Consultant

PCR Marketing Consultants a full service marketing and small business development provider. We work with our clients to define, clarify, and achieve their marketing and communications goals. At PCR Marketing Consultants, we understand that each client is unique therefore we provide customized solutions based on their goals. This approach has helped us to develop our reputation as a company that consistently exceeds our customer's expectations. Our current and former clients include small, medium, and industrial businesses. All of our clients benefit from our knowledge of effective marketing and strategies techniques as well as our commitment to prompt, exceptional service.

03/2005 to 12/2005 Centennial of PR
Business Account Executive

As a business account executive I was in charge to identify corporate accounts and individual prospective to bring them to our company. In order to select and identify my target market I have to prepare an effective marketing plan. I base my target market by identifying and analyzing the segment in a product-market, deciding which segment to target and designing and implementing a positioning strategy for each market.

10/1994 to 11/2003 Cingular Wireless
Business Account Executive

As a business account executive, also I was in charge to identify corporate accounts and individual prospective to bring them to our company. This includes Identification, research and education of potential new clients through to close of sale and Maintenance of good client relationships in order to keep the 100% satisfied.

Extracurricular Activities

- Member of the American Marketing Association (AMA)
- Member of the Phi-Alpha-Delta Law Fraternity, International
- Honorary Award Recognition by The National Dean's List (1998)

Skills:

Bilingual: Spanish & English

Computer Literacy:

Microsoft Publisher®, Microsoft FrontPage®, Microsoft Visio®, Microsoft Excel®, Microsoft PowerPoint®, Microsoft Word®, Internet Explorer, Microsoft Access® & Microsoft Outlook®.